2012 KDI Journal of Economic Policy Conference

Shared Growth and Sustainable Development

Hosted by
K D I
KAEA

ⓒ December 2012
Korea Development Institute
47 Hoegiro, Dongdaemun-gu
Seoul 130-740, Korea

ISBN 978-89-8063-688-4(93320)

Contents

CHAPTER 1
Persistent Racial Inequality in the US
(*Glenn C. Loury*) 1
1. Introduction and Motivation 2
2. Segregation, Spillovers and Persistent Inequality: Theory 10
3. The Importance of Social Affiliation: Evidence 14
4. Stigma versus Discrimination: More Theory 16
5. Causal Misattribution and Its Consequences 18
6. Boys and Girls, Blacks and Whites 20
7. Campaigning for Respect (and Being Judged for It) 23
8. The Culture Argument: 'Acting White' or Blacks *and* Whites Acting? 25
9. Conclusion: What Has President Obama's Election to Do with This? 28

References 34

CHAPTER 2
사회적 성과 보상(*심상달*) 43
1. 서 론 43
2. 소셜임팩트본드 47
3. 우리나라 소셜임팩트본드 도입 가능성 검토 53
4. 정부의 역할: 세제혜택, 지원, 서비스의 개방 58
5. 결 론 63

참고문헌 64

CHAPTER 3
A Trade Triangle among North Korea, South Korea, and China (*Semoon Chang*) 65
1. Introduction 66
2. Trade Data among North Korea, South Korea and China 67
3. Trends in Trade by Level of Technology 72
4. KDI Study on the Quality of North Korea's Trade Data 77
5. Importance of Technology-Based Exports 78
6. Crystal-Balling the Trade Triangle 80
7. Conclusion 86

References 88

CHAPTER 4
Is Income Growth in the United States Pro-Poor? A State Level Analysis (*Edinaldo Tebald, Jongsung Kim*) 90
1. Introduction 91
2. What is Pro-poor Growth? 93
3. Data 95
4. Descriptive Analysis 96
5. The Sources of Poverty Change 106
6. The Determinants of the Growth Component 111
7. Results 112
8. Conclusion 115

References 117

CHAPTER 5
Support System over the Lifecycle: A Cross-Country Comparison (*Sang-Hyop Lee*) 119
1. Introduction 120
2. Consumption 121
3. Economic Resources to Fund Consumption 131
4. Public Support and Sustainability 139

5. Implication for Korea's Sustained Growth 142
6. Conclusion 144

References 146

CHAPTER 6
Joblessness among the Highly Educated Youth:
The Causes of and Policy Implications (*Yong-seong Kim*) 148
1. Introduction 149
2. Literature Review 150
3. Job Search Theory 151
4. Empirical Results 153
5. Conclusion 161

References 163

CHAPTER 7
'연줄'인가, '연결'인가? 인적 네트워크의 노동시장
효과 분석(*김영철*) 165
1. 서 론 166
2. 분석자료 170
3. 분석 변수 173
4. 일자리 이동의 영향요인 179
5. 분석 방법 186
6. Propensity Score의 추정 193
7. 분석 결과 197
8. 분석의 확장: 구직 네트워크의 가치 추정 214
9. 결언 및 시사점 217

참고문헌 220
부 록 222

CHAPTER 8
노인의료비 지출 분석(*정완교*) 225
1. 서 론 227

2. 건강보험과 의료급여 노인진료비 228
3. 노인의료비 분석 233
4. 결 론 245

참고문헌 247

CHAPTER 9
The Role of Foreign Banks in Monetary Policy Transmission: Evidence from Asia during the Crisis of 2008-09
(*Bang Nam Jeon*) 250
1. Introduction 251
2. The Model, Data and Econometric Methodology 257
3. Empirical Results 263
4. Robustness Tests 284
5. Conclusion 288

References 291

CHAPTER 10
금융위기의 고용파급효과에 대한 실증분석
(*신석하, 조동철*) 298
제1절 서 론 299
제2절 성장률과 고용조정 300
제3절 수요 구성 306
제4절 기대 및 금융경색 요인과 고용 309
제5절 민간부문과 공공부문의 고용 312
제6절 OECD 국가들과의 비교 315
제7절 요약 및 시사점 319

참고문헌 321

<부 록 1> 323
<부 록 2> 324

CHAPTER 11
Asymmetric Loss in the Greenbook and the Survey of Professional Forecasters (*Yiyao Wang, Tae-Hwy Lee*) 325
1. Introduction 326
2. Data 330
3. The EKT Method 333
4. Empirical Analysis 338
5. Conclusions 346

References 350

CHAPTER 12
Uncertainty, Fear, and Liquidity (*Kee H. Chung, Chairat Chuwonganant*) 352
1. Introduction 353
2. Data Sources and Variable Description 357
3. Regression Results for the Effect of VIX on Various Liquidity Measures 362
4. Market Structure and the Uncertainty Elasticity of Liquidity 379
5. Summary and Concluding Remarks 394

References 397

List of Tables

CHAPTER 2

〈표 1〉 분석자료에 대한 기술통계량 55
〈표 2〉 OLS 및 도구변수법 추정 결과: 종속변수는 세 과목 평균 점수 57
〈표 3〉 OLS 및 도구변수법 추정 결과: 종속변수는 개별 과목 점수 60
〈표 4〉 사교육비 효과에 대한 구간추정법의 추정 결과 63
〈표 5〉 처치수준별 성적의 평균, $\hat{E}[y(t)]$ 64

CHAPTER 4

Table 1 Poverty Rate - Headcount, U.S. States, 1992-2011 98
Table 2 Poverty Gap, U.S. States, 1992-2011 100
Table 3 Poverty Gap Squared, U.S. States, 1992-2011 101
Table 4 Correlations of Poverty Change and Mean Income Growth 105
Table 5 Growth vs. Distribution (ΔG vs. ΔD), 1992-2011 109
Table 6 Average Growth and Sensitivity to Average Growth component, 1992-2011 110
Table 7 List of Variables, Definition and Sources 112
Table 8 Regression Output for the Determinants of the Growth Component Dependent Variable: Growth Component of Poverty Headcount 114

CHAPTER 5

Table 1 Per Capita Consumption by Children and the Elderly 125
Table 2 Ratio of Labor Income to per Capita Consumption of Children and Elderly 134
Table 3 Fiscal Support Ratios (%): 1950–2050 139

CHAPTER 6

Table 1 Summary Statistics of the GOMS Data 154
Table 2 Summary Statistics of the KEEP Data 155
Table 3 Mean Values of Expected, Reservation Wages and Implicit Income 158
Table 4 Calculated Elasticities of Interests 159
Table 5 Comparison of Results between This Study and Others 160

CHAPTER 7

<표 1> 일자리 소유자들의 연간 일자리 이동 현황 171
〈표 2〉 개인 및 일자리 특성변수별 기초통계량 175
〈표 3〉 이직 및 성과지표별 기초통계량 178
〈표 4A〉일자리 이동 영향요인 분석(I) 182
〈표 4B〉일자리 이동 영향요인 분석(II) 184
〈표 5〉 Propensity Score의 추정방정식 194
〈표 6〉 Balancing Property 검증을 위한 구간 설정 196
〈표 7〉 주요 성과지표의 연간 변화 단순비교 198
〈표 8〉 일자리 진입방식별 이직의 성격 분류 199
〈표 9〉 이직을 통한 직장만족도 변화 201
〈표 10〉 이직을 통한 직무만족도의 변화 202
〈표 11〉 이직을 통한 일자리만족도의 변화 203
〈표 12〉 이직을 통한 기술적합도의 변화 208
〈표 13〉 이직을 통한 교육적합도의 변화 209
〈표 14〉 이직을 통한 교육기술복합지수의 변화 210
〈표 15〉 이직을 통한 임금수준의 변화 213

〈부표 1〉 경력직 취업자(1802명)의 일자리 진입방식별 구직방법의 분포 222
〈부표 2-A〉 Propensity Score 각 구간(Block)에 대한 Mean-Difference T-test 결과(I) 223
〈부표 2-B〉 Propensity Score 각 구간(Block)에 대한 Mean-Difference T-test 결과(II) 224

CHAPTER 8

〈표 1〉 건강보험 65세 이상 인구의 진료비 229
〈표 2〉 의료급여 65세 이상 인구의 진료비 232
〈표 3〉 요약통계 235
〈표 4〉 연령과 의료비 지출 236
〈표 5〉 사망 전 시기(time until death)와 의료비 지출(Tobit model) 239
〈표 6〉 노인가구 내 사망 전 시기(time until death)와 의료비 지출(Tobit model) 241
〈표 7〉 사망 전 시기의 연령과 의료비 지출(Tobit model) 243

CHAPTER 9

Table 1 The Effect of Changes in Monetary Policy on Loan Growth of Domestic and Foreign Banks in Asia, 2000-2009 266

Table 2 The Effect of Changes in Monetary Policy on Loan Interest Rates of Domestic and Foreign Banks in Asia, 2000-2009 269

Table 3 The Effect of Changes in Monetary Policy on Loan Growth and Loan Interest Rates of Domestic and Foreign Banks in Asia, 2000-2009: Expansionary vs. Contractionary Monetary Policy 272

Table 3 a. Monetary Policy Phases in Asian Countries, 2000-2009 273

Table 4 The Effect of Changes in Monetary Policy on Loan Growth and Loan Interest Rates of Domestic and Foreign Banks in Asia, 2000-2009: Foreign Bank Subsidiaries whose Parent Banks are More Adversely Affected vs.Subsidiaries whose Parent Banks Are Less Affected 275

Table 5 The Effect of Changes in Monetary Policy on Loan Growth and Loan Interest Rates of Domestic and Foreign Banks in Asia, 2000-2009: Foreign Bank Subsidiaries whose Parent Banks are More Dependent on Wholesale Funding vs. Subsidiaries whose Parent Banks Are Less Dependent on Wholesale Funding 278

Table 6 The Effect of Changes in Monetary Policy on Loan Growth and Loan Interest Rates of Domestic and Foreign Banks in Asia, 2000-2009: Global vs. Regional Foreign Banks 280

Table 7 The Effect of Changes in Monetary Policy on Loan Growth and Loan Interest Rates of Domestic and Foreign Banks in Asia, 2000-2009: De Novo vs. M&A Foreign Bank Subsidiaries 283

Table 8 Robustness Tests 286

Appendix 1 Foreign Bank Penetration Levels in Asia (2000-2009) 294

Appendix 2 a. List of Multinational Banks which Operate Foreign Subsidiaries in Asia, 2000-2009 295

Appendix 2 b. Distribution of the Home Country of Foreign Banks Subsidiaries During the Period 2000-2009 297

Appendix 3 The Summary Descriptive Statistics: Domestic vs. Foreign Banks in Asia, 2000-2009 297

CHAPTER 10

〈표 1〉 고용증가율 회귀분석 결과 311
〈표 2〉 실업률갭 회귀분석 결과 312
〈표 3〉 경제위기 기간 정부 일자리 대책 월평균 수혜자 313
〈표 4〉 금융위기 기간 고용변화 회귀분석 결과: OECD 국가, 2007~09 318

〈부표 1〉 단위근 검정 결과 323
〈부표 2〉 고용–GDP 공적분 검정 결과 323

CHAPTER 12

Table 1 Descriptive Statistics 360
Table 2 The Effect of VIX on Various Liquidity Measures 367
Table 3 Correlation Matrix of the Estimated Coefficients in Regression Models (6) and (7) 373
Table 4 Effects of Stock Attributes on the Uncertainty Elasticity of Liquidity 376
Table 5 Effects of the New Order Handling Rules (OHR) on the Uncertainty Elasticity of Liquidity (UEL) 381
Table 6 Effects of the Tick-size Reduction in 1997 on the Uuncertainty Elasticity of Liquidity (UEL) 384
Table 7 Effects of Decimalization in 2001 on the Uncertainty Elasticity of Liquidity (UEL) 387
Table 8 Effects of the Amendment of NASDAQ Rule 4613 (c) on the Uncertainty Elasticity of Liquidity (UEL) 391
Table 9 Regression Results for the Effects of the Amendment of NASDAQ Rule 4613 (c) on the Uncertainty Elasticity of Liquidity (UEL) 393

List of Figures

CHAPTER 1

Figure 1 Percent of Native-Born, Non-Hispanic Men and Women Aged 25 to 34 Reporting a Four-Year College Education 3
Figure 2 Reading Scores (Neational Assessment of Educational Progress) 3
Figure 3 Median Wage and Salary Earnings for Native-Born Non-Hispanics Reporting Earnings 4
Figure 4 Percent of Native-Born, Non-Hispanic Men and Women Aged 25 to 59 Employed: 1968 to 2007 4
Figure 5 Median Income of Households Headed by Native-Born Non-Hispanics (shown in constant 2007 dollars) 5
Figure 6 Percent of Native-Born Non-Hispanics Below the Poverty Line: 1968 to 2007 5
Figure 7 HOME OWNERSHIP Percent of Native-Born Non-Hispanic Households Owning their Residence 6
Figure 8 Median Net Worth by Race 6
Figure 9 Incarceration in Western Europe and the US, 2001 7
Figure 10 Us Imprisonment Rate, 1925-2006 7
Figure 11 Incarceration by Race and Education 8
Figure 12 Men's Risk of Imprisonment by 30-34 9
Figure 13 Children with Incarcerated Parents, 1980-2008 9
Figure 14 Effects of Segregation and Population Shares on Persistent Inequality 11
Figure 15 THE REPUTATION GAME 23
Figure 16 Popularity and Grades (1994-1995) 26

CHAPTER 2

[그림 1] 소셜임팩트본드의 성과 보상구조 48
[그림 2] Peterborough 소셜임팩트본드의 구조 49

CHAPTER 3

Figure 1 Share of Trade with China: North Korea 71
Figure 2 Share of Trade with China: South Korea 72
Figure 3 NK Exports to China by Tech Level ($million) 74

Figure 4 NK Imports from China by Tech Level ($millions) 75
Figure 5 SK Exports to China by Tech Level ($million) 76
Figure 6 SK Imports from China by Tech Level ($millions) 76

CHAPTER 4

Figure 1 Ratio of Aver. Income of the Richest 10% to Aver. Income of the Poorest 20%, 1992 and 2011 104
Figure 2 Income Growth and Poverty Change, U.S. States 106
Figure 3 Decomposition of Changes in Distribution and Poverty into Growth and Distributional Effects 107

CHAPTER 5

Figure 1 Age Consumption Profiles by Component (Korea, 2000 and Sweden, 2003) 123
Figure 2 Per Capita Consumption for Children (ages 0-19) vs. for the Elderly (ages 65 and older) 124
Figure 3 Per Capita Private Consumption vs. Public Consumption for Children and the Elderly 127
Figure 4 Per Capita Private Consumption vs. Public Consumption for Children and the Elderly 129
Figure 5 Importance of per Capita Healthcare Consumption for Ages 65 and Older (as % all per capita consumption age 65+) 131
Figure 6 Per Capita Net Flows by Age in Korea in 2000 132
Figure 7 Private Transfers as a Proportion of the Lifecycle Deficit for Ages 0–19 135
Figure 8 Support Systems for Population Aged 65 and Older 137
Figure 9 Projected and Actual Publicly Funded Health Expenditures for China, Japan, and Korea from 1995 to 2008 141

CHAPTER 6

Figure 1 Range of Acceptable Wages 157

CHAPTER 7

[그림 1] 통합샘플(Pooled Dataset)의 구성도 171
[그림 2] 각 집단별 Propensity Score 분포도 197
[그림 3] 연령별 이직률(26세부터 59세까지) 215

CHAPTER 9

Figure 1 Average Loan Growth Rates of Domestic and Foreign Banks (year-on-year, in %), 2000-2009 252
Figure 2 Foreign Banks' Cross-border Lending to the Asian Economies (in $billion), 2000-2009 253

CHAPTER 10

[그림 1] 경제위기와 고용 취업자 증가율 실업률 299
[그림 2] 성장률과 고용증가율, 실업률 증감 302
[그림 3] 실제 총고용의 장기균형 수준으로부터의 괴리 304
[그림 4] 고용증가율 예측 오차: 성장률 305
[그림 5] 실업률갭 예측 오차: 성장률 306
[그림 6] 경제위기 기간 소비비중의 변화 307
[그림 7] 고용증가율 예측오차: 소비비중, 어음부도율과 CSI 310
[그림 8] 실업률갭 예측오차: 소비비중, 어음부도율과 CSI 311
[그림 9] 경제위기와 고용: 민간부문 vs. 공공부문 314
[그림 10] OECD 국가의 고용증가율 변화 316
[그림 11] OECD 국가의 실업률 변화 316

CHAPTER 11

Figure 1 Output Growth Forecast (h=1) 339
Figure 2 Output Growth Forecast (h = 4) 340
Figure 3 Inflation Forecast (h = 1) 341
Figure 4 Inflation Forecast (h = 4) 342

CHAPTER 12

Figure 1 Quoted Spread, Price Impact, Depth, Market Quality Index, and VIX for NYSE Stocks from January 2007 to December 2009 361

CHAPTER 1

Persistent Racial Inequality in the US

by
*Glenn C. Loury**
(Merton P. Stoltz Professor of the Social Sciences, Brown University)

Abstract

"I have a dream that one day this nation will rise up and live out the true meaning of its creed: "We hold these truths to be self-evident: that all men are created equal." I have a dream that one day on the red hills of Georgia the sons of former slaves and the sons of former slave owners will be able to sit down together at a table of brotherhood." (Dr. Martin Luther King, Jr., Washington, DC, 1963)

(A fist bump across generations! The 'fist bump' is a popular greeting among young African-Americans.)

* Address at KDI Conference on Inequality and Sustainable Development Seoul, South Korea, June 2012.

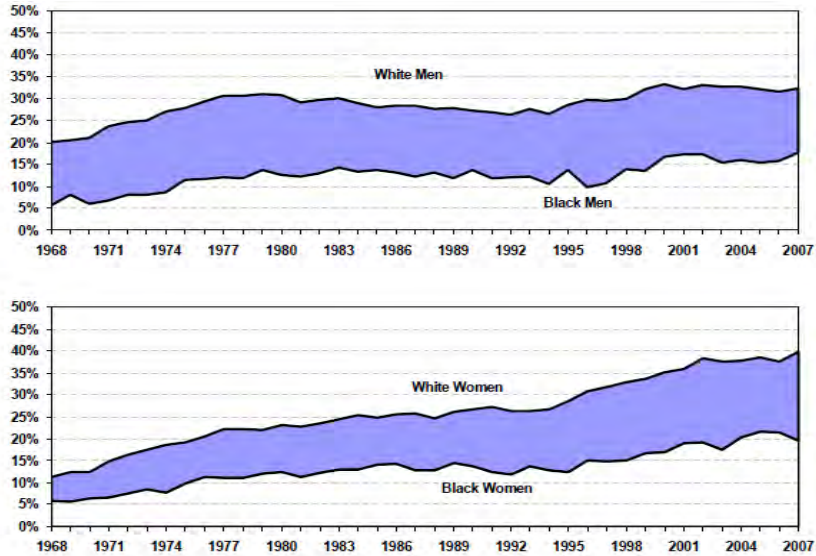
1. Introduction and Motivation:

This essay reviews and analyzes the persistent social and economic disadvantage of blacks in the United States. I begin by observing a few salient social facts about racial disparities in the US today: African American disadvantage is a stubbornly persistent fact in contemporary US society. No trend toward parity is to be observed in the data. And so, the "dream" of equality famously associated with Dr. Martin Luther King, Jr. remains unrealized. Moreover, inequality between racial groups in involvement with the criminal justice system is the starkest area of social disparity. And, fifth, all of this is true despite the fact that the country has elected its first black president.

By breaking through the skin-color barrier in American politics, does the election of President Barack Obama's signal a fundamental shift in the social position of African Americans? This question is being asked widely both inside the U.S. and without. Some have endowed the ascendancy of President Obama with great significance, based on the fact that a black man now occupies the nation's highest office. But, whatever the merits of this president's successful political career, there is reason to be skeptical that we have, in fact, entered a new era. More pointedly there is reason to doubt that President Obama's ascendancy constitutes a fulfillment of the Rev. Dr. Martin Luther King's fabled 'dream.'

To see this, consider some recent statistics on trends in inequality between racial groups in the U.S. First, in the area of educational attainment, note that over a forty year period at the end of the 20th century the gap between four-year college completion rates for black and white Americans has remained substantial for both men and women, and has widened considerably for women.

Figure 1 Percent of Native-Born, Non-Hispanic Men and Women Aged 25 to 34 Reporting a Four-Year College Education



Also, differences between racial groups in their youngsters' performances on reading and mathematics tests administered to primary and secondary school students have also persisted:

Figure 2 Reading Scores (Neational Assessment of Educational Progress)

Likewise, wage and employment rates of adult black males lag considerably behind those for whites:

Figure 3 Median Wage and Salary Earnings for Native-Born Non-Hispanics Reporting Earnings

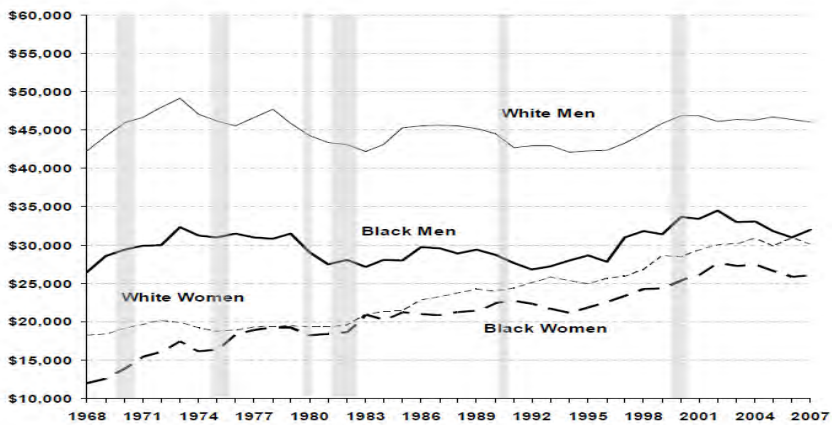
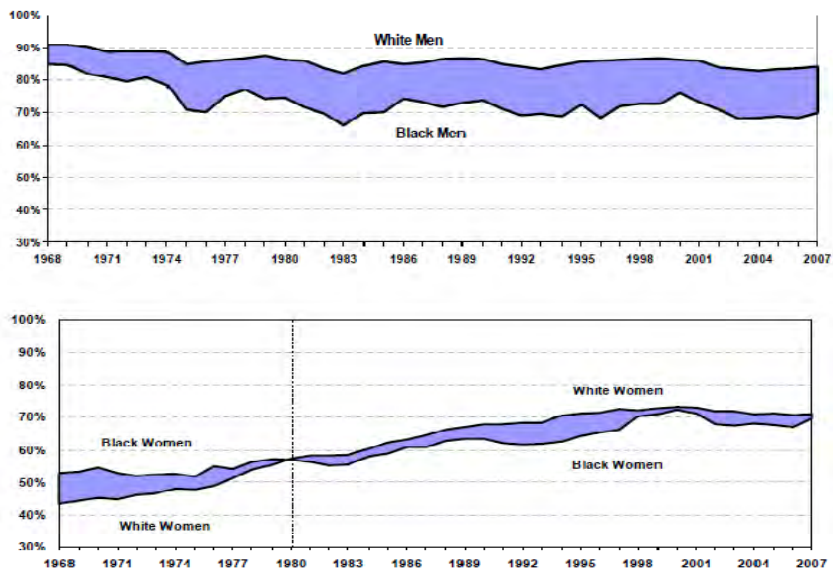


Figure 4 Percent of Native-Born, Non-Hispanic Men and Women Aged 25 to 59 Employed: 1968 to 2007



Family incomes are lower for black than white households, and poverty rates are higher, and this disparity shows no tendency to shrink in the four decades since the late 1960s. There is also substantial inequality of asset holdings between racial groups – based on home ownership rates and household net worth – that has persisted over a long period and shows no tendency to disappear:

Figure 5 Median Income of Households Headed by Native-Born Non-Hispanics (shown in constant 2007 dollars)

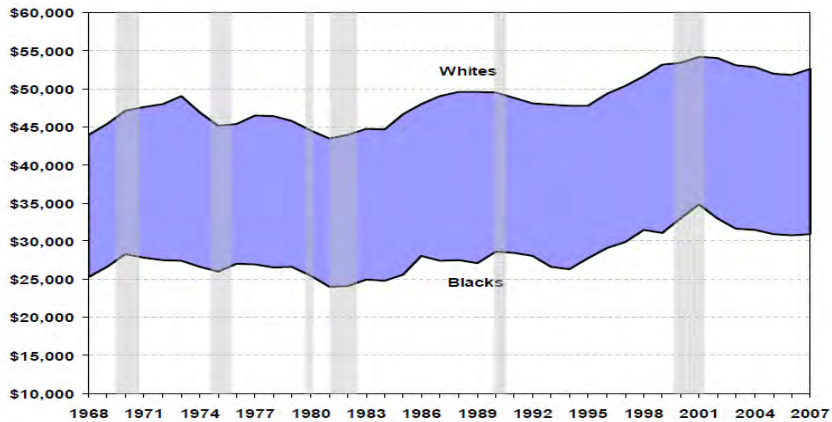


Figure 6 Percent of Native-Born Non-Hispanics Below the Poverty Line: 1968 to 2007

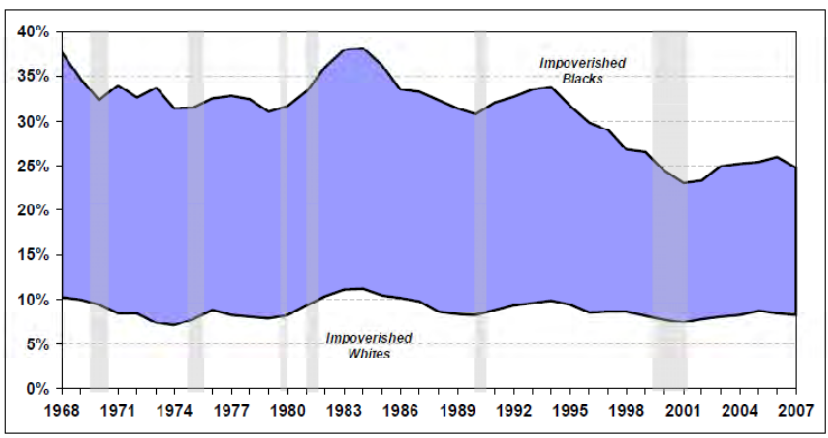


Figure 7 HOME OWNERSHIP

Percent of Native-Born Non-Hispanic Households Owning their Residence

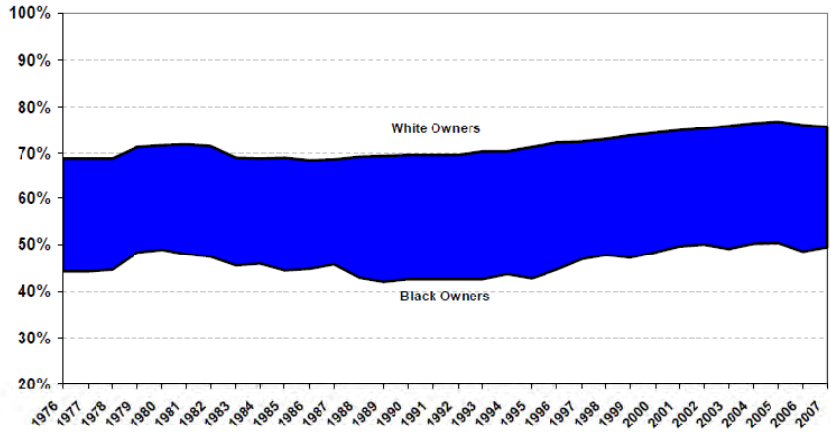
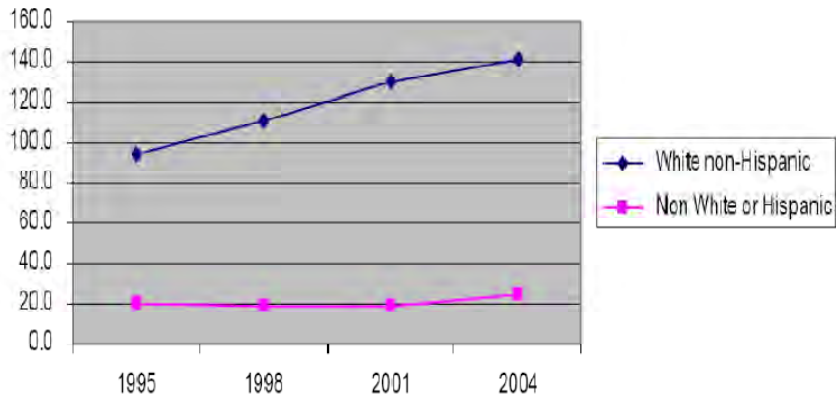


Figure 8 Median Net Worth by Race



But, the area where racial differences are starkest in the US is in the realm of criminal punishment.

Over the past four decades, the United States has become a more vastly punitive nation, without historical precedent or international parallel. With roughly five percent of the world's population, the U.S. currently confines about one-quarter of the world's prison inmates. In 2008, one in a hundred American adults was behind bars. And racial inequality in the incidence of punishment is staggering. America

imprisons nearly as great a fraction of our population to a lifetime in jail—more than fifty people for every hundred thousand residents) than Sweden, Denmark and Norway imprison for any duration whatsoever. Thus:

Figure 9 Incarceration in Western Europe and the US, 2001

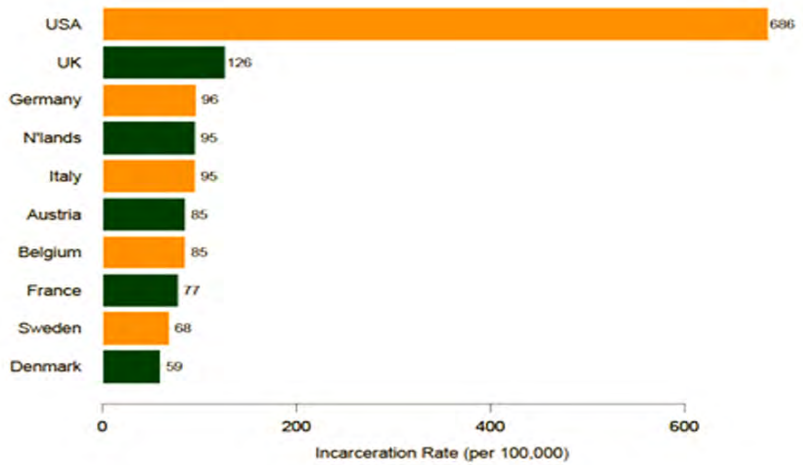
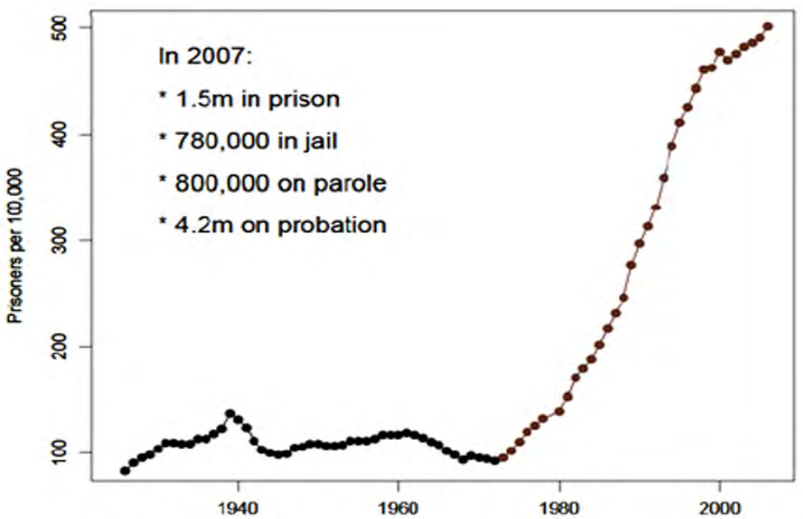


Figure 10 Us Imprisonment Rate, 1925-2006



That America's prisoners are mainly minorities, particularly African Americans, who come from the most disadvantaged corners of our unequal society, cannot be ignored. In 2008, one in nine black men between the ages of 20 and 34 were serving time. And, the lifetime risk of imprisonment for black men in the same cohort who did not complete high school was nearly 70%. The role of race in this drama is subtle and important, and the racial breakdown is not incidental; prisons both reflect and exacerbate existing racial and class inequalities. Here are some measures of race/class inequality in the incidence of imprisonment in the U.S. Notice that there are a large and growing number of black American children whose parents have been incarcerated:

Figure 11 Incarceration by Race and Education

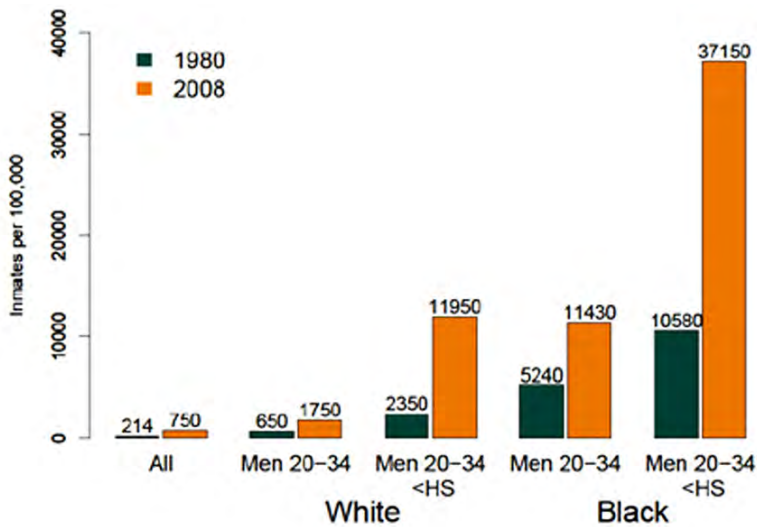


Figure 12 Men's Risk of Imprisonment by 30-34

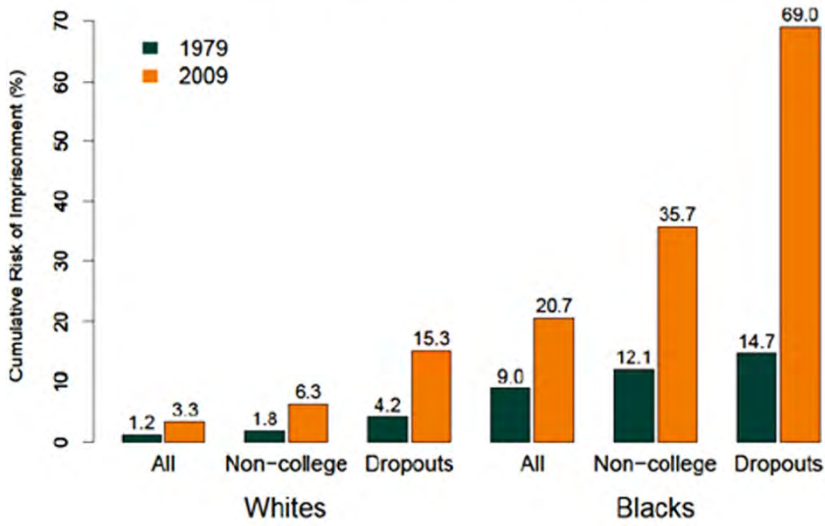
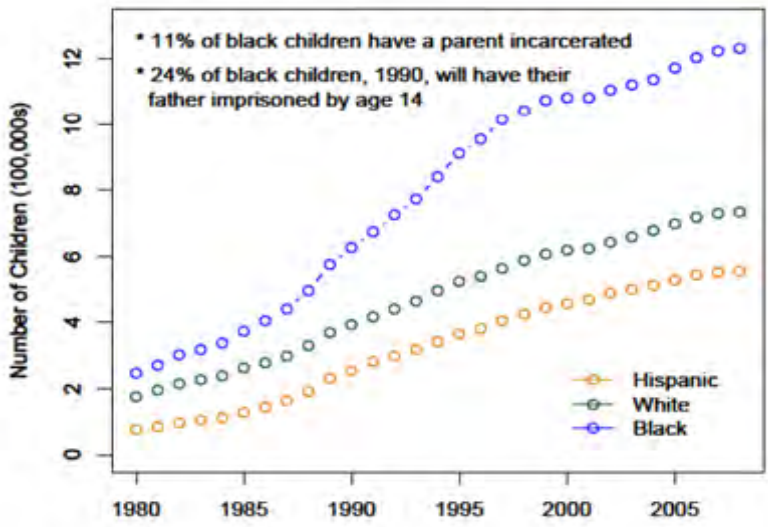


Figure 13 Children with Incarcerated Parents, 1980-2008



In the next section of this essay I argue that persistent group inequality in general, and racial disparities in the incidence of incarceration in particular, should not be surprising since the subordinate status of black ghetto-dwellers – their social deprivation and spatial isolation in the cities – puts them at greater risk of embracing the dysfunctional behaviors that lead to incarceration, and since incarceration itself leads to more dysfunction.

2. Segregation, Spillovers and Persistent Inequality: Theory

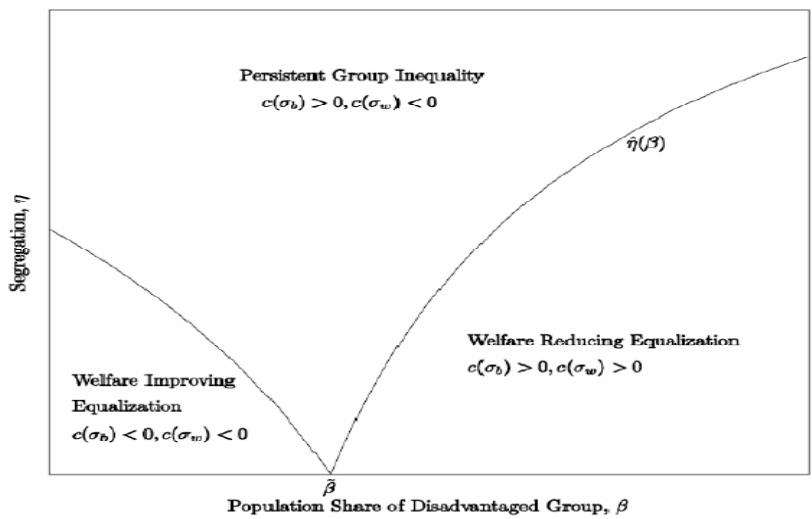
Disparity in the incidence of punishment in America is just one facet of a persisting racial hierarchy. Persistent group inequality is nothing new. Many societies have sustained long periods of hierarchical organization characterized by distinctly unequal opportunity for members of different social groups. Examples include the United States during slavery and the Jim Crow period, where hierarchy and status were based in an informal system of racial classification; South Africa during Apartheid, where a person's social identity was based on a formal system of racial classification; and, the Indian subcontinent, where one finds caste-based hierarchies that have been in place for centuries. I will argue that there is a common structural elements the spans these otherwise very different cases – the deleterious effects on human development that derive from social segregation. In each of these societies a transition has taken place from an explicitly hierarchical order to what is at least a notionally egalitarian one. Yet, when one looks closely, the consequences of these transitions have been less than fully satisfying. Evidently, historical discrimination against a marginal identity group implies that formal equality opportunity need not result in the convergence of group outcomes.

One of the principle reasons for this, I argue, is that informal social networks remain segregated under the newly reformed order. Enforcement of anti-discrimination laws may eradicate discrimination, but because many important non-market interactions lie outside the scope of such laws, the reform process cannot undo the harmful effects

of stigma. The law can have only the most modest impact on individual choices of a date, a spouse, an adopted child, a role model, residence in a neighborhood of membership in a voluntary association. Early childhood development takes place within the spheres of family, neighborhood and peer-group. Racial segregation in the formation of these social networks can have important implications for the perpetuation of group inequality across generations. Discrimination in contact can give rise to persistent group inequality even in the absence of discrimination in contract.

At the most basic conceptual level, one expects to see a link between social segregation and the dynamics of inequality, because there are interpersonal spillovers in human capital accumulation. Human development always and everywhere takes place within a social context, and can be greatly facilitated by access to a social network that is rich in human capital. In his classic article on the mechanics of economic development (1988), Robert Lucas observes that, "human capital accumulation is a social activity, involving groups of people in a way that has no counterpart in the accumulation of physical capital." William Brock and Steven Durlauf (2001) hypothesize that an individual's cost

Figure 14 Effects of Segregation and Population Shares on Persistent Inequality



of investing effort in education is lower, the more greater the investments of his social affiliates. When this is so, two individuals with identical ability who belong to different social groups will generally make different investment decisions, and group bias in social ties can cause historical group disparities to become locked-in. This can happen even though human capital investments are not impeded by financial constraints.

I have explored this issue, at the level of theory, in a paper with Samuel Bowles and Rajiv Sethi (2007). The paper develops a model where people belong to one of two groups and parents invest in the human capital of their children. We study the case where there are two occupational categories, one of which requires a costly human capital investment and the other not. The cost of human capital depends on ability and on the level of human capital in a person's social network. Under market competition wages are determined by the overall distribution of human capital in the economy, and investment decisions are assumed to depend on anticipated wages. Discrimination in the labor market is assumed not to exist, due to the perfect enforcement of laws guaranteeing formal equality of opportunity. Nevertheless, we show that even if ability is identically distributed within the two groups, when the initial state is one of inequality, when human capital spillovers are important, and when the degree of informal segregation of social networks is sufficiently great, then the members of different groups will invest in human capital at different rates. Our findings are illustrated in Figure 2 above, where a threshold level of network segregation above which persistent inequality is assured is shown to vary with the population share of the disadvantaged group. Furthermore, we show that when segregation is too high, groups are not likely to achieve similar socioeconomic outcomes even if they do not differ in underlying potential.

This finding is relevant to the debate over the appropriate policy response to a history of overt discrimination. And, in a general way, it is relevant to a discussion of racial inequality in the burdens imposed by law enforcement. Rule-oriented approaches emphasize the equality of individual persons before the law. This procedural approach to defining equal citizenship is characterized by a focus on individuals and their

rights – but necessarily gives short shrift to group interactions and large-scale social processes. And, it leaves little room for the advocacy of group-redistributive remedies. That inequality can persist indefinitely between racially self-aware population aggregates, even in the face of formal equality of opportunity, need not imply that group-redistributive policies ought to be adopted in every case. But it does mean that a failure to adopt them can result in persistent divergence across groups in economic and social outcomes. Put differently, if group equality is a policy goal, equal opportunity may not be enough to secure it.

In *Brown v. Board of Education* (1954) the U.S. Supreme Court struck down laws enforcing racial segregation of public schools on the grounds that 'separate educational facilities are inherently unequal.' Yet, the demise of legally enforced discrimination against African Americans coupled with the apparent reduction in racial prejudice among whites has not created an environment in which significant racial disparities are withering away. As mentioned, while substantial racial convergence in earnings and incomes did occur from the 50s to the mid-70s, little progress has since been made.

Conditional on the income of their parents, African-Americans have substantially (about a third) lower incomes than do whites, and this intergenerational race gap has not diminished appreciably over the past two decades (Hertz, 2005). Similarly, convergence in years of schooling attained and cognitive scores at given levels of schooling which was being celebrated prior to 1980 appears not to have continued subsequently (Neal, 2005). Significant racial differences in mortality, wealth, subjective well being, and other indicia also persist (Deaton and Lubotsky, 2003, Wolff, 1998; Blanchflower and Oswald, 2004).

Enduring discriminatory practices are no doubt part of the explanation (Bobo *et al*.; 1997, Greenwald *et al*.; 1998, Bertrand and Mullainathan, 2004; Quillian, 2006). These may be motivated by racial prejudice or hostility (Becker, 1957), or by more subtle psychic mechanisms. Although there is considerable survey evidence to suggest that the principle of equal opportunity is now widely accepted (Bobo, 2001; Schuman *et al*., 1997), it is also clear from the evidence that racial stereotypes persist to the disadvantage of blacks, and that the policy preferences of whites on facially non-racial matters (like welfare and

crime) are nevertheless influenced, again to the disadvantage of blacks, by racial factors (Bobo and Johnson, 2004).

3. The Importance of Social Affiliation: Evidence

Assortative interaction within social networks represents a mechanism other than explicit job discrimination through which group inequality may be sustained: Racial segregation of friendship networks, mentoring relationships, neighborhoods, workplaces and schools places the less affluent group at a disadvantage in acquiring the things – contacts, information, cognitive skills, behavioral attributes – that contribute to economic success. We know from Schelling's tipping model of segregation (1971, and subsequent literature) that equilibrium racial sorting does not require overt discrimination and may occur even with pro-integrationist preferences (Young, 1998; Sethi and Somanathan, 2004). Preferentially associating with members of one's own kind (known as homophily) is a common human trait that has been well-documented for race and ethnic identification, as well as religion, and other characteristics (Tajfel, Billig, Bundy, and Flament, 1971). A recent survey of empirical work in this area (McPherson, Smith-Lovin, and Cook, 2001) reported that:

> "We find strong homophily on race and ethnicity in a wide range of relationships, ranging from the most intimate bonds of marriage and confiding, to the more limited ties of schoolmate friendship and work relations, to the limited networks of discussion about a particular topic, to the mere fact of appearing in public or 'knowing about' someone else... Homophily limits peoples' social worlds in a way that has powerful implications for the information they receive, the attitudes they form, and the interactions they experience." (p.415, 420).

In a nationally representative sample of 130 schools and 90,118 students, controlling for school racial composition, same-race friendships were found to be almost twice as likely as cross-race friendships (Moody, 2001). Compared to the friends of white students in this sample, the

friends of African American students had significantly lower grades, attachment to school, and parental socioeconomic status. There is also evidence that peer effects such as penalties for 'acting white' among African American students can provide disincentives for academic achievement (Fryer and Torelli, 2005).

While there are many channels through which the racial bias in social networks can disadvantage members of the less well-off group, statistical identification of these effects often is an insurmountable challenge because networks are selected by individuals and, as a result, exogenous variation in the composition of an individual's networks is seldom observed. Some scholars [Hoxby (2000); Hanushek, Kain, and Rivkin (2002)] have used the year-to-year cohort variation in racial composition within grade and school to attempt to identify racial network effects. They find large negative effects of racial assortation on the academic achievement of black students. Moreover, studies that use the randomized assignment of college roommates have also found important behavioral and academic peer effects (Kremer and Levy, 2003; Sacerdote, 2001; Zimmerman and Williams, 2003). Another study (of annual work hours), that used longitudinal data with individual fixed effects, found strong neighborhood effects especially for the least educated and those in the poorest neighborhoods (Weinberg *et al*., 2004). An experimental study documents strong peer effects in a production task, particularly for those with low productivity in the absence of peers (Falk and Ichino, 2004). Our model shows that socioeconomic outcomes for blacks and whites can continue to diverge across the generations because of racial differences in the social networks to which individuals have access.

My 2002 book, *The Anatomy of Racial Inequality* proposed as a general matter that durable racial inequality could be understood as the outgrowth of a series of "vicious circles of cumulative causation." I argued that the "social meaning of race" – that is, the tacit connotations associated with "blackness" in the observer's imagination, especially the negative connotations—biases the social cognitions of observing agents, leading them to make detrimental causal misattributions. They have difficulty identifying with the plight of people whom they mistakenly assume simply to be "reaping what they have sown." This lack of

empathy undermines public enthusiasm for egalitarian racial reform, thus encouraging the reproduction through time of racial inequality. Yet, absent such reforms, the low social conditions of (some) blacks persist, the negative social meanings ascribed to blackness are thereby reinforced, and the racially biased social-cognitive processes are reproduced, completing the circle. As they navigate through the epistemic fog, observing agents find their cognitive sensibilities being influenced by history and culture, by social conditions, and by the continuing construction and transmission of civic narrative. Groping along, these observers-acting in varied roles, from that of economic agent to that of public citizen-"create facts" about race, even as they remain blind to their ability to unmake those facts and oblivious to the moral implications of their handiwork. I believe that mass imprisonment is now a central factor in this tragic and morally troubling process.

4. Stigma versus Discrimination: More Theory

Social networks are also social products – the result of choices of affiliation that people make. In turn, choices about informal association and imagined connectivity are at least partially guided by how people perceive and value those with whom they might or might not connect.

To understand the persistent subordination of blacks within American society it is crucially important to distinguish between racial discrimination and racial stigma. Discrimination has to do with how blacks are treated, while stigma is concerned with how black people are perceived. Biased treatment in formal transactions based on racial identity – whether in the marketplace or with the state – is, in my view, less significant as a factor accounting for durable racial inequality than is blocked access to those resources critical for human development, but available only via informal social interactions. This point is especially significant, given the cultural and historical context of race within American society.

Any theory of racial inequality should begin with an account of the phenomenon of "race" itself. What needs to be explained is why people notice and assign significance to the skin color, hair texture, and bone

structure of other human beings. I suggest that we think about "race" as a social phenomenon which results from the combination of two processes – *categorization* and *signification*. Categorization entails the sorting of persons into a cognitively manageable number of subgroups, based on bodily marks, in order to differentiate one's dealings with such persons. Signification involves the mental activity of associating certain connotations or "meanings" with these categories. My argument is that, at bottom, "race" is all about "embodied social signification."

Let me dispose of a red herring at the outset. Some commentators argue that racial categorization is problematic because modern science has shown that there are no "races" as such. The attempt to classify human beings on the basis of natural variation in genetic endowments across what for much of human history had been geographically isolated sub-populations is controversial (Cavalli-Sforza, 2000; Olson, 2002). I wish to stress, however, that my view of "race" embodied social signification is an altogether distinct enterprise from using "race" as an instrument of biological taxonomy. There well may be no "races" in the biological sense. Still, we can adopt the linguistic convention that when saying, "person A belongs to race X" what we mean is, "person A possesses physical traits which (in a given society, at a fixed point in history, under the conventions of racial classification extant there and then) will cause him to be classified (by a preponderance of those he encounters in that society and/or by himself) as belonging to race X."

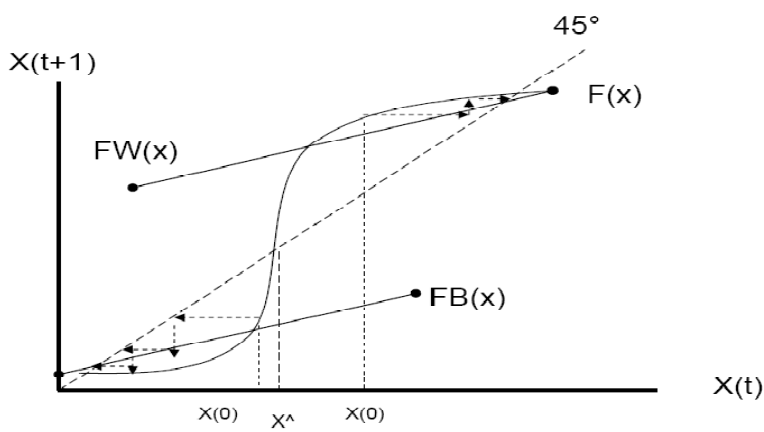
The history and culture peculiar to a given society may cause certain connotations or "meanings" to be associated with the bodily marks carried by persons in that society. I claim that this is decidedly the case with respect to the marks that connote "blackness" in American society. When studying racial disparities in the incidence of punishment, I think analysts should pay more attention to how social data about blacks is interpreted – as distinct, say, from focusing solely on an observer's discriminatory preferences. With my core concept – biased social cognition – I attempt to move from the fact that people make use of racial classifications, to some understanding of how this alters the causal accounts settled-upon for what they observe in the social world. The question becomes, how does the "race" of those experiencing some difficult circumstance affect whether powerful observers come to

understand the plight of the disadvantaged as constituting a *societal*, as distinct from a *communal*, problem?

5. Causal Misattribution and Its Consequences

Race conventions may be arbitrary, but we nevertheless filter social experience through racial categories. For this reason, and gven the ancillary meanings with which those categories are freighted, we can be led to interpret our data in such a way that the arbitrariness of the race convention remains hidden from our view. Thus, in my book, *The Anatomy of Racial Inequality* (2002), I use the notion of *racial stigma* in an attempt to move from the fact that people take note of racial classification in the course of their interaction with one another, to some understanding of how this affects their *perceptions* of the social world around them, and how it shapes the *explanations* they settle upon for what they observe. It is the link between cognitive perception and causal explanation that I am interested in. I am asking: When does the "race" of those subject to some problematic social circumstance affect whether powerful observers perceive there to be a problem, and if so, what follows from this?

My argument is illustrated in the figure below:



This figure illustrates an abstract, dynamic process where the prevalence of some activity within a social group evolves over time. For concreteness, let us suppose that X(t) represents the prevalence of gun-carrying among young males in some population, at stage t of an adjustment process. Each young man decides whether or not to carry at each stage of the process, based on how many others he expects to be carrying. That is, a given young man carries only if he thinks the overall carry rate is sufficiently great. But this threshold (above which a given young man carries) varies from one person to the next. The lazy-S curve in the figure, labeled F(x), depicts the proportion of young men who feel obliged to carry a gun when they expect that the overall carry rate to be x.

The figure illustrates what is sometimes called "the tipping property": For $x < x$ ^, few want to carry; but for $x > x$ ^ most want to carry. The dynamic behavior of this little system depends on initial conditions. If the initial expectation, X(0) lies above the threshold x ^ then the system eventually settles-in at a relatively low rate of gun carrying in the population. While, if the initial expectation exceeds the threshold, the system "tips" – that is, it gravitates toward a relatively high carry rate. If there were two racially distinct and socially isolated population sub-groups, then even though these racial groups may be characterized by an identical distribution of gun-carrying proclivities (represented by the function F(x)), different initial conditions would lead to radically different long-run behavioral patterns within the groups. (Even though I illustrate this argument by reference to gun ownership, the same logic could apply to many other behaviors where the value of an action to each individual depends on how many others in their social network acting in a similar way.)

Consider now the inferences about group inequality that someone observing this process might be inclined to make. The structure here is a bit complex – multiple self-sustaining behavior patterns are consistent with a common population distribution of some trait (here, the proclivity to carry a gun). If whites are observed mainly near the low equilibrium in the figure, and if blacks are observed mainly near the high one, an observer, particularly one already inclined in this direction, will be tempted to conclude that the racial populations are essentially different,

characterized by distinct distribution functions [denoted FW(x) and FB(x) in the figure]. That is, they might settle upon an racially essentialist account of the inequality. The choice between the complex structural account and the simplistic essentialist one is a choice of specification (about the causal processes underlying one's observations) which can easily be impacted by the social meanings associated with the racial markers characteristic of a particular society.

Tacit association of "blackness" with "unworthiness" in the American public's imagination affects cognitive processes and promotes essentialist causal misattributions. When confronted by the facts of racially disparate achievement, the racially disproportionate transgression of legal strictures, and racially unequal development of productive potential, observers will have difficulty identifying with the plight of a group of people whom they (mistakenly) think are simply "reaping what they have sown." In such a case, there will be little public support for egalitarian policies benefiting a stigmatized racial group. This, in turn, encourages the reproduction through time of racial inequality because, absent some policies of this sort, the low social conditions of many blacks persist, the negative social meanings ascribed to blackness are then reinforced, and so the racially biased social-cognitive processes are reproduced, completing the circle.

6. Boys and Girls, Blacks and Whites

I can make this same point with a less abstract example, and one that does involve race. Consider gender inequality. We know that there is disparity in the social outcomes for boys and girls in two different venues – the schools and the jails. Thus suppose that, when compared to the girls, boys are over-represented among those doing well in math and science in the schools, and also among those doing poorly in society at large by ending-up in jail. There is some evidence to support both suppositions, but only the first is widely perceived to be a problem for public policy. Why? My answer is that it offends our basic intuition about the propriety of underlying social processes that boys and girls have different levels of achievement in the technical curriculum of our

schools. Although we may not be able to put our fingers on exactly why this outcome occurs, we instinctively know that it is not right. In the face of this disparity we are inclined to interrogate our institutions – to search the record of our social practice and examine myriad possibilities in order to see where things might have gone wrong. Our base-line expectation is that equality should prevail here. Our moral sensibility is offended when it does not. And so, an impetus to reform is spurred thereby. We cannot easily envision a wholly legitimate sequence of events that would produce the disparity, so we set ourselves the task of solving a problem.

On the other hand, gender disparity in rates of imprisonment occasions no such disquiet. This is because, tacitly if not explicitly, we are "gender essentialists." That is, we think boys and girls are different in some ways relevant to explaining the observed disparity – different either in their biological natures, or in their deeply ingrained socializations. (Note well, the *essentialism* with which I am concerned need not be based solely or even mainly in biology. It can be grounded in (possibly false) beliefs about profound cultural difference as well.) As "gender essentialists," our intuitions are not offended by the fact of vastly higher rates of imprisonment among males than females. We seldom ask any deeper questions about why this disparity has come about. In this sense, we do not perceive there to be a problem, and so no solution is sought.

Now, we may be right or wrong to act as we do in these gender disparity matters, but my point with the example is to show that the bare facts of gender disparity do not, in themselves, suggest any course of action. To act, we must marry the facts we observe to some model of social causation. This model need not be explicit in our minds. It can and usually will lurk beneath the surface of our conscious reflections. Still, it is the facts *plus* the model that lead us to perceive a given circumstance as indicative of some as yet undiagnosed failing in our social interactions, or not. This kind of reflection on the deeper structure of our social-cognitive processes, as they bear on the issues of racial disparity, is what I have in mind when I speak of "biased social cognition." And, the role of "race" in such processes is what I am alluding to when I talk about "racial stigma." Such stigma could be of

great *political* moment, because if one attributes an endogenous difference (a difference produced within a system of interactions) to an exogenous cause (a cause located outside that system), then one is unlikely to see any need for systemic reform.

This distinction between *endogenous* and *exogenous* sources of social causation, I am arguing, is the key to understanding the difference in our reformist intuitions about gender inequalities in the schools and in the jails: Because we think the disparity of school outcomes stems from endogenous sources, while the disparity of jail outcomes is tacitly attributed in most of our "causal models" to exogenous sources, we are differentially moved to do something about the observed disparities. So, the effect I am after when I talk about "racial stigma" and the reason I employ an apparently loaded phrase like "biased social cognition" is this: It is a politically consequential cognitive distortion to understand the observably disadvantageous position of a racially defined population subgroup as having emerged from qualities taken to be intrinsic to the group when, as a matter of actual social causation, that disadvantage is the product of a system of social interactions. I argue that a given instance of social disparity is less likely to be thought to constitute a social problem when people see the disparity as having been caused by what they take to be the deficiencies of those (e.g., the boys in the jails, but not the girls in the schools) who lag behind. I reiterate that it hardly matters whether the internal qualities *mistakenly* seen as source of some group's observed laggardly status are biological or deeply cultural. What matters, I argue, is that something has gone wrong if observers fail to see *systemic, endogenous* interactions that lead to bad social outcomes for blacks, and instead attribute those results to *exogenous* factors taken as internal to the group in question.

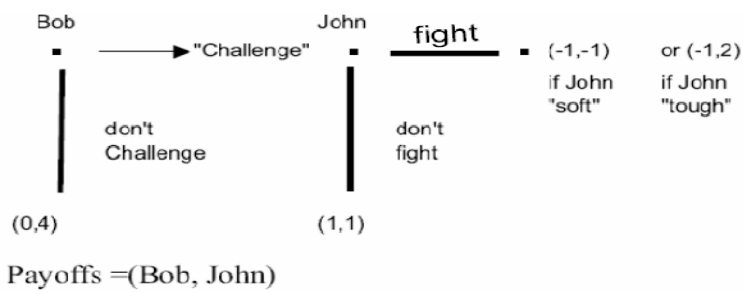
One consequence of racial stigma, I suggest, is that because those bearing the brunt of the cost of our punitive response to the broad social malady of drug usage are disproportionately black, our society is less impelled to examine what we are undertaking in this area of policy, and to consider reform. I could be wrong about this, but the speculation is certainly not implausible. How "serious" a given crime is seen to be in the minds of those who through their votes indirectly determine our policies, and how "deserved" the punishment for a given infraction, can

depend on the racial identities of the parties involved. This, I am holding, is human nature. There need be nothing “sinister” in any of it. But, if we want to *analyze* what is going on around us, and not limit ourselves to *moralizing* about it, we should take such possibilities seriously.

7. Campaigning for Respect (and Being Judged for It)

The Reputation Game models an ethically significant the interaction between Bob and John. (See diagram below.) In this dynamic game of incomplete information, John can be either of two types – soft or tough (one thinks of Elijah Anderson’s “decent” vs. “street” distinction.) Bob chooses whether to Attack or Not; John responds, choosing whether or not to Fight. (The game is ‘ethically significant’ because it shows that the link between character and behavior depends on the social context.) The payoffs (specified in parentheses in the diagram) are such that both the soft and the tough versions of John would much prefer not to be attacked, though if attacked a soft John would want not to fight and a tough John would want to fight. (This is reflected in the fact that both soft and tough versions of John receive payoff = +1 from not fighting, while fighting gives soft John a payoff = -1, but tough John’s payoff from fighting = +2.) Also, the payoffs indicate that Bob wants not to attack if will be fought (payoff = -1 versus 0), and wants to attack if he will not be fought (payoff = +1 versus 0).

Figure 15 THE REPUTATION GAME



If this interaction between Bob and John were to occurs only once, then rational agents would play as follows: if attacked, a tough John fights and a soft John does not. So, Bob computes the average of his payoffs over the outcomes that could obtain, and attacks only if he thinks the probability that John is tough is less than 1/2. The soft and tough types of John react naturally. The game is trivial.

But, should these players interact twice in succession, the outcome of the game is more interesting. Now, John's action at the first stage can serve as a signal to Bob about his type, thereby affecting how the second stage is played. John knows this. Bob knows that John knows, John knows that Bob knows that he knows…, etc.

Given this structure, we make the following two claims:

Claim 1: In the twice-played game it is inconsistent with rationality for the soft John never to fight when first attacked.

Proof: If soft John were never to fight when first attacked, then because tough John always fights, John's first stage action would be a perfect signal of his type: "fight at the first stage" would mean he's tough, "not fight" would means he's soft. But then, Bob's rational response to this situation is to attack at the second stage only if he is fought at the first stage. Yet, this response on Bob's part means that soft John could avoid being attacked at the second stage by fighting at the first stage which, if he is rational, he would want to do since (-1+4 – his payoff from fighting and thereby avoiding subsequent attack, exceeds (1+1)—his payoff from not fighting at either stage. This contradicts the supposition that he never fights when first attacked.

Claim 2: In the twice-played game it is inconsistent with rationality for Bob to always attack at the second stage after being fought at the first stage.

Proof: If Bob always attacks after being fought, soft John can gain nothing by fighting at the first stage and so, being rational, soft John would never fight when first attacked. But, Claim 1 asserts that this can't occur when the players are rational.

Taken together, Claims 1 and 2 imply that the only outcome of the twice-played game consistent with player rationality has soft John

mixing his behavior at the first stage between fighting and not fighting, while Bob mixes at the second stage between attacking and not, given that he has been initially fought. (If Bob is not fought at the first stage then he knows John is soft and so definitely attacks at the second stage.) Indeed, if $P < 1/2$ is Bob's assessment of likelihood that John is tough, then the unique equilibrium of the twice-played game entails soft John fighting when first attacked with probability $P/(1-P)$, and Bob attacking at the second stage if fought at the first with probability 1/3. John's personal "values" may reflect a disdain for fighting (soft John), and yet his rational adaptation to his circumstances lead him to behave in a way that is inconsistent with those "values."

8. The Culture Argument: 'Acting White' or Blacks *and* Whites Acting?

We are not looking down into the souls or at the predetermined qualities of groups when we observe these disparate patterns of behavior. We're looking at the end product, the final outcome, of a process of social interaction that is embedded in a larger structure of social relations, where ideas about race and racial identity play a prominent role. To see what I have in mind, consider the so-called "acting white" problem (Ogbu, 2003; Ferguson, 2005; Fryer and Torelli, 2005): black students are said to ostracize those of their peers who value academic success, labeling such behavior as "acting white." The graphs below, showing the relationship between popularity and grades among racially defined adolescent peer groups in a sample of American high schools (taken from the research of Harvard economist, Roland Fryer), tells the tale.

As I like to say to my colleague, Roland Fryer – "acting white" probably has as much to do with the way white people act, as it has to do with the way blacks act. The evidence presented in Fryer and Torelli (2005) supports this claim. In the schools where the population and therefore, one would have to say, the culture is predominantly black, Fryer observe no "acting white" behavior (student popularity is

positively associated with their grades). While, in the schools where blacks are fewer than 20% of the student body, the correlation between grades and popularity can be negative, at least when grades are above the level of B+ (see Figure 1B. below, where the middle line depicts the relationship between popularity and grades for black students, controlling for other observed student characteristics.). What this says to me is that the way black kids are interacting with each other has something to do with the way that black kids and white kids interact with each other. So, to talk about a pathological black youth culture, without reference to the larger structure of social interaction within which black students are situated, would be to make a mistake.

Figure 16 Popularity and Grades (1994-1995)

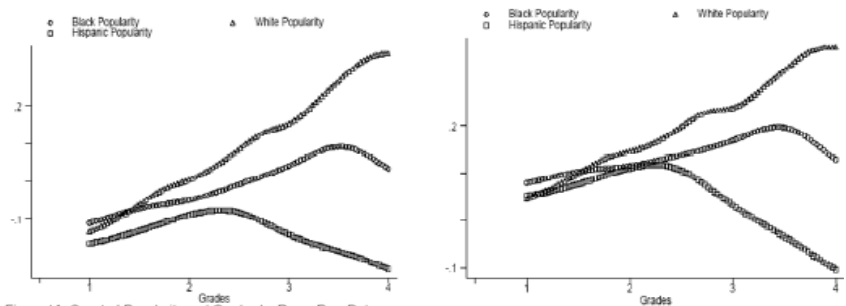


Figure 1A: Spectral Popularity and Grades by Race, Raw Data

Figure 1B: Spectral Popularity and Grades by Race, With Controls

Here is another example to illustrate my point – marriage. Given that there is a high racial endogamy rate (i.e., most married blacks are married to other blacks; most married whites are married to other whites), one might imagine that the huge disparity in marital and child-bearing behavior between blacks and whites provides a compelling example of racially distinct cultural practices. Is one not forced to conclude that a higher out-of-wedlock birthrate among blacks than whites, or a lower marriage rate, indicates a racially disparate cultural dynamic?

Yet, consider that, since there are six times as many whites as blacks in America, were the percentage of white men marrying black women to increase slightly, the nature of the “marriage market” among blacks could be dramatically changed. As an economist, my model of marriage

involves bargaining between negotiating parties over the division of the surplus from cooperation within the household. The threat point in that negotiation is “how well I could do if I didn't have you.” Were that threat point to move a little bit – because, say, 5% of white men were inter-marrying with black women, then the leverage of black women in the intra-racial marriage market could be considerably enhanced, and as a result a very different outcome might arise in the equilibrium of marital interactions between black men and black women: Perhaps black men would be less “trifling” if they had more competition.

Of course, this speculation is all a bit “tongue in cheek.” My point, however, is not a factual one; nor am I making a policy recommendation. My point is a conceptual one: It is a mistake to say of black men and women that their marital behavior reveals inadequacies of black culture, when what one observes is the equilibrium outcome from a system of interactions within which a change of behavior across the group boundary (in the case at hand, behavior between white men and black women), partially determines the observed outcome.

(A simplistic and false narrative has emerged equating the political programs of these men)

9. Conclusion: What Has President Obama's Election to Do with This?

My radical answer for that question answer is, "next to nothing, though that is not his fault.) As a political matter, America's first black President dare not speak directly of racial inequality and racial subordination, because he (rightly) fears losing his legitimacy in the eyes of the voting majority were he to do so. Ironically, the president can appeal openly for Hispanic or gay votes, but he cannot (and need not) be seen to solicit the help of blacks, as such. It is not implausible to think that blacks' economic interests get less political attention under President Obama than they got twenty years ago under President Clinton. But, I wish to argue that the current situation is actually worse than that! It is not only that black officials atop the US government are unable/unwilling to address the leadership challenges posed by persistent African-American subordination in the society. What is worse is that the ascendancy of blacks to such high office has fostered a false narrative of racial equality undercutting possibilities for change. Their rise also threatens to neutralize a prophetic social critique of US politics and policy – both domestic and foreign – that is naturally rooted in the heroic legacy of the black freedom struggle!

Martin King was a black American prophet standing squarely within the tradition of social criticism which I will call the "black prophetic tradition." Barack Obama is not. This difference, I wish to argue, matters a great deal. I see the black prophetic tradition as embodying an outsider's and underdog's critical view about national narrative of the United States of America. It is, to be concrete, an historical counter-narrative – one, for example, that sees the dispossession of the native people of North America as the great historic crime that it was; one that looks back on the bombing of Hiroshima with feelings of horror and national shame. It's an insistence that American democracy – which of course has always been a complicated political compact, often serving the interests of the powerful at the expense of the weak – live up to the true meaning of our espoused civic creed. It is an understanding that

struggle, resistance and protest are the only ways to bring this about. And it's the recognition that even in the late 20th and early 21st century, America has not yet to fully do so.

The black prophetic tradition is anti-triumphalist, vis-à-vis America's role in the world, and it is deeply suspicious of the "city on a hill" rhetoric of self-congratulation to which American politicians, including President Obama, are so often inclined. It's a doggedly critical assessment of what Americans do, an assessment that sympathizes in a deep way with the struggles of those who are dispossessed: the stateless Palestinians in the Middle East today, for instance, or, the blacks at the southern tip of Africa three decades ago. This is a tradition of moral witness within American historical experience that I associate with the anti-slavery movement of the 19th century, and with the civil right movement of the 20th century. It is a tradition that views "collateral damage" – where civilians are killed by U.S. military operations – as not simply the unavoidable cost of doing the business of national defense in the modern world, but rather as a deeply problematic offense against a righteousness toward which we ought to aspire. What I am calling the black prophetic tradition also reflects a universal theory of freedom – one with a strong anti-imperialist, anti-racist and anti-militarist tilt.

What, then, is President Obama's relationship to this tradition? What, in this regard, are we entitled to expect from him? Frankly, I have concluded that as president his connection to this great moral tradition is tenuous, at best. More crucially, we would be foolish to expect much at all from him in this vein. This is my principle point. President of the United States is an office. The office has its own imperatives quite apart from whatever an individual's personal beliefs might be. When one is sitting with the military Joint Chiefs of Staff, and one is told that a Predator drone operation against a "terrorist" operative in the tribal regions of Pakistan awaits one's authorization, then one has to make that call. Such a moment as that is no time to be quoting Martin Luther King or Frederick Douglass, or to be talking about the tradition of critical political thought which has been nurtured by black people in America

for centuries. Rather, at a time like that, one simply has to decide whether one is going to kill those people or one is not going to kill them. My view is that the person who is the Commander in Chief of the United States of America, regardless of his individual biography, when placed in that position and forced to carry out those acts, needs to be viewed with clear-eyed realism for who and what they are: namely, in the context of the example at hand, the Commander-in-Chief of the largest military force in the history of human experience. Such a person ought not to be viewed through a rose-tinted glass, with some romantic and unrealistic narrative.

So, the question I wish to pose is this: what does the tradition of black protest and struggle in America have to do with the exercise of the powers of the Office of the Presidency. I suspect that the answer to that question is, very little at all. Moreover, I believe it is a mistake – a serious political error – to think otherwise. Of course, I could be wrong about this, but I remain to be convinced. I′m a skeptic about this kind of talk in reference to President Obama, based on the fact of his "blackness."

Romantic idealists argue that surely his biography, even his skin color informs the man who is now President. But, for me that merely shifts the question to an inquiry about the extent that personality and individual morality can exert leverage over the exercise of such an office as the American presidency. Here is an analogy to ponder: A woman rises to be the position of CEO at a large corporation – Exxon-Mobil, or Bank of America, say. What real difference should we expect this to make – for matters like the environment, or economic equity, or corporate governance? At the end of the day that job is about making money for the shareholders-period. It is not about anything else – not about saving the planet, or integrating the workforce, or ending poverty. It is about making profits for the shareholders. Now this woman – with her unique experiences and inspiring biography – may approach the exercise of her responsibilities in that office with a slightly different style than would a man. But she won't be the chief executive officer for

very long if she fails to continue making profits for the shareholders. The leverage she has for doing good in the world is pretty small, relative to the imperative of sustaining her company's financial performance at a high level. Likewise, if someone is the chief executive officer and commander-in-chief of the largest military in the world – if someone has a military officer always nearby carrying an electronic device, as the US president does have, allowing one to signal the special codes to submarine commanders at sea, armed with multiply targeted warheads, authorizing the release of those weapons so as to incinerate tens or hundreds of thousands of persons – then the imperative of that office is to 'make profits for the shareholders,' so to speak. Put plainly: the imperatives of office in the position of the American presidency are, basically, to further the interest of the American imperial project, not to criticize that project. If one were to engage in too much of the latter, then one won't be running the show for very long. Yet, if the history of blacks in America teaches us anything, it is that the American project warrants to be criticized.

I wish to avoid misunderstanding. I am not here attacking Barack Obama, the man. As it happens, I admire him greatly. Left to his own devices, I feel confident in saying, he would always stand on the right side of history. The Rev. Martin Luther King, Jr. once said that "the moral arc of the universe is long, but it bends toward justice." Well, it is at least arguable that the rise of Barack Hussein Obama represents one way in which that moral arc is, indeed, bending toward justice. He is someone, I think it fair to say, with more room within his own philosophy for concern about the dispossessed than anyone who has held that office. He is, I would reckon, aware of the imperfections of American democracy and of the inflated character of some of the rhetoric that he himself has had to use as a matter of political expediency. But the main point that I'm making here is that the office has its own imperatives; and, that's the thing which those of us who have been clamoring for change and who so far have been sorely

disappointed, must take the measure of. Just because he is a black man does not mean he has the ability to move the government so as to lessen the extent of African American disadvantage.

But, given the country's history, persistence of racial inequality on a scale such as I have illustrated here poses a profound challenge to the moral integrity of the American nation. The plain historical truth of the matter is that North Philadelphia, the West Side of Chicago, the East Side of Detroit, or South Central Los Angeles did not come into being by accident of nature. As the sociologist Loïc Wacquant has argued, these ghettos are man-made, created and persisting because the concentration of their residents in such urban enclaves serves the interests of others. As such, the desperate and vile behaviors of some of the people reflect not merely their personal moral deviance, but also the shortcomings of our society as a whole. "Justice" operates at multiple levels, both individual and social.

Take the issue of criminal punishment, for instance. Defenders of the current regime put the onus on law-breakers: "If they didn't do the crimes, they wouldn't have to do the time." Yet a pure ethic of personal responsibility does not and could never justify the current situation. Missing from such an argument is any acknowledgement of social responsibility—even for the wrongful acts freely chosen by individual persons.

In saying this, I am not saying that a criminal has no agency in his behavior. Rather, I am arguing that the larger society is implicated in a criminal's choices because we have acquiesced to social arrangements that work to our benefit and to his detriment—that shape his consciousness and his sense of identity in a way that the choices he makes (and that we must condemn) are nevertheless compelling to him.

Put simply, the structure of our cities with their massive ghettos is a causal factor in the deviancy among those living there. Recognition of this fact has far-reaching implications for the conduct of public policy. What goals are our prisons trying to achieve, and how we should weigh the enormous costs they impose upon our fellow, innocent citizens?

In short, we must think of justice as a complex feedback loop. The way in which we distribute justice – putting people in prison – has

consequences, which raise more questions of justice, like how to deal with convicts' families and communities, who are also punished, though they themselves have done nothing wrong. Even if every sentence handed out to every prisoner was itself perfectly fair (an eminently dubious proposition), our system would therefore still be amoral since it punishes innocents. Those who claim on principled arguments that "a man deserves his punishment" are missing the larger picture. A million criminal cases, each one rightly decided—each distributing justice to a man who deserves his sentence—still adds up to a great and historic wrong.

References

Akerlof, George, “The Economics of Caste and of the Rat Race and Other Woeful Tales,” *Quarterly Journal of Economics* 90, 1976, pp.599~617.

Akerlof, George, “Social Distance and Social Decisions,” Econometrica 65 (5), 1997, pp.1005~1027.

Akerlof, George and Rachel Kranton, “Economics and Identity,” *The Quarterly Journal of Economics* 115 (3), 2000, pp.715~753.

Akerlof, George and Rachel Kranton, “Identity and Schooling: Some Lessons for the Economics of Education,” *Journal of Economic Literature* 40 (4), 2002, pp.1167~1201.

Aronson, Joshua, Claude M. Steele, M. F. Salinas, and M. J. Lustina, “The Effects of Stereotype Threat on the Standardized Test Performance of College Students,” in E. Aronson (ed.), *Readings About the Social Animal*, 8th edition, New York, Freeman, 2003.

Arrow, K. J., “The Theory of Discrimination.” in Ashenfelter and Rees, editors, *Discrimination in Labor Markets*, Princeton, NJ: Princeton University Press, 1973.

Banerjee, Abhijit V. and Andrew F. Newman, “Occupational Choice and the Process of Development,” *Journal of Political Economy* 101 (2), 1993, pp.247~298.

Barabási, Albert-László, Linked: *How Everything Is Connected to Everything Else and What It Means*, Perseus Books Group, 2002.

Baumeister, Roy, “The Self,” in Daniel T. Gilbert, S. Fiske, and G. Lindzey, *Handbook of Social Psychology*, Vol. 1, Oxford University Press, 1998, pp.680~740.

Becker, G. S., *The Economics of Discrimination*. Chicago: University of Chicago Press, 1957.

Becker, Gary, “Crime and Punishment: An Economic Approach,” *Journal of Political Economy* 76 (2), 1968, pp.169~217.

Becker, Gary S. and Nigel Tomes, “A Theory of the Distribution of Income and Intergenerational Mobility,” *Journal of Political Economy* 87 (6), 1979, pp.1153~1189.

Beggs, Gordon, “Novel Expert Evidence in Federal Civil Rights Litigation,” *American University Law Review* 45 (1), 1995, pp.1~75.

Bennett, W., J. DiIulio, and J. Walters, *Body Count: Moral Poverty… and How to Win*

America's War Against Crime and Drugs, New York: Simon and Schuster, 1996.

Bertrand, M. and S. Mullainathan, "Are Emily and Greg More Employable Than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination," *American Economic Review* 94 (4), 2004, pp.991~1013.

Blanchflower, David G. and Andrew J. Oswald, 2004. "Well-Being over Time in Britain and the USA." *Journal of Public Economics*, pp.1359~86.

Blumstein, Alfred, "Restoring Rationality in Punishment Policy," in M. Tonry (ed.), *The Future of Imprisonment*, Oxford: Oxford University Press, 2004.

Blumstein, Alfred and Allen Beck, "Population Growth in U.S. Prisons: 1980-1996," in M. Tonry and J. Petersilia (eds.), *Prisons, Crime and Justice: A Review of Research*, Vol. 26, Chicago: University of Chicago Press, 1999.

Bobo, L., "Racial Attitudes and Relations at the Close of the Twentieth Century." in *America Becoming: Racial Trends and Their Consequences*, edited by Neil Smelser, William Julius Wilson, and Faith Mitchell, Washington, D.C.: National Academy Press, 2001.

Bobo, L. "Inequalities that Endure? Racial Ideology, American Politics, and the Peculiar Role of Social Science." Chp. 2 in Maria Krysan and Amanda Lewis (eds.), *The Changing Terrain of Race and Ethnicity*, New York: Russell Sage, 2004.

Bobo, L. and D. Johnson, "A Taste for Punishment: Black and White Americans' Views on the Death Penalty and the War on Drugs." *Du Bois Review* 1 (1), 2004, pp.151~180.

Bobo, L. and V. Hutchings, "Perceptions of Racial Group Competition: Extending Blumer's Theory of Group Position to a Multiracial Social Context." *American Sociological Review* 61, 1996, pp.951~972.

Bobo, L., J. R. Kluegel, and R. Smith, 1997. "Laissez-faire racism: the crystallization of a kinder, gentler, antiblack ideology," in *Racial Attitudes in the 1990s: Continuity and Change*, edited by S.A. Tuch and J.K. Martin, pp.15~42. Westport, CT: Praeger.

Bonzcar, Thomas P. and Allen J. Beck, *Lifetime Likelihood of Going to State or Federal Prison*, Bureau of Justice Statistics Bulletin, NCJ 160092, Washington DC: U.S. Department of Justice, 1997.

Bouza, Anthony V., *The Police Mystique: An Insider's Look at Cops, Crime, and the Criminal Justice System*. New York: Plenum Press, 1990.

Bowles, Samuel and Herbert Gintis, "The Inheritance of Inequality." *Journal of Economic Perspectives* 16 (3), pp.3~30.

Bowles, Samuel, Glenn Loruy, and Rajiv Sethi, "Is Equal Opportunity Enough? A Theory of Persistent Group Inequality," unpublished manuscript., Columbia University, 2007.

Brock, William and Steven Durlauf, “Discrete Choice with Social Interactions,” *Review of Economic Studies* 68 (2), 2001, pp.235~260.

Chaudhuri, Shubham and Rajiv Sethi, 2003, “Statistical Discrimination with Neighborhood Effects: Can Integration Eliminate Negative Stereotypes?” Columbia University Economics Department Discussion Paper 0304-09.

Corman, Hope and H. Naci Mocan, “A Time –Series Analysis of Crime, Deterence, and Drug Abuse in New York City.” *American Economic Review*. June, 90, 2000, pp.584~604.

Cutler, D. M. and Edward Glaeser, 1997. “Are ghettos good or bad?” *Quarterly Journal of Economics*, 111, pp.508~48.

D’Souza, Dinesh, *The End of Racism*. New York: The Free Press, 1995.

Davis, Angela, *Are Prisons Obsolete?* Toronto: Open Media Books, 2002.

Deaton, Angus and Darren Lubotsky, 2003. “Mortality, Inequality, and Race in American Cities and States.” *Social Science and Medicine* 56, pp.1139-1153.

DeParle, Jason, “The American Prison Nightmare,” *The New York Review of Books*, 2007.

Dilulio, John and Anne Piehl, “Does Prison Pay? The Story National Debate over the Cost-Effectiveness of Imprisonment.” *The Brookings Review*, Fall 1991, pp. 28-35.

Durlauf, Stephen, 2006. “The Memberships Theory of Inequality: Ideas and Implications,” in *Elites, Minorities and Economic Growth*. E. Brezis and E. Temin, eds. Amsterdam: North Holland.

Durlauf, Steven, 2006. “Groups, Social Influences and Inequality,” in Samuel Bowles, Steven Durlauf, and Karla Hoff (eds), *Poverty Traps*, Princeton and New York: Princeton University Press and the Russell Sage Foundation, 2006, pp.141-175.

The Economist, “The Kindness of Strangers?” Feb. 26, 2004.

Ehrlich Isaac, “The Deterrent Effect of Capital Punishment: A Question of Life and Death.” *American Economic Review* 65(3), 1975, pp.397~417.

Elsner, Alan, “America’s Prison Habit.” *Washington Post*, 24 January 2004.

Falk, Armin and Andrea Ichino, “Clean Evidence on Peer Effects,” IZA working paper, 2004.

Ferguson, Ronald, “Why America’s Black-White School Achievement Gap Persists,” in G. Loury, T. Modood and S. Teles (eds.), *Ethnicity, Social Mobility and Public Policy in the US and the UK*, Cambridge University Press, 2005.

Fleury-Steiner, Benjamin, *Jurors’ Stories of Death*, Ann Arbor: University of Michigan Press, 2004.

Fleury-Steiner, Benjamin and Carla Crowder, “Dying Inside: A Sociolegal Autopsy of

Preventable Deaths at Limestone Prison," Unpublished manuscript, Department of Sociology, University of Delaware.

Freeman, Richard, 1995. "The Labor Market," in *Crime*. James Q. Wilson and Joan Petersilia, eds. San Francisco: ICS Press, pp. 171-92.

Fryer, Roland. 2003. "An Economic Approach to Cultural Capital," unpublished manuscript, Harvard University.

Fryer, Roland and Matt Jackson, "Categorical Cognition: A Psychological Model of Categories and Identification in Decision Making," unpublished manuscript, Harvard University, 2002.

Fryer, Roland and Paul Torelli, "An Empirical Analysis of 'Acting White,'" Uunpublished Manuscript, Harvard University, 2005.

Garland, David, 2001a. "Introduction: The Meaning of Mass Imprisonment." Pp. in 1-3 in *Mass Imprisonment: Social Causes and Consequences*, edited by David Garland. London, UK: Sage Publications.

Garland, David, 2001b. "*Culture of Control: Crime and Social Order Contemporary Society*. Chicago, IL: University of Chicago Press.

Gibbons, John H. and Nicholas de B. Katzenback. 2006. "Confronting Confinement: A Report of the Commission on Safety and Abuse in America's Prisons." Available at www.prisoncommission.org.

Goffman, Erving. 1963. *Stigma: Notes on the Management of Spoiled Identities*. Simon & Schuster.

Greenwald A., D. McGhee, and J. Schwartz, 1998. "Measuring individual differences in implicit cognition: the implicit association test." *Journal of Personality and Social Psychology* 74, pp.1464~80.

Grief, Avner, "Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies." *The Journal of Political Economy*, 102 (5), 1994, pp.912~950.

Hanushek, Eric A., John F. Kain, and Steve G. Rivkin, "New evidence about Brown v. Board of Education: The Complex Effects of School Racial Composition on Achievement." Working Paper 8741, National Bureau of Economic Research, 2002.

Holzer, Harry J., *What Employers Want: Job Prospects for Less-Educated Worker*s, New York: Russell Sage Foundation, 1996.

Holzer, Harry J., Steven Raphael, and Michael A. Stoll, "Employer Demand for Ex-Offenders: Recent Evidence from Los Angeles," March 2003, pp.1~24.

Hoxby, Caroline Minter, "Peer Effects in the Classroom: Learning from Gender and Race Variation." National Bureau of Economic Research, 2000.

Jackson, Matthew, “The Study of Social Networks in Economics,” Unpublished manuscript, Department of Economics, Stanford University, 2007.

Jacob, Brian, “Public Housing, Housing Vouchers, and Student Achievement: Evidence from Public Housing Demolitions in Chicago,” Kennedy School of Government, 2003.

James, Joy, *The New Abolitionists: (Neo)Slave Narratives and Contemporary Prison Writings*, Albany: State University of New York Press, 2005.

Johnson, Rucker C. and Steven Raphael, “The Effects of Male Incarceration Dynamics on AIDS Infection Rates among African –American Women and Men,” Goldman School of Public Policy, University of California, Berkeley, July 2005, pp.1~65.

Katznelson, Ira, *When Affirmative Action Was White: An Untold History of Racial Iequality in Twentieth-Century America*, New York: W.W. Norton, 2005.

Kennedy, Randall, 1997. *Race, Crime and the Law*, New York: Vintage Books.

Kleiman, Mark and Steven Teles, “Escape from America’s Prison Policy.” *The American Prospect*, Sept. 11, 2000, pp.30~34

Kleiman, Mark, “Controlling Drug Use and Crime among Drug-Involved Offenders.” Phillip Heymann (ed.). *Drug Addiction and Drug Policy*. Cambridge: Harvard University Press, 2001.

Kremer, Michael and Dan Levy, “Peer Effects and Alcohol Use Among College Students,” National Bureau of Economic Research, 2003.

Levitt, Steven D., “The Effect of Prison Population Size on Crime Rates: Evidence from Prison Overcrowding Litigation,” *Quarterly Journal of Economics* 111:2, 1996, pp.319~52.

Levitt, Steven D., “Using Electoral Cycles in Police Hiring to Estimate the Effect of Police on Crime.” *American Economic Review*. 87 (3), 1997, pp.270~90.

Levitt, Steven D., “Juvenile Crime and Punishment.” *Journal of Political Economy*, December, 106, 1998, pp.1156~185.

Levitt, Steven D., 1998. “Why Do Increased Arrest Rates Appear to Reduce Crime: Deterence, Incapacitation, of Measurement Error?” *Economic Inquiry*; Jul 1998 36, 3; ABI/INFORM Complete pp.353~372.

Levitt, Steven D., 2004. “Understanding Why Crime Fell in the 199s: Four Factors that Explain the Decline and Six that Do Not.” *Journal of Economic Perspectives* Vol. 18, No. 1 Winter 2004. pp.163~190.

Liptak, Adam, 2005a. “Inmate was considered property of gang, witness tells jury in prison rape lawsuit.” *New York Times*. (September 25)

Liptak, Adam, 2005b. “Locked away forever after crimes as teenagers.” *New York*

Times. (October 3)

Loury, Glenn C., 1977. “A Dynamic Theory of Racial Income Differences.” In *Women, Minorities and Employment Discrimination*, edited by Phyllis Wallace and Annette LaMond. Lexington: Lexington Books.

Loury, Glenn C., “Intergenerational Transfers and the Distribution of Earnings,” *Econometrica* (July), 1981.

Loury, Glenn C., *One By One From the Inside Out: Essays and Reviews on Race and Responsibility in America*. New York: The Free Press, 1995.

Loury, Glenn C., “The Impossible Dilemma.” *The New Republic* (Jan. 1), 1996.

Loury, Glenn C., *The Anatomy of Racial Inequality*. Harvard University Press, 2002.

Loury, Glenn C., Steven Teles, and Tariq Modood (eds). *Ethnicity, Social Mobility and Public Policy in the US and the UK*. Cambridge University Press, 2005.

Lucas, Robert E., Jr., “The Mechanics of Economic Development.” *Journal of Monetary Economics*, 22, 1998, pp.3~42.

Lundberg, Shelly and Richard Startz, “On the Persistence of Racial Inequality.” *Journal of Labor Economics* 16, 1998 pp.292~323.

Mansa, Jeff and Christopher Uggen, *Locked Out: Felon Disenfranchisement and American Democracy*, Oxford: Oxford University Press, 2006.

Massey, Douglas and Nancy Denton, “The Dimensions of Residential Segregation,” *Social Forces* 67, 1988, pp.281~315.

McPherson, Miller, Lynn Smith-Lovin, and James Cook, “Birds of a Feather: Homophily in Social Networks,” *Annual Review of Sociology* 27, 2001, pp.415~44.

McWhorter, John, *Losing the Race: Self-Sabatoge in Black America*, New York: The Free Press, 2000.

Mookherjee, Dilip and Debraj Ray, “Persistent Inequality,” *Review of Economic Studies* 70 (2), 2003, pp.369~393.

Morone, James, *Hellfire Nation: The Politics of Sin in American History*, New Haven: Yale University Press, 2003.

Myrdal, Gunnar, *An American Dilemma: The Negro Problem and Modern Democracy*, New York: Harper & Brothers, 1944.

Neal, Derek, “Why Has Black-White Skill Convergence Stopped?” in Eric Hanushek and Finis Welch (eds.). *Handbook of the Economics of Education*, Elsevier, 2006.

North, Douglas, *Structure and Change in Economic History*, W.W. Norton & Company, 1981.

Ogbu, John, *Black Students in Affluent Suburbs: A Study in Academic Disengagement*, Mahwah, NJ: Lawrence Erlbaum, 2003.

Oreopoulos, Philip, “The Long-Run Consequences of Living in a Poor Neighborhood,” *Quarterly Journal of Economics*, 118 (4), 2003, pp.1533~75.

Pager, Devah, “The Mark of a Criminal Record,” *American Journal of Sociology* 108, 2003 pp.937~75.

Parenti, Christian, *Lockdown America: Police and Prisons in the Age of Crisis*. London: Verso, 2000.

Patterson, Orland, *Rituals of Blood: The Consequences of Slavery in Two American Centuries*, New York: Basic-Civitas, 1998.

President’s Council of Economic Advisors, *Economic Report of the President*, Washington: U.S. Government Printing Office, 1991, 2003.

Quillian, Lincoln, “New Approaches to Understanding Racial Prejudice and Discrimination,” *Annual Review of Sociology* 32, 2006, pp.299~328.

Raphael, Steven, “The Socioeconomic Status of Black Males: The Increasing Importance of Incarceration,” Goldman School of Public Policy, University of California, Berkeley. March. 2004, pp.1~38.

Risse, Mathias and Richard Zeckhauser, “Racial Profiling,” *Philosophy and Public Affairs*. 32 (2), 2004, pp.131~170.

Sacerdote, Bruce, “Peer Effects with Random Assignment: Results for Dartmouth Roommates.” *Quarterly Journal of Economics* 116, 2001, pp.681~704.

Sampson, Robert J. and John H. Laub, *Crime in the Making: Pathways and Turning Points Through Life*, Cambridge, MA: Harvard University Press, 1993.

Schelling, T., “Dynamic Models of Segregation,” *Journal of Mathematical Sociology* 1, 1971, pp.143~86.

Schelling, Thomas, *Micromotives and Macrobehavior*. New York: W. W. Norton & Co., 1978.

Schuman, H., C. Steeh, L. Bobo, and M. Krysan, *Racial Attitudes in America: Trends and Interpretations*, Revised Edition, Cambridge: Harvard University Press, 1997.

Sethi, Rajiv and Rohini Somanathan, “Inequality and Segregation.” *Journal of Political Economy* 112, 2004, pp.1296~321.

Sidanius, James and Felicia Pratto, *Social Dominance: An Intergroup Theory of Social Hierarchy and Oppression*, Cambridge University Press, 2001.

Steele, Shelby, *A Dream Deferred: The Second Betrayal of Black Freedom*. New York: HarperCollins, 1998.

Tajfel, Henri, M. Billig, R. P. Bundy, and Claude Flament, “Social Categorization and Intergroup Behavior,” *European Journal of Social Psychology* 1, 1971, pp.149~77.

U.S. Supreme Court, “Brown v. Board of Education, 347 U.S. 483.”, 1954.

Thernstrom, Stephen and Abigail Thernstrom, *America in Black and White: One Nation Indivisible*. New York: Simon and Schuster, 1997.

Venkatesh, Sudir A. and Steven D. Levitt, "Are We a Family or a Business?' History and Disjuncture in the Urban American Street Gang," *Theory and Society* 29, 2000, pp.427~62.

Wacquant, Loïc, "The New 'Peculiar Institution': On the Prison as Surrogate Ghetto," *Theoretical Criminology* 4, 2000, pp.377~89.

Wacquant, Loïc, "Deadly Symbiosis: When Ghetto and Prison Meet and Mesh," pp.82~120 in *Mass Imprisonment: Social Causes and Consequences*, edited by David Garland. London: Sage.

Walmsley, Roy, *World Prison Population* List (sixth edition). London: International Centre for Prison Studies at King's College, 2002.

Warr, Mark, 1998. "Life-Course Transitions and Desistance From Crime," *Criminology* 36: 183-216.

Waters, Mary, *Black Identities: West Indian Immigrant Dreams and American Realities*, Harvard University Press, 2001.

Weaver, Vesla M. "Dark Prison: Race, Rights, and the Politics of Punishment." (draft Ph.D. dissertation, Department of Political Science, Harvard University)

Weinberg, Bruce, Patricia Reagan, and Jeffrey Yankow. 2004. "Do Neighborhoods Affect Hours Worked? Evidence from Longitudinal Data." *Journal of Labor Economics* 22:4, pp. 891-921.

Western, Bruce, 2006. *Punishment and Inequality in America*. New York: Russell Sage Foundation.

Western, Bruce and Becky Pettit, 2004. "Mass Imprisonment and the Life Course: race and Class Inequality in U.S. Incarceration." *American Sociological Review*, Vol. 69, 2004, pp.151-169.

Western, Bruce and Becky Pettit, 2005. "Black-White Wage Inequality, Employment Rates, and Incarceration." *American Journal of Sociology*, Volume 111 Number 2 (September 2005): pp. 553-78.

Western, Bruce, Becky Pettit, and Josh Guetzkow, "Black Economic Progress in the Era of Mass Imprisonment," in Marc Mauer and Meda Chesney-Lind (eds.), *Invisible Punishment: The Collateral Consequences of Mass Imprisonment*, New York: Free Press, 2002, pp.165~180.

Western Bruce, and Katherine Beckett, 1999. "How Unregulated is the U.S. Labor Market? The Pena System as a Labor market Institution." *American Journal of Sociology*, Vol. 104, No. 4. pp.1030~1060.

Witte, Ann, "Estimating the Economic Model of Crime with Individual Data." *Quarterly*

Journal of Economics, February 1980, pp.57~84.

Wolff, Edward, 1998. “Recent trends in the size distribution of household wealth.” *Journal of Economic Perspectives*, 12:3, pp.131~50.

Young, H. Peyton, *Individual Strategy and Social Structure: An Evolutionary Theory of Institutions*, Princeton, NJ: Princeton University Press, 1998.

Zimmerman, David J. and Gordon Williams, “Peer Effects in Higher Education.” National Bureau of Economic Researchm, 2003.

Ziedenberg, Jason and Vincent Schiraldi, “Cellblocks or Classrooms?: The Funding of Higher Education and Corrections and Its Impact on African American Men,” Washington D.C.: Justice Policy Institute, September, 2002.

CHAPTER 2

사회적 성과 보상*

심 상 달
(한국개발연구원 초빙연구위원)

1. 서 론

가. 자본주의 경제체제의 위기와 공유가치 창출

아직 끝나지 않은 전 세계적인 금융위기 속에서 우리는 기존의 자본주의가 세계의 지속적인 발전을 보장해 줄 수 있는가에 대한 위기의식을 느끼고 있다. 개발도상국이나 소위 선진국을 막론하고 경제 양극화와 빈곤층 증가 문제는 심화되고 있으며, 금융위기의 극복과 고령화라는 구조적 요인으로 인해 재정적자에 허덕이는 각국 정부는 부의 편중이라는 시장의 문제점을 해결하는 데에 그 부족함을 드러내고 있다. 시민들은 이제 정부가 시장의 문제들을 해결하기 위해 세금을 더 걷는 것을 원하지 않는다. 정부가 돈을 효율적으로 사용하는 능력을 상실했다고 믿기 때문이다. 각국의 금융 및 재정 위기와 이후 전 세계적으로 확산되고 있는 분노의 시위들은 결국 각각 정부와 시장의 실패를 극명하게 나타내주고 있다고 하겠다.

이러한 시장과 정부의 실패는 과연 어떻게 해결될 수 있을 것인가? 기존

* 본 논문은 2012년 6월 20일에 개최된 2012 KDI Journal of Economic Policy Conference에서 발표된 것을 보완·재정리한 것이다. 본 논문을 위해 자료를 제공하여 준 SK 행복나눔재단 이승현 팀장 및 SK경제연구소의 최지영 수석연구원, 아울러 원고 정리에 도움을 준 KDI 임채정 연구원에게 감사를 표한다.

의 자본주의를 개선할 새로운 경제체제를 어떻게 만들어 나갈 것인가? 국민을 설득하고 변화시킬 수 있는 정치적인 리더십이 부재하는 지구촌에서 공생발전을 이루기 위해서는 기업이 사회와 공유하는 가치를 창출하도록 할 필요가 있다. 이에 대해 마이클 포터와 잭 크레이머(2011)[1]는 사회적 가치와 재무적 이윤의 창출은 서로 맞물려 있다고 말한다. 기업의 목적을 주주만의 이익을 추구하는 데서 사회와 공유하는 가치를 추구하는 것으로 재정립하는 것은 사회를 더 좋은 방향으로 개선시킬 뿐만 아니라 기업에게 아직 충족되지 않은 새로운 시장과 이윤의 기회를 가져다 줄 수 있다는 것이다. 이처럼 사회적 가치와 재무적 이윤을 동시에 추구하는 공유가치 창출(Creating Shared Value)은 이미 전 세계에서 다양한 방법으로 시도되고 있다. 많은 사회적 기업, 혹은 기존의 영리기업들이 아직 충족되지 않은 사회적 수요에 맞추어 상품과 서비스를 개발하거나 공급체인을 개선하고 있으며, 제품 원산지의 사회시설 정비 및 교육투자를 통해 사회적 기반과 생산성의 향상을 동시에 추구하고 있기도 하다. 공유가치 창출을 위하여 사회적 기업가와 일반 영리기업이 생산의 각 단계에서 서로 잘하는 것을 협력하여 더 큰 경제적 이윤과 사회적 가치를 창출 하는 것을 Bill Drayton(2006)은 '혼합 가치 사슬(Hybrid Value Chain)'이라고 한 바 있다.

이러한 공유가치 창출은 재정위기 극복을 위한 하나의 방법으로도 쓰일 수 있는데, 이는 각 분야에서 사회적 가치를 추구하는 기업들이 많아질수록 정부는 사회보장지출을 줄일 수 있기 때문이다. 대규모의 재정적자와 씨름하는 각국 정부는 현재 공공부문 비용을 줄이기 위해 선제적으로 투자가 필요한 사회서비스부문ㅡ주택 지원, 직업 교육, 범죄 예방 등ㅡ에 제대로 돈을 쓰지 못하고 있다. 이러한 선제적 투자의 부재는 향후 교정과 사회안정망 마련에 더 많은 비용을 지불하게 하여 재정적자를 심화시키는 악순환에 빠질 위험이 있다. 최근 재무적 이윤과 함께 사회적 가치를 추구하는 사회목적투자(Impact Investment)라는 새로운 자산형태가 형성되고 있어 위의 문제를 해결할 희망을 제공하고 있다. 공공부문에 대한 정부의 자금 집행이나 보조금 지급과는 달리 사회목적투자는 민간 기업이나 사회적 기업이 새

1 Michael Porter, Creating Shared Value, *Harvard Business Review*, Jan 2011.

로운 아이디어와 기업가적 마인드를 통해 정부가 기존에 제공하지 못했던 새로운 서비스를 제공하거나, 서비스 제공방식을 개선하여 재무적 수익을 창출하고 이를 다시 사회부문에 재투자하는 것을 가능케 한다. 이를 통해 기존에 정부가 제공하던 사회적 서비스의 가치와 그 혜택이 증대됨은 물론, 사회적 가치와 이윤을 동시에 추구하는 기업의 능력과 영향력이 확대될 수 있다.

사회적 가치와 재무적 이윤을 동시에 추구하는 공유가치 창출과 이러한 공유가치 창출사업을 가능케 하는 사회목적투자는 이처럼 시장의 실패와 정부의 실패를 극복하는 새로운 자본주의의 대안이 될 수 있다고 할 것이다. 그러나 현재 사회목적투자는 새로운 자본주의의 대안으로서의 그 가능성에 걸맞은 발전을 이루지 못하고 있다. 사회적 가치 창출을 시장이 보상하지 못하고 있기 때문이다.[2] 사회적 기업을 포함하는 비영리기관이 성장하기 위해서는 사회목적투자 또는 사회적 기업에의 투자가 활성화되어야 하며, 이를 위해서는 사회적 가치 창출이 재무적 가치로 보상되는 시스템이 마련되어야 할 것이다. 이를 위한 방법 중 하나로 지난 '2012 사회적 기업 포럼'[3]에서는 사회적 기업이 창출하는 사회적 가치를 측정하여 이에 대하여 세제혜택을 제공하자는 의견이 제기되었다.[4]

본 논문에서는 사회적 성과를 보상해 주는 프로그램의 하나로서 사회적 기업의 사회적 성과로 인해 절감되는 정부비용의 일부를 투자 원금과 이익으로 사회적 기업에 돌려주는 영국의 Social Impact Bond를 분석하고, 이를 우리나라에 도입할 수 있는지를 모색함과 아울러 사회적 기업 투자에 대한 세제혜택 등 사회목적투자가 활성화될 수 있는 다른 여러 방안을 검토하도록 하겠다.

---

2 사회목적투자자 중에는 사회적 가치에 대한 보상을 바라지 않는 사람들과 사회적 가치 창출을 위해서 재무적 가치를 희생해서는 안 된다고 생각하는 사람들도 상당수가 있다. 그러나 사회적 가치 창출에 보상이 따른다면 영리적인 목적으로 투자를 하는 사람들을 포함하여 더 많은 사람들이 사회목적투자에 관심을 가질 수 있을 것이다.

3 2012 사회적기업 포럼 "공생발전을 위한 협력적 기업가정신", 2012. 4. 30.

4 사회적 가치 창출을 보상하는 시스템을 만들자는 의견은 2012년 4월 30일 한국경영학회와 SK가 주최한 '사회적기업포럼 2012'에서 SK 최태원 회장에 의해 제기되었다.

나. 성장자본 유치에 어려움을 겪는 사회적 기업가

현재(2012년 6월 기준) 고용노동부 인증 국내 사회적 기업의 수는 656개로 2007년 55개소 대비 1092% 증가하여 급속한 성장세를 보이고 있다.[5] 그러나 많은 사회적 기업들이 아직도 정부 또는 기업의 보조금 이외에 사회적 가치 창출에 대한 적절한 사회적 투자를 유치하는 데 어려움을 겪고 있다. 총 인증 사회적 기업의 자산규모는 3,300억 정도로 추정되며, 이 중 정부 또는 일반 기관의 보조금은 90% 이상을 차지 하고 있다. 사회적 기업가 개인의 신용 또는 담보 없이는 민간자본 조달이 어려우며, 단순한 보조금이 아닌 사회적 문제를 해결하기 위한 투자로서의 Social Fund는 아직 정착되지 못하고 있다.

국내 사회적 기업의 운영 현황을 보면 2009년 기준으로 평균 매출액 8억원, 영업이익은 -1억 9,500만원, 당기 순이익은 2,400만원으로 연도별 영업이익 및 당기 순이익은 매년 감소세를 보이고 있으며 운영 적자를 정부 지원금으로 보충하고 있는 것이 현실이다.[6] 현재 사회적 기업의 아이디어가 다양해지고, 그 사업영역이 확대되며, 재능 있는 사회적 기업가들이 늘어나고 있는 현실을 감안하면, 사회적 기업가가 초기 성장단계를 거치기 위해 필요한 민간투자를 제대로 받지 못하는 것은 매우 안타까운 현실이다. 이는 사회적 기업 및 사회적 투자에 대한 인식수준이 아직 낮으며, 사회적 기업에 대한 투자가치 판단을 위한 평가 시스템 및 정부 세제혜택의 부재에 기인한다고 하겠다.

앞서 사회적 기업이 영리기업과 함께 사회적 가치와 재무적 이윤을 함께 추구하는 공유가치 창출을 언급한 바 있다. 그러나 사회적 기업이 해결하고자 하는 사회적 문제 중에는 기업의 비즈니스 라인과 연결되지 못하는 영역도 많이 있다. 장기 실업상태에 있는 사람들을 교육시켜서 일자리를 만들어주는 일을 하는 민간 비영리단체나 거리의 노숙자들을 돌보는 사회적 벤처 등이 그러한 예이다. 이들은 훌륭한 사회적 가치를 창출하고 있음에도 불구

---

5 고용노동부 산하 한국사회적기업진흥원.

6 SK 행복나눔재단 사회적기업사업단, 2011. 10. 11.

하고 재무적 이윤을 추구하기 어려운 사업구조를 갖고 있다. 실제 이러한 서비스들은 정부가 제공해야 할 일을 민간 비영리단체나 사회적 기업이 대체하고 있는 것으로 많은 사회적 서비스가 이러한 부류에 속한다. 이러한 영역에서 활동하는 사회적 기업은 대부분 개인 기부금이나 정부의 보조금에 의해 운영되고 있으며, 이러한 자금은 그 성격상 단기에 그치거나 사업의 성장을 도모하기에는 너무 작은 규모인 경우가 많다. 이는 비영리단체나 사회적 기관들이 장기적인 성장전략을 세우는 데 걸림돌이 되고 있으며, 이로 인해 몇몇 성공적인 사회적 기업조차 그들의 서비스와 상품을 많은 사람들에게 알리고 전달하는 데 어려움을 겪고 있다 하겠다. 자금을 집행하는 측면에서도 어떠한 사업이 더 효과적인가를 판단하기에는 충분한 척도를 갖고 있지 않기 때문에 더 잘하는 기관에게 더 많은 기회와 자금을 부여할 시스템이 부족한 것이 현실이다. 본 논문은 소셜임팩트본드라는 새로운 금융상품을 통해 이러한 현실을 개선할 수 있는 가능성을 모색해 보고자 한다.

2. 소셜임팩트본드[7]

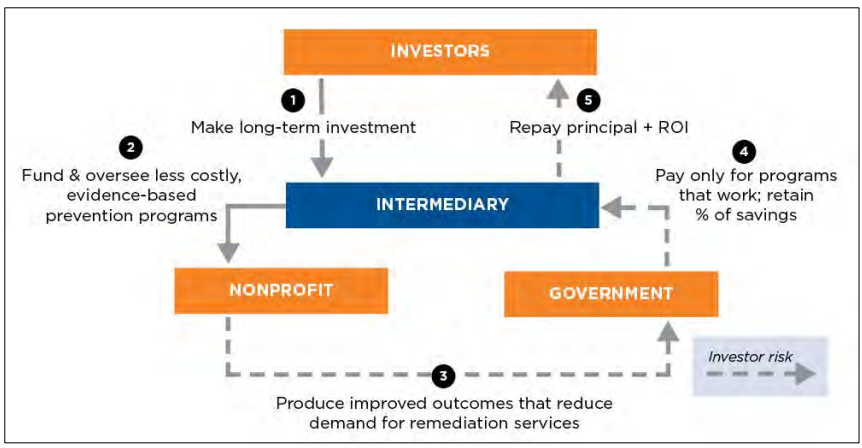
가. 소셜임팩트본드란 무엇인가

'소셜임팩트본드(Social Impact Bond)'는 비영리단체나 사회적 기업의 활동으로 인해 향상된 사회적 성과에 대하여 재무적 이윤을 지불하기로 약속하는 공공부문과의 계약이다. 비영리단체나 사회적 기업은 이 계약에 입각하여 사회적인 목적을 갖고 있는 투자자들로부터 자금을 모을 수 있으며, 이 자금은 사회적 문제를 해결하고 개선시키기 위한 사업에 사용된다. 이러한 사회적 성과가 발생하면 투자자는 개선된 사회적 성과로 인해 절감된 정부의 비용으로부터 투자 원금과 이윤을 돌려받을 수 있게 된다. 이때 돌려받는 이윤은 사회적 성과가 개선되는 정도에 따라 달라진다. 현재 소셜임팩

7 소셜임팩트본드에 대한 자료는 많은 부분 Social Finance Inc.에서 발간하고 Rockefeller Foundation에서 후원한 "A New Tool For Scaling Impact: How Social Impact Bonds Can Mobilize Private Capital to Advance Social Good"에서 발췌하였다.

트본드는 공공부문이 제공하지 않는 예방적·조기 치료적인 프로그램을 사회적 기업이 혁신적인 방법으로 실행하게 하고, 이후 이로 인해 발생하는 정부의 비용절감효과를 평가해 그중 일부를 투자자들에게 이익으로 되돌려 주는 방식으로 사용되고 있다.

[그림 1] 소셜임팩트본드의 성과 보상구조[8]

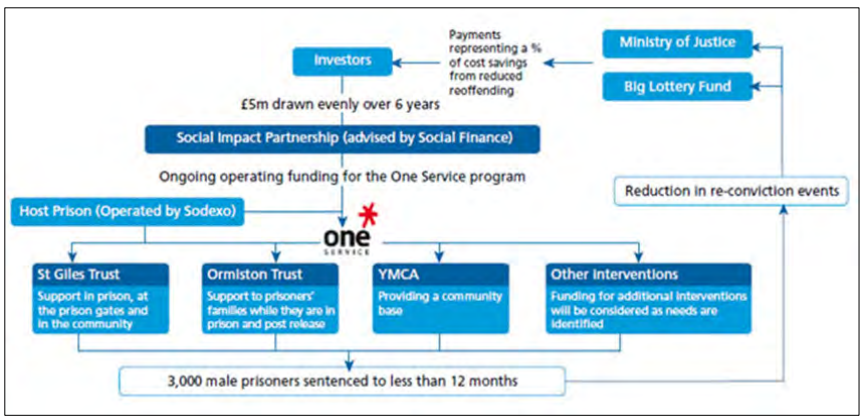


세계 최초의 소셜임팩트본드는 영국 Social Finance가 Peterborough 지방교도소 출소자 사회정착 프로그램을 실행하기 위해 2010년 9월 발행되었다. 17명의 투자자들로부터 모은 5백만파운드는 6년에 걸쳐 가벼운 형을 선고받은 수감자들의 재수감률을 줄이는 데 사용된다. 보통 1년 이하의 수감자들은 형을 마친 후 제대로 된 보호와 지원을 받지 못하며, 이에 따라 이들의 1년 이내 재수감률은 60%에 달한다. 소셜임팩트본드의 계약에 참여하는 Rockefeller Foundation과 같은 자선단체들의 투자자금은 따라서 약 3,000여 명의 수감자들에게 맞춤화된 일대일 멘토링, 직업훈련, 주거 제공 등을 통합한 종합서비스를 제공하는 데 사용된다. 영국의 법무부와 Big Lottery Fund는 이 프로그램에 참가한 수감자들이 형을 마친 후 1년 이내 재범률이 비교그룹에 비해 7.5% 이상 줄어들면 투자자들에게 일정한 배당금을 제공하

8 Social Finance Inc. http://www.socialfinance.org.uk/.

기로 보증하고 있다.[9] Peterborough 소셜임팩트본드는 8년 만기로 1년부터 6년까지 매년 자본투입이 이루어지며, 조건이 충족될 경우 투자자들에 대한 수익은 4, 6, 8년 차에 배분된다. 이때 수익률은 프로그램의 성과에 따라 2.5%에서 13%로 예상되고 있다.[10]

[그림 2] Peterborough 소셜임팩트본드의 구조[11]



소셜임팩트본드의 힘은 비영리서비스 제공자와, 개인적 투자자, 그리고 정부의 이해를 조율하여 사회에 꼭 필요한 변화를 효과적인 방법으로 이룰 수 있다는 점에 있다. 또 하나의 핵심적인 특징은 정부가 향후 더 많은 비용을 지불해야 할 교정의 필요를 줄이기 위해, 예방과 조기 개입 프로그램을 위한 자금을 제공할 수 있다는 점이다. 소셜임팩트본드를 통해 정부는 노숙자문제, 범죄나 다른 경제적 사회적 조건을 악화시키는 문제의 근본 원인을 다루는 데 민간의 혁신적 아이디어와 효과적인 프로그램을 사용할 수 있게 되며, 성과에 따른 보상을 통해 정부가 갖는 재무적 리스크를 줄일 수 있게

9 Peterborough 소셜임팩트본드의 성과는 단지 프로그램에 참가하는 출소자들이 다시 범죄를 저지르느냐 아니냐가 아니라 출소자 전체의 재수감 횟수를 기준으로 평가된다. 따라서 이러한 소셜임팩트본드 발행사업에 참여한 단체들은 Peterborough 교도소를 떠나는 모든 수감자들을 지원할 유인이 있다. 성공률이 높은, 좋은 출소자만을 골라 프로그램을 실시하는 것(Cherry Picking)을 방지하는 시스템을 갖추고 있다고 하겠다.

10 Emily Bolton and Jenna Palumbo, "Overview of the Peterborough Social Impact Bond," Social Finance UK, March 2011.

11 The Lancet: UK Policy Matters, http://ukpolicymatters.thelancet.com/.

된다.

정부기관들은 예방적 정책의 효과를 잘 인지하고 있지만 많은 자금이 소요되는 조기 예방 프로그램을 실행할 재정적 여유가 없을 뿐 아니라 이러한 프로그램이 실패할 위험을 꺼리고 있다. 특히 선거 사이클에 따른 단기적 시각은 위험이 많은 장기적이고 예방적인 투자를 회피하게 한다. 또한 정부기관들은 자신의 영역 안에서 일하려고 하는 경향 때문에 여러 분야에 걸친 문제를 해결하기 위해 협력하는 것에 어려움을 느끼게 된다. 교정과 예방에 필요한 예산은 각 부처들에 나누어지기 때문에 큰 규모의 효과적인 통합 프로그램을 정부 기관들이 서로 협조해서 개발하고 제공할 유인이 부족한 문제도 있다. 소셜임팩트본드는 정부로 하여금 예방 프로그램에 수반되는 금융위험을 민간투자자들에게 전가할 수 있게 함으로써 이 모든 문제를 해결할 수 있다. 또한 서비스 및 상품에 대한 평가와 리스크 관리에 뛰어난 민간투자자들에게 리스크 관리를 맡겨 더 효과적인 사회적 가치 창출이 가능함과 동시에 효과적인 아이디어를 가진, 성과가 좋은 비영리기관에 장기적인 성장자본을 제공할 수 있게 된다.[12]

소셜임팩트본드의 발행에 가장 적합한 대상은 장애인이나 노숙자 등 잘 정의된 대상 그룹과, 이들의 삶을 개선시키는 데 성공적인 서비스를 제공한 실적이 있는 비영리단체들이 될 것이다. 투자자들은 비영리단체가 제대로 된 성과를 만들어 낼 수 있다고 확신할 수 있을 때에만 투자를 할 것이기 때문이다. 또한 사회적 기업 및 비영리단체의 성과는 단기간에 정부비용의 절감으로 연결될 수 있어야 하며, 프로그램 성공 시 정부비용 절감액이 소셜임팩트본드의 비용을 상쇄함은 물론 참여한 투자자들에게 일정한 수익을 제공할 수 있을 만큼 충분히 커야 한다. 이를 위해서는 앞의 영국Peterborough 소셜임팩트본드의 사례처럼 채권의 생애주기 동안 프로그램이 계속 추적할 수 있는 대상 그룹이 있고, 프로그램을 실행하지 않는 그룹과 비교하여 성과를 평가할 수 있는 척도 또한 있어야 한다.

---

12 소셜임팩트본드는 정부기관들이 프로그램을 통한 비용절감요소를 찾아내어 투자자 상환을 위해 함께 노력할 유인을 제공한다.

나. 소셜임팩트본드의 성공을 위한 중간조직의 역할

소셜임팩트본드의 성공을 위해서는 헌신적인 '중간조직(Intermediary)'의 역할이 중요하다. 중간조직은 이러한 채권의 개발 및 발행뿐 아니라 이 상품의 생애주기 동안 민・관・비영리기관 파트너십을 관리하는 데 중요한 역할을 할 수 있다. 사업기회의 발굴(Deal Sourcing), 사업 디자인, 정부와의 계약 확보, 상품 구조화, 채권 발행 등 소셜임팩트본드의 개발 및 발행에 관련된 모든 일들이 중간조직의 역할로 지칭될 수 있을 것이다. 또한 투자자들과의 관계 및 사업 관리 측면에서도 투자자들로부터 자본을 모으는 일, 투자자들이 상품의 가격과 리스크를 분석하고 판단할 수 있는 창구를 제공하는 것 등이 포함된다. 중간조직은 이로써 채권의 발행 및 평가, 수익의 배분 등과 같이 전 기간에 걸쳐 복잡한 프로젝트를 관리하고 리스크를 줄이며 서비스 제공자들이 장기간 동안 목표로 하는 성과를 이룰 수 있도록 돕는 역할을 하게 된다.

민간투자 유치사업에서 정부가 성과를 기준으로 현금을 지불하는 방식은 그동안 많이 실행되어 왔다. 민간이 운영하는 시설에 대한 이용실적을 기준으로 현금을 지급하는 방식이나, 바우처를 나눠주고 이용자가 선택하여 서비스를 구매하게 하는 것 등이 그 예이다. 이러한 프로그램들은 정부가 시민의 선택권을 늘리기 위해 기존에 하던 프로그램을 아웃소싱했던 차원에 그친다. 반면 소셜임팩트본드는 정부가 그동안 실행하지 않았던 새로운 프로그램을 민간과 시민사회가 고안하고, 정부가 그중 한 프로그램을 선정하며, 이 프로그램의 리스크를 전적으로 투자자들이 부담하도록 하여 사회적 문제를 해결하기 위해 필요한 서비스를 통합하여 제공한다는 것이 그 특징이라 하겠다.

소셜임팩트본드는 공유가치 창출을 위하여 중간조직을 중심으로 성과연계보상계약을 통해 공공부문, 투자자 그리고 시민사회가 협력하는 것이다.

다. 소셜임팩트본드의 전망

소셜임팩트본드는 사회목적투자부문의 유망한, 새로운 상품으로 효과적인 사회적 사업 프로그램에 수십억달러 규모의 성장자본을 공급하게 될 가능성이 있다. 지금은 초기단계에 있지만 미국과 호주, 캐나다, 아일랜드의 정부와 비영리단체 등이 현재 소셜임팩트본드의 발행을 시작하는 데 관심을 갖고 있다. 호주는 2011년 9월 Social Benefit Bonds에 대한 제안서(Request for Proposal) 모집공고를 하였으며,[13] 미국의 오바마 대통령은 2012년 예산에 소셜임팩트본드를 위한 자금으로 1억달러를 요청하기도 하였다. 미국의 매사추세츠 주는 2011년 'Request for Information'을 요청함으로써 소셜임팩트본드에 관심을 표시한 첫 번째 주가 되었으며, 2012년 1월에는 노숙자와 소년원 수감자들에 대한 지원 확대를 위해 소셜임팩트본드를 사용하는 것을 고려하는 'Request-for-Response(RFR)'를 발표하였다. 이러한 소셜임팩트본드에 대한 세계적인 관심은 사회적 자본 시장의 확대를 위한 이 상품의 가치를 반증하고 있다 하겠다.

초기의 소셜임팩트본드는 자선가에 가까운 투자자들이 관심을 갖고 있는 서비스에 대해, 단기간에 정부의 비용절감으로 이어질 수 있는 프로그램에 운영자금을 제공하는 형식이 될 것이다. 그러나 향후 소셜임팩트본드의 구조는 시간이 지날수록 다양해지고 유연해질 것으로 예측되고 있다. 일례로 정부가 지불을 보증할 수 없는 경우, 자선재단이 채권의 보증자로 참여하는 방식이 있을 수 있다. 이미 2012년 8월에 골드만삭스는 Social Finance Inc.의 중개로 뉴욕 시의 라이커스 아일랜드의 소년원 수감자 교정 프로그램을 위하여 960만달러를 대출하였다. 이 소셜임팩트본드 계약은 10% 이상 재수감률이 떨어질 경우 원금을 뉴욕 시가 갚아 주기로 되어 있으며, 성과에 따라 210만달러를 추가로 받게 되어 있고 마이클룸버그재단이 원금을 부분 보증하기 때문에 골드만삭스는 최악의 경우에도 75% 이상 손해를 보지 않는 구조로 설계되었다.

소셜임팩트본드사업이 추진하는 사회문제의 해결이 자신에게 유리한 경

---

13 Australia NSW Treasury, http://www.treasury.nsw.gov.au/.

우, 일반 영리기업 또한 채권의 발행자가 될 수 있을 것이다. 건강보험회사들의 경우, 특정 인구의 건강보험지급 청구를 줄이는 소셜임팩트본드에 참여하고자 할 수 있다. 소셜임팩트본드가 투자의 하방위험을 줄이도록 하는 구조로 설계될 경우, 투자에 대한 엄격한 규제를 받는 전문적인 기관투자가들도 투자자로 합류할 수 있을 것이다. 또한 소셜임팩트본드로 펀딩이 이루어진 프로그램들의 바스켓을 구성한다면, 소셜임팩트본드의 대상이 건별 투자가 아닌 다양한 사업의 포트폴리오로 구성되어 투자자의 위험을 분산하게 될 수 있을 것이다.

3. 우리나라 소셜임팩트본드 도입 가능성 검토

가. 유망영역

우리나라에서도 사회적 기업을 활성화하고 조기 예방이 필요한 공공서비스 부족 문제를 해결하기 위한 방안으로 소셜임팩트본드의 도입을 고려해 볼 수 있다. 유망한 사업대상으로는 만성적인 노숙인들, 청소년 및 성인 범죄자들, 저소득 노인을 고려할 수 있을 것이다. 노숙인들은 응급실, 감옥과 노숙자 쉼터를 드나들며 납세자에게 상당한 부담을 준다. 미국에서는 노숙인들에게 '영구적 주거지원서비스(Permanent Supportive Housing)'를 제공하였는데, 이러한 정책이 노숙인에 대한 처우를 개선함과 동시에 공공비용을 크게 절감시키는 것으로 나타났다.

우리나라에서도 노숙인들에게 저렴한 주거서비스와 맞춤 의료서비스를 함께 받을 수 있는 총체적 서비스를 제공하는 것을 가정해보자. 이러한 프로그램이 제공되기 전, 한 국가에서 만성적인 노숙인들에게 들어가는 비용이 1,000억원이라고 가정했을 때, 영구적 주거지원서비스가 제공되면 이후에 이러한 비용을 현저히 줄일 수 있다. 소셜임팩트본드가 평가와 관리 비용을 포함해 영구적 주거지원프로그램을 시행하기 위해 필요한 사업비용을 400억원으로 책정하고, 외래 진료와 예방적 진료를 위해 필요한 비용을 250억원으로 책정할 경우, 정부는 350억원의 순 비용을 절감하게 되는 것이다.

이러한 서비스가 소셜임팩트본드로 시행되었다면, 정부는 이렇게 절감된 비용의 일부를 투자자들에게 수익으로 돌려주며, 나머지는 보유하여 향후 다른 정부사업에 집행할 수 있게 된다.[14]

또 다른 예로는 저소득 노인들에 대한 '재가(在家)서비스'를 들 수 있다. 우리나라는 현재 가장 급속한 속도로 노령화되고 있는 나라 중 하나이다. 65세 이상 노령인구의 비율은 2010년 11%에서 2030년에는 24%, 2050년에는 39%의 속도로 증가될 전망이며, 이에 따라 병약하고 거동이 불편한 노인들의 수가 더 많아질 것이다. 독립적으로 살 수 없는 이러한 노인들은 요양시설에 들어가야 하는데, 저소득층 노인은 장기 요양보험의 혜택과 의료보험의 혜택을 받을 자격이 있으므로 정부는 요양시설의 유지 및 의료서비스 지원에 상당한 비용을 지출하게 된다.[15] 우리나라에서는 이미 노인들을 위한 재가서비스가 부분적으로 실시되고 있지만, 만약 새로운 형태의 재가서비스와 같은 효과적인 대체 요양서비스가 있다면 노인들은 자신의 집이나 동네에 머물며 더 저렴한 비용의 서비스를 제공받을 수 있게 될 것이다.

우리나라는 신용등급 7급 이하의 인구가 2010년 말 현재 830만명이고 이 중 부채의 늪에서 헤어나오지 못하는 다중 채무자가 23만명이라고 한다. 이러한 저신용자에 대한 재무개선 서비스도 대상사업이 될 수 있다. 이들의 문제는 금융에 접근하지 못해서가 아니라 악재, 고금리 대부업체 이용, 잘못된 재무설계 등 때문이라고 할 수 있다. 이러한 근본 원인을 해결하지 않고 단순히 고금리를 저금리로 바꾸어 주는 전환대출은 이들이 다시 사금융을 쓰게 하여 부채가 늘어나게 하는 결과를 낳고 있다. '희망을 만드는 사람들'이 제공하는 저신용자의 종합 재무개선 서비스는 저신용자들의 고통을 같이 느낄 수 있는 상담사들이 1:1로 부채상담을 하며 개별 현금흐름의 근본적인 해결책을 만들어 주면서 적합한 시점에 금융기관의 전환대출에 연계하고 있다. 또한 사후관리를 통해 생활패턴을 바꾸어 줌으로써 상당한 성과를 보이고 있다. 소셜임팩트본드를 발행하여 조달한 자금으로 이러한 성과가 입증

---

14 이 부분의 수치는 예시로서의 가정적인 수치이다.

15 이러한 기관에 입소하는 요건은 거동이 매우 불편한 사람들로 엄격히 제한되고 있기 때문에 아직은 비용부담이 많지 않지만, 고령인구의 증가로 이 비용은 급속히 증가할 것으로 예상된다.

된 재무개선 서비스를 확대하는 데 사용할 수 있다. 금융기관의 정년퇴직자 등을 훈련시켜 이들을 상담사로 채용함으로써 저신용자들에게 지속적으로 상담을 제공하며 그들의 생활패턴을 바꾸는 데 필요한 기타 서비스를 제공하는 것이다. 이를 통해 이들을 방치하였을 경우 저신용자들 중 일부가 최빈층으로 전락하게 됨에 따라 정부가 지급해야 하는 기초생활비와 이들을 교정하여 정상화시키기 위해 드는 몇 배의 비용을 절감할 수 있으며, 또한 가정의 해체와 우울증 등 저신용자들이 이 과정에서 받아야 하는 많은 고통을 줄여 줄 수 있다.

한편, 미국에서는 미국의 다른 지역보다 천식환자의 비율이 높은 캘리포니아 프레즈노웨스트의 저소득 천식환자들의 생활환경 및 습관을 바꾸도록 하는 프로그램을 비영리기관들이 제공하는 데 투자하는 '헬스임팩트본드'의 파일럿 프로젝트가 시작되었다. 이 프로젝트는 천식환자들의 건강이 현저히 좋아져서 이들이 병원에 입원하지 않아도 됨으로써 의료보험자들이 지급하는 의료비가 일인당 연 5,000달러가 줄어들 것을 기대한다. 우리나라에서도 개인들이 질병의 뿌리가 되는 탈수를 방지하고 혈액이 건강하도록 하는 음용 및 건강관리 습관을 갖게 하는 건강서비스를 제공하는 데 헬스임팩트본드사업을 시행할 수 있다. 이 분야의 전문가인 고 주기환 박사의 '홈 헬스케어 프로젝트 Asia'는 지난 몇 년 동안 한국, 일본 그리고 중국에서 질병의 뿌리가 무엇인지, 이를 어떻게 제거할 수 있을지에 관한 세미나를 개최하고 혈액 건강상태를 검사하여 줌으로써, 많은 사람들의 혈액 건강을 개선시키는 데 상당한 성과를 거두었다. 이러한 혈액 건강 개선서비스를 어느 특정 지역을 정하여 확대 실시, 건강한 음용습관을 갖게 함으로써 시민들의 건강이 개선되고 이에 따라 건강보험관리공단의 보험급여 지급액이 감소되는 성과에 연동하여 원리금을 지급하는 사업을 구상할 수 있다.

나. 우리나라 소셜임팩트본드 중간기관 및 평가자

우리나라 소셜임팩트본드의 도입 및 활성화를 위해서는 성과의 측정이 가능한 영역을 찾아내고, 정부와 협력하여 상품을 설계하는 역할을 할 수 있

는 중간기관의 역할이 필수적이다. 영국의 Social Finance UK를 모델로 하는 Social Finance Korea Ltd.와 같은 회사가 그 예가 될 수 있을 것이다. 이러한 중간기관은 시민사회, 민간 투자자, 정부기관 및 금융상품으로서의 소셜임팩트본드 평가자 간의 협력을 도울 수 있을 것이다. 또한 민간투자자를 모을 뿐 아니라 예상대로 자금이 조달되지 않거나 비용이 초과될 때 또는 서비스기관이 제대로 제공되지 못할 때 위험을 관리하는 역할을 맡게 될 것이다. 2012년 2월 설립된 사회목적투자 자문 및 투자 기관인 MYSC[16]와 같은 기관이 이러한 중간기관의 역할을 할 수 있을 것으로 기대된다. 또한 이러한 중간기관의 설립 및 사회적 자본시장의 설립을 위한 연구를 위해 사회활동가, 금융인, 학계 및 공공부문의 전문가들로 구성된 사회적금융포럼과 SEN[17] 산하 Impact Investment Club 및 자본시장의 투자자로 구성된 Impact Forum이 활동하고 있으며, 사회적 금융시장의 활성화에 관심을 갖고 있는 사회적기업진흥원 및 SK Group 등의 활동으로 향후 더 많은 중간기관이 출현할 것이 기대되고 있다.

우리나라 소셜임팩트본드의 발전을 위해서 필요한 평가자의 역할을 담당할 기관도 있다. 우선 KDI 공공투자관리센터를 들 수 있을 것이다. KDI 공공투자관리센터는 2001년 발족되어 대규모 재정투자 사업에 대한 '예비타당성조사', 총사업비 관리를 위한 '타당성 재검증' 등 재정투자 평가업무를 수행하고 있으며, 2005년부터는 민간투자사업계획의 검토·평가 및 실시협약 체결 등 사업 시행자 지정과 관련된 업무의 지원과 공공투자관리 관련 제도 개선을 위한 연구를 지속적으로 추진하고 있다. 또한 공공투자관리센터는 임대형 민간투자 사업의 적격성 검토를 수행하고 있는데, 이러한 민간투자사업(BTL사업)은 민간사업 시행자가 컨소시엄을 형성하여 시설을 마련하고 운영하며, 정부로부터 이 시설에 대한 임대료를 받아 건설 및 운용·관리 비용 및 수익을 회수하는 형식으로 이루어지고 있다.

소셜임팩트본드사업의 적격성 판단은 프로그램의 성과에 대해 제시된 척도가 객관적으로 측정 가능한 것인지, 그리고 이 프로그램의 성과로 인해

---

16 Merry Year Social Company.

17 Social Enterprise Network.

절감되는 정부의 비용이 프로그램에 소요되는 비용에 비하여 충분히 큰지 판단하는 것을 중심으로 평가될 수 있다. 이때 프로그램의 비용을 과소하게 잡고 프로그램의 혜택을 크게 잡는 일반적인 경향인 낙관적 편의(Optimism Bias)가 감안되어야 한다.[18] 임대형 민간투자사업은 소셜임팩트본드 프로젝트보다는 시설비의 비중이 높고 프로젝트의 위험을 정부가 일부 공유하는 차이가 있긴 하지만, 공공사업의 관·민 파트너십이라는 점에서 비슷한 구조를 가진다. 따라서 KDI 공공투자관리센터가 가진 임대형 민간투자사업 적격성 평가에의 경험은 소셜임팩트본드사업의 적격성 검토 및 투자·관리 지원에 적절한 도움을 줄 것으로 판단된다. KDI는 재정사업성과 평가사업도 수행하고 있고 또한 정부의 사회복지프로그램에 대한 예비타당성조사를 위한 연구도 수행하고 있다. 따라서 이러한 모든 사업경험을 활용하여 KDI는 사업을 제안하는 민간 비영리단체나 사회적 기업, 정부기관과 함께 소셜임팩트본드의 구조를 만드는 과정에도 참여할 수 있으며, 채권의 생애주기 중 중간상황을 평가하여 프로그램이 잘 수행될 수 있도록 하는 전략개발자의 역할 또한 수행할 수 있다고 판단된다. 현재 영국의 소셜임팩트본드는 사업이 창출하는 사회적 가치 중 확실하게 측정할 수 있는 부분만을 공공부문의 지출절감효과로 잡는다. 세금절감 부분을 넘어서는 사회적 가치, 예컨대 Peterborough의 예에서 재수감률이 줄어들어 사회가 더 안전해지고 쾌적해지는 등의 혜택은 오랜 기간을 통해 실현되며 그 측정이 쉽지 않기 때문에 잡지 않고 있다. 따라서 초기 소셜임팩트본드사업의 성과 및 사회적기업의 가치 측정에 대한 사회적 신뢰가 축적된 연후에 검토될 수 있을 것이다.

한국에서 소셜임팩트본드시장이 자리를 잡아 제 역할을 하게 되기 위해 중요한 또 한 가지는 정부기관들에 다양한 사회서비스분야 프로그램을 제안하고 실행할 수 있는 우수한 비영리단체나 사회적 기업가들이 더 많이 발굴되어야 한다는 점이다. 아쇼카와 같이 가능성 있는 다양한 사회적기업가를 발굴하는 시스템이 발족되어야 할 필요성이 절실하다 하겠다. 또한 소셜임

---

18 일반 민간투자사업의 적격성 검사는 해당사업을 민간이 하였을 경우와 정부가 하였을 경우의 총 생애비용을 서로 비교하여 적격성을 판단하는 반면, 소셜임팩트본드의 적격성은 프로그램을 실시하였을 경우와 하지 않았을 경우의 정부지출액 변화가 프로그램의 투자비용에 비해 충분히 큰지를 비교한다.

팩트본드 프로그램이 작동되기 시작하고 사회적 서비스를 제공하는 기업이 투자대상이 될 수 있게 되면, 사회적기업의 주식이 거래될 수 있는 거래소 등의 중간기관이나 사회투자기금과 혁신적인 상품 개발을 지원하고 사회적 금융시장의 발전을 촉진하는 중심자의 역할을 하는 영국의 Big Society Capital과 같은 도매(wholesale) 사회적 투자은행이 우리나라에도 설립될 필요가 있다. 서울시가 2013년부터 서울시 자금 500억원과 민간의 기부 및 투자금 500억원으로 사회적 배려기업과 사회적 기업을 중간조직을 통해 지원하고, 소셜임팩트본드와 같은 사회목적투자의 활성화를 위해 도매 사회적 투자은행으로서 서울시사회투자기금을 시작하기로 한 것은 참으로 다행스러운 일이다. 이를 계기로 다른 광역 지자체와 국가가 사회적 투자은행을 설립할 것을 기대해 본다. Young-June Kwon(2012)이 제안한 바와 같이 현재의 정책금융공사를 이러한 사회적 투자은행으로 전환하는 것과 영국과 같이 휴면예금을 사회적 자본 시장의 인프라 구축에 사용하는 것이 고려될 수 있을 것이다.

4. 정부의 역할: 세제혜택, 지원, 서비스의 개방

2012년 우리나라 사회적 기업가 70명을 대상으로 한 인식조사를 보면 사회적 기업가들은 사회적 기업의 발전을 저해하는 기업 내부요인으로서 첫째로 자본조달의 어려움(25.4%)을 꼽고 있다. 사회적 기업 생태계 활성화를 위해 필요한 것으로는 사회적 자본시장의 활성화(23.5%)를 지적하며, 사회적 자본시장 활성화를 위해 가장 필요한 것으로는 투자자에 대한 세제혜택 등의 정부지원(27.7%)을 들고 있다.[19] 이러한 조사 결과는 사회적기업에 대한 투자를 촉진시키는 정부의 역할을 강조하고 있다 하겠다. 그렇다면 사회적 기업 투자자에 대한 세제혜택은 어떻게 확대되고 개선될 수 있을까?

현재 실행되고 있는 사회적 기업에 대한 세제혜택으로는 사회적 기업의 법인세 및 소득세 4년간 50% 감면, 취득세 및 면허세 50% 감면, 재산세

19 2012 사회적기업 포럼, “공생발전을 위한 협력적 기업가정신”, 사회적 기업 관련 인식조사 결과, 2012. 4. 30.

25% 감면, 사회적 기업에 기부하는 일반 법인, 개인, 연계 기업에 그 기부금을 소득의 10% 범위에서 손금산입 처리 등이 있다. 또한 사회적 기업이나 예비 사회적 기업으로 지정된 기업들에는 일자리사업에 참여하는 경우, 1인당 최저임금과 고용주의 4대 보험비 수준의 인건비(2012년 기준 약 100만원 수준) 지원이 제공되고 있다.[20] 한편, 사회적 기업에 대한 투자에 대해서는 특별한 지원사항이 부재한 상황이다. 이는 사회적 기업을 투자대상이 아니라 보조금이나 기부금을 받아야 할 대상이라고 보는 시각에서 기인한다. 보조금과 기부금으로 운영하는 기관과 비즈니스를 하는 기관 사이에는 그 지원에 있어 적절한 차이가 있어야 한다. 사회적 기업은 앞서 언급한 공유가치를 창출하는 투자대상으로 보아야 하며, 사회적 기업에 대한 지속적·장기적인 투자를 유치하기 위해서는 이러한 투자에 대한 세제혜택을 마련하는 것이 중요하다.

기존의 벤처 캐피털 자금이 사회적 기업으로 흘러 들어가게 하기 위한 세제혜택을 마련하는 것은 장기적으로 지속 가능한 사회적 금융시장을 만드는 데 매우 중요하다. 물론 벤처 캐피털 이외에도 사회적 기업 부문으로 유입될 수 있는 자금의 종류는 다양하며, 몇몇의 자금은 좀 더 직접적인 방식으로 투자될 수 있다. 현재는 민간 자금의 대부분이 기존의 주류 금융시장으로 흘러 들어가고 있다. 본고에서 언급한 다양한 세제혜택과 사회적 기업 주식거래시장 등의 인프라스트럭처, 그리고 소셜임팩트본드와 같은 새로운 금융상품을 복합적으로 이용한다면, 기존의 주류 금융시장으로 유입되던 자금—특히 기관 자금—이 사회적 기업으로 투자될 수 있는 기회가 좀 더 많아질 것이다. 예를 들면, 현재 네덜란드에서는 개인이 그린 비즈니스나 사회적·문화적·창업 캐피털 펀드를 비롯한 특수 펀드에 투자할 경우, 연간 5만 5천유로에 달하는 부유세 감면을 받을 수 있다.

한편, 사회적 기업으로 지정되지는 않았지만 사회적 기업과 같이 사회적 가치를 창출하는 미션을 수행하는 기업에도 이러한 세제혜택이 가도록 하는

---

20 임시투자세액공제제도는 2010년 말로 만료되었으며, 현재는 투자액의 7%를 상한으로 하여 신규고용 1인당 1000만원까지 법인세액에서 공제를 할 수 있는 고용세액공제도로 대체되었다. 수도권은 제외된다.

것도 중요하다. 이를 위해서는 사회적 기업이라고 인정받을 수 있는 영국의 Community Interest Company(CIC)와 미국의 Low Limited Liability Company (L3C)와 같은 법인 형태의 도입이 필요하다. 영국의 경우 유한책임회사는 공동체를 위해 사용하도록 자산을 동결할 수 없다. 또한 복지법인의 경우 창립자가 이사가 되면 월급을 받기가 어렵게 되어 있다. 사회적 기업가가 복지법인을 창립한 후 월급을 받기 위해서는 단체의 통제를 자원봉사하는 이사들에게 넘겨야 하고 또한 추가적인 당국의 규제를 받아야 한다.[21] CIC는 이러한 문제를 해소하기 위해 영국에서 2005년에 도입되었다. CIC로 등록된 회사는 공동체를 위해 사용하도록 자산을 동결할 수 있고, 배당과 이자지급에 상한[22]이 있는 대신 창립자가 급여를 받을 수 있으며, 복지법인보다 더 신축적으로 운영될 수 있다. 다만, CIC는 복지법인과 같은 법인세 면세혜택은 받지 못한다. CIC는 주식회사, 보증책임회사, 협동조합 합자회사 등과 같은 다양한 형태를 가질 수 있으나 복지법인의 형태를 갖는 것은 제한되고 있다. 한편, 미국에는 최근에 만들어진 법인 형태로서 자선재단의 설립목적과 관련된 투자인 프로그램 투자(PRI)를 받을 수 있는 L3C가 있다. 우리나라에는 최근의 상법 개정으로 유한책임회사가 추가되기는 하였으나 유한책임회사와 비영리기관의 중간형태로서 사회적 목적과 재무적 이윤을 추구하고 이를 사람들에게 인정받을 수 있는 법인 형태는 없는 실정이다. 이러한 새로운 형태의 법인제도를 도입하고, 이러한 법인에 투자하는 투자자들에게 돌아갈 세제혜택을 마련하는 것이 바람직하다.

이는 사회적 기업을 기부금을 받아 운영하는 형태와 투자를 받을 수 있는 CIC와 같은 형태의 두 가지로 분리하는 데서 출발할 수 있다. 투자를 받을 수 있는 기업형태는 영국의 CIC와 같은 형태로 하여 가칭 공동체이익회사로 등록하게 할 필요가 있다. 이를 규제하는 당국은 별도로 지정되어야 하며, 공동체회사에 대한 세제혜택은 이 회사가 목표로 하고 있는 사회적 변화가 얼마나 달성되었는가에 의해 결정되어야 할 것이다. 더 많은 사적 자본이

---

21 Vince Heaney, "Investing in Social Enterprise: The Role of Tax Incentives," NESTA, Centre for the Study of Financial Innovation, May 2010.

22 CIC는 가용이익의 30%이내 에서 배당할 수 있으며, 개별투자자 투자액의 20%를 상한으로, 성과연동이자지급은 10%를 상한으로 하고 있다.

공유가치 창출에 끌어들여지기 위해서는 CIC의 지위를 더 많은 기업이 누릴 수 있도록 하는 것도 매우 중요하다. 공동체회사에 대한 투자의 세제혜택은 주식투자뿐 아니라 성과에 연동하여 이자를 지급하는 준 주식형태의 투자에도 제공함으로써 주식회사의 형태를 취하지 않는 다른 형태의 공동체이익회사도 투자를 받을 수 있도록 해야 할 것이다. 또한 주류 금융시장에 존재하는 금융상품을 사회적 금융시장에서 벤치마킹함으로써 사회적 금융시장은 더 많은 기관과 개인의 투자자금을 끌어모을 수도 있을 것이다.

현재 사회적 금융시장의 중요한 일부분으로 등장하고 있는 사회적 벤처펀드들도 사회적 임팩트를 얼마나 이루었는가 하는 성과에 링크된 금융상품을 사용하고 있다. 가난한 지역에서 콜센터를 운영하는 Call Britannia라는 기업의 투자자들은 이 기업이 목표로 하는 사회적 변화의 목표를 이루지 못할 경우 대출상환을 요구할 수 있는 권리를 갖게 된다. HCT 그룹은 2010년 2월 고정금리 대출과 사회적 대출 금융 패키지를 통해 3백만파운드를 모집했는데, 이 자금은 그들의 사회적 임팩트 성과목표가 얼마나 달성되느냐에 따라 각각 다른 조건의 수익률을 제공하게 된다. HCT 그룹은 영국 런던과 요크셔에서 대중교통과 그에 관련된 트레이닝을 제공하는 회사로, 주요 버스 운행과 아이들 및 장애인을 위한 교통, 노인과 장애인을 위한 서비스 교통 시스템을 운영하고 있다. HCT 그룹은 앞으로 총 5백만파운드에 달하는 투자를 유치할 예정이며, 이 중 2백만파운드는 사회적 대출로, 3백만파운드는 전통적인 고정금리 대출로 충당할 예정이다. 이 중 사회적 대출은 준 주식상품으로서, 투자자들에게 회사의 성과에 따른 쿠폰을 제공하게 된다. 성과에 따라 달라지는 수익률은 20%가 상한이며, HCT가 특별히 세워 놓은 사회적 목표를 달성하지 못할 경우 투자자들은 그들의 투자금에 대한 추가적인 법적 보호를 받게 된다. 이러한 사례는 자본의 공급뿐 아니라 제공하는 서비스 측면에서도 사회적 책임을 중시한다는 점에서 매우 중요한 의미를 가진다.

정부는 성과에 연동된 사회적 가치 보상 시스템을 마련하기 위해 소셜임팩트본드의 구조와 같이 성과가 입증된 사업에 투자금을 돌려주는 일뿐 아니라 성과가 입증된 사업에 기존의 투자를 늘리는 것도 고려해 볼 수 있다.

미국 오바마 대통령은 2009년 4월 연방정부기관인 국가 및 공동체 서비스 회사(Corporation for National and Community Service)가 운영하도록 5천만달러의 Social Innovation Fund를 설립하는 법률에 서명하였다. 아울러 미국의 교육부 내에 What Works Fund로 6억달러를 설정하기도 하였다. SIF(Social Innovation Fund)의 특징은 초기단계의 프로그램이 아니라 이미 성과가 입증된 프로그램을 확대하는 데 사용된다는 점이다. 혁신을 만든 성과가 있고 그 성과가 높은 지역사회단체는 정부의 1달러, 이를 수령하는 중간기관이 모은 1달러, 이를 재수령하는 비영리단체가 모은 1달러 등, 각 단계에서 1대 1로 매칭이 된 기금으로 총 3달러를 수령하게 된다.

현재 영국에서는 이에 한 발 더 나아가 정부가 제공하는 공공서비스의 공급을 시민사회에 개방, 더 효율적이고 혁신적인 서비스의 제공이 사회적 경제조직에서 의해 제공되는 '개방형 공공서비스(Open Public Service)'의 개념을 등장시키기도 하였다. 개방형 공공서비스는 정부에서 제공하는 것보다 더 나은 서비스를 시민사회가 제공할 수 있다고 생각할 경우에는 시민사회 조직이 이를 제안하고(Right to Challenge), 또한 공공서비스기관의 전문인들이 사업을 사원조합(Mutua)으로 분사해 나아가서 공급할 수 있도록 하고 이들의 사회적 성과에 적절한 보상을 하도록 하는 시스템이다. 사회적 자본시장에서 운영자금 확보가 수월할수록 공공기관과의 성과연계계약이 유리하다. 또한 개방형 공공서비스는 사회적 가치와 재무적 이윤을 동시에 추구하는 사회목적투자의 투자기회를 제공한다. 따라서 개방형 공공서비스와 사회적 목적 투자는 성과연계보상을 매개로 서로를 활성화한다.

소셜임팩트본드와 같은 투자는 그 위험이 민간에 집중되어 있다. 정부는 민간의 이러한 투자에 대해 후순위채권을 발행하거나 신용보증을 제공하는 등 신용 보강자의 역할을 할 수 있다. 그러나 정부는 언제나 한 가지 원칙을 지키는 것이 필요하다. 사회적 성과가 없는 것에는 인센티브 제공을 하지 않는 것(No Impact No Relief)이다. 소셜임팩트본드사업은 민간의 이니셔티브에 정부가 파트너링하는 형태로 진행되며 성과와 연계한 지원이 그 뒤를 따르는 것이다. 이렇게 성과에 연동한 지원방식은 투자를 받는 민간 비영리단체나 사회적 기업의 근본적인 사고방식의 전환을 수반하는 것으로, 더 엄

격한 규율이 확립되어 사회적 자본시장이 건강하게 성장하는 데 기여하게 될 것이다.

5. 결 론

사회적 기업과 시민단체들은 창업단계뿐 아니라 성과가 상당히 입증된 이후에도 계속 자금난을 겪고 있다. 주 원인은 시장이 사회적 가치에 보상하지 않고 있기 때문이다. 소셜임팩트본드는 투자자, 시민사회단체 그리고 공공부문이 사회적 성과 연계계약을 통하여 사회적 가치의 창출이 재무적 가치로 연결되도록 하는 것을 가능케 한다. 이러한 사회적 성과와 연계한 보상제도가 확립될 경우, 사회목적투자의 활성화로 사회적 기업이나 시민사회단체가 초기 성장단계에서 겪는 재정적 어려움이 해결될 뿐 아니라, 자본시장을 활용해서 많은 사회적 문제를 해결할 수 있게 된다. 이론적으로는 모든 사회문제의 해결에 자본시장이 활용될 수 있다.

사회적 성과 연계보상을 통한 사회목적투자가 활성화되기 위해서는 본고에서 살펴본 새로운 금융상품 및 중간조직, 세제 및 법제 개혁, 개방형 공공서비스제도 등이 필요하다. 이를 모색하기 위해서는 공공부문, 재계, 학계, 및 시민사회를 아우르는 Task Force의 마련이 필요하다.

서울시 사회투자기금이 사회적 기업은 기부나 보조금의 대상이 아니라 투자의 대상이란 인식을 심어주고 사회목적 투자기회를 발굴하고 중간조직을 지원하는 우리나라의 사회적 자본시장 발전의 마중물 역할을 해줄 것을 기대한다.

참고문헌

최태원, 「사회적 기업가정신 확산을 위한 SK의 비전」, 2012 Social Enterprise Forum "공생발전을 위한 협력적 기업가정신," 2012. 4.

SK M&C, 사회적 기업 관련 인식 조사 결과, 2012 Social Enterprise Forum "공생발전을 위한 협력적 기업가정신," 2012. 4.

A Technical Guide to Developing a Social Impact Bond: Criminal Justice, Social Finance Inc., Mar 2011.

Drayton, Bill, "Everyone A Changemaker: Social Entrepreneurship's Ultimate Goal," *Innovations*, MIT Press, Winter 2006.

Heaney, Vince, "Investing in Social Enterprise: the Role of Tax Incentives," NESTA, Centre for the Study of Financial, May 2010.

Open Public Services, HM Government White Paper, Presented to Parliament by the Minister for Government Policy by Command of Her Majesty, July 2011.

Rt. Hon Francis Maude MP, Nick Hurd MP, Growing the Social Investment Market: A Vision and Strategy, HM Government, Feb 2011.

Social Finance Inc., "Peterborough Social Impact Bond," 2011.

Social Finance Inc., "A New Tool for Scaling Impact: How Social Impact Bonds Can Mobilize Private Capital to Advance Social Good," Feb 2012.

Young-June Kwon, "Impact Finance and Social Enterprise," Prensented at the Post Conference Seminar of Global Korea 2012, Feb 2012.

CHAPTER 3

A Trade Triangle among North Korea, South Korea, and China

by
Semoon Chang
(Mitchell College of Business, University of South Alabama)

Abstract

As hostile as the relation between the two Koreas may seem, the two Koreas have had numerous cooperative relations ever since the Korean War ended on July 27, 1953. Looming on the horizon of these murky relations between the two Koreas has been the dramatic increase in North Korea's dependence on China as a trading partner since 2001. In 2009, the share of North Korea's exports to China relative to North Korea's total exports was 64.7 percent, while the share of North Korea's imports from China relative to North Korea's total imports reached 77.5 percent. How the increased dependence of North Korea on China as a trading partner will affect the future relation of the two Koreas is the focus of this paper. The underlying hypothesis of this paper is that the best unification policy for South Korea is to continue to promote bilateral economic relations with China, to stay away from economic sanctions against North Korea, and to convince China of the increasingly burdensome role that North Korea plays to China. The changing trade triangle that increasingly favors South Korea over North Korea is likely to tempt, if not force, China to reconsider its support of North Korea.

1. Introduction

As hostile as the relation between the two Koreas may seem, the two Koreas have had numerous cooperative relations ever since the Korean War ended on July 27, 1953. The first joint statement "South-North Joint Communiqué" between the two Koreas, released on July 4, 1972, states that "Reunification will take place without reliance on or intervention by foreign nations; it will be achieved by a peaceful means," and that "The two sides shall institute various exchanges in the economic, social and cultural areas." So did the long journey of economic cooperation begin against rocky political confrontations between the two Koreas.[1]

On October 9, 1983, four South Korean cabinet members were killed by North Korean agents in Burma. On November 29, 1987, Korean Air 858 was exploded by two North Korean agents 45 minutes away from Bangkok, killing all 115 passengers and crew members aboard. Yongbyon's nuclear facility was identified through U.S. satellite photos during 1989 when Soviet Union was dissolved. On February 10, 2005, North Korea declared that it had nuclear weapons and pulled itself out of the six-party talk. On October 9, 2006, North Korea conducted an underground nuclear test. On March 26, 2010, South Korean Navy ship, Cheonan, with its 46 sailors was sunken to the floor of the West Sea, by a North Korean torpedo according to the May 20, 2010 announcement by the South Korean government.

These provocative actions by North Korea did not derail economic cooperation between the two Koreas that began to flourish when the then President Kim Dae-jung announced his *sunshine policy* during his inaugural speech on February 25, 1998. President Kim won the Nobel Peace Prize in 2000. Only about two years later on November 20, 2002, North Korea enacted the Kaesong Industrial District Law, establishing the Kaesong Industrial Complex (KIC) that may well have been the crown-jewel of the sunshine policy. On December 15, 2004, first products produced at the KIC were shipped to South Korea. The KIC remained unaffected when punitive measures relating to the March 2010

1 Chang (forthcoming).

sinking of the South Korea's Navy ship were announced by South Korea on May 24 and by North Korea on May 25, 2010.[2]

Looming on the horizon of these murky relations between the two Koreas has been the dramatic increase in North Korea's dependence on China as a trading partner since 2001. In 2009, the share of North Korea's exports to China relative to North Korea's total exports was 64.7 percent, while the share of North Korea's imports from China relative to North Korea's total imports reached 77.5 percent. How the increased dependence of North Korea on China as a trading partner will affect the future relation of the two Koreas is the focus of this paper. The underlying hypothesis of this paper is that the best unification policy for South Korea is to continue to promote bilateral economic relations with China, to stay away from economic sanctions against North Korea, and to convince China of the increasingly burdensome role that North Korea plays to China.

2. Trade Data among North Korea, South Korea and China

Every year, over 130 countries provide the United Nations Statistics Division with their annual international trade statistics, detailed by commodity and partner country. This database is known as the United Nations Commodity Trade Statistics Database (Comtrade). All values are converted into U.S. dollars using exchange rates supplied by the countries, or derived from monthly market rates and volume of trade. Trade data in this paper between North Korea and China as well as trade data between South Korea and China are based on Comtrade. Comtrade does not include trade figures between North Korea and South Korea by treating the figures as intra-national trade, rather than international trade. Trade data between the two Koreas are obtained separately from the Korea Ministry of Unification.

2 For good summaries on economic sanctions, see Chang (2006b), Noland (2008), and Lee and Choi (2008).

It is important to note that, at least in principle, the value of country A's imports from country B should be equal to the value of country B's exports to country A during the same period. They are not. There are significant differences in bilateral trade data. For instance, the amount of Korea's exports to China for a particular year, as reported by Korea, is not equal to the amount of China's imports from Korea as reported by China. There are several reasons for the discrepancy.

First, some countries include the cost of freight and insurance while others do not. Imports are generally reported on the basis of Cost, Insurance and Freight (CIF), while exports are reported on a Free On Board (FOB) basis. For this reason, import values tend to be higher than export values. Second, territories such as Puerto Rico or Guam may be included as part of a country by some, and treated as separate entities by others. Third, shipments may be exported late in one year and imported early in the following year, thus being reported as exports of one year by the exporting country, but reported as imports in the following year by the importing country. Fourth, some countries do not report the value of imports and exports that fall below some threshold value while others do. Fifth, some differences may exist because of discrepancies in how goods are classified or how they are reported. Sixth, some differences may simply be the result of reporting errors. Seventh, perhaps most complicated, are the re-exports/entrepot trade and price markups. Export country may be the final destination or an intermediary country, and the value may be increased to reflect price markups or further processing of goods. Put differently, imports are attributed to the country where the goods are produced while exports are attributed to the last country of destination known at the time of export, which may not be the final country of destination that adds markups.

Admittedly, there are additional problems with trade data. One problem is an aggregation that allows intra-industry trade. Another problem, especially with time-series data, is that increases in international trade may be a result of economic growth and inflation rather than changes in comparative advantages. Another problem is that increases in international trade may be a result of lower trade barriers and reduced transportation costs. Another problem is that the trade data may not account for re-exporting of commodities. Still another problem is that

the share of parts and components in total trade is rising, raising the possibility that the same inputs may be counted several times. Such trade is particularly important in telecom equipment, office machinery, motor and non-motor vehicles, and electric machinery. In the telecom industry, for example, trade in parts and components accounted, on average, for half the total exports, while almost three-quarters of all Asian imports of telecom equipment consisted of components for further assembly.[3]

To summarize, there are at least nine hypotheses relating to issues involving intra-industry trade: (1) data aggregation hypothesis; (2) increasing returns to scale hypothesis motivating specialization within industries; (3) small technical differences hypothesis prompting specialization within industries; (4) border trade hypothesis for homogeneous products to save transportation cost; (5) re-export trade hypothesis between two countries for specialized processing; (6) cyclical trade hypothesis of certain agricultural products at different times of the year; (7) product differentiation hypothesis; (8) taste/product difference hypothesis among countries with similar income levels; and (9) product differentiation by country of origin hypothesis. It is not clear how much of the intra-industry between Korea and China can be explained by each or any of these hypotheses.[4] Gannon and Rose (1995) believe that the 4-

---

3 United Nations (2003), p.145.

4 See for details of these hypotheses: Bela Balassa, "Trade Liberalisation and Revealed Comparative Advantage," *Manchester School of Economics and Social Studies* 33, 1965, pp.99~123; Jagdish Bhagwati and Donald R. Davis, "Intraindustry Trade: Issues and Theory," forthcoming in James Melvin, James Moore, and Ray Riezman (eds.), *Trade, Welfare, and Econometrics: Essays in Honor of John S. Chipman*, New York: Routledge, p.6 quoted from www.columbia.edu/~drd28/Chipbhag.PDF; Terrie Carolan, Nirvikar Singh, and Cyrus Talati, "The Composition of U.S. - East Asia Trade and Changing Comparative Advantage," *Journal of Development Economics* 57, 1998, pp.361~389; John S. Chipman, "Intra Industry Trade, Factor Proportions and Aggregation," in J. Trout Rader, *Economic Theory and International Trade: Essays in Memoriam*, NY: Springer Verlag, 1992; Harvey Cutler, David J. Berri, and Terutomo Ozawa, "Market Recycling in Labor-Intensive Goods, Flying Geese Style: An Empirical Analysis of East Asian Exports to the U.S.," 14, 2003, pp.35~40; Donald R. Davis, "Intra-industry Trade: A Heckscher-Ohlin-Ricardo Approach," *Journal of International Economics* 39, 1995, pp.201~226; Alan V. Deardoff, "The General Validity of the Law of Comparative Advantage," *Journal of Political*

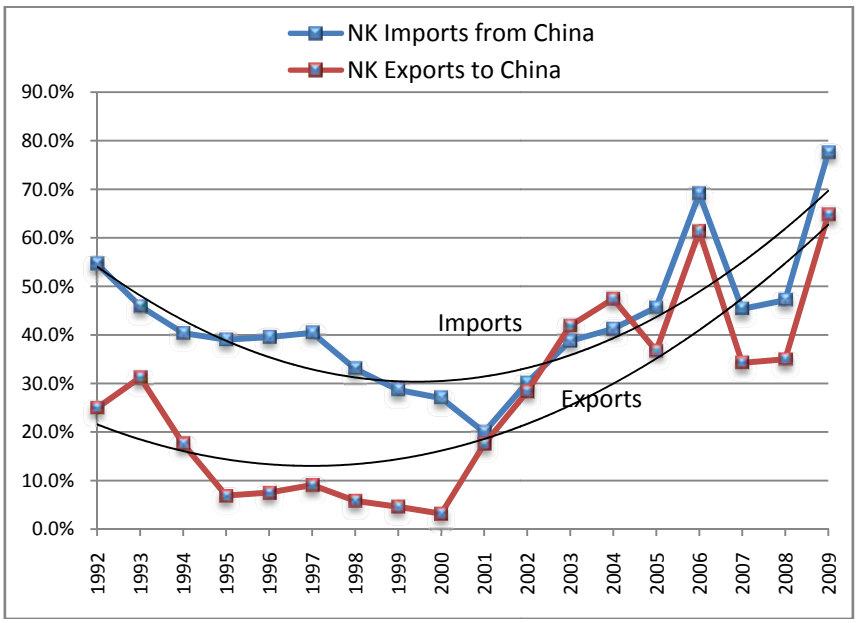
digit SITC level is low enough to avoid aggregation problem by allowing little intra-industry trade. Comtrade data employed in this study are at the 4-digit level SITC.

Trends in global trade of the two Koreas are truly contrasting. Firsts of all, there is a huge difference in the amount of trade of the two Koreas. In 2009, for instance, total exports and imports were, respectively, $1.2 billion (i.e., $1,225,543,655) and $2.4 billion (i.e., $2,435,218,421) for North Korea, but $314 billion (i.e., $313,964,220, 162) and $237 billion (i.e., $237,429,619,611) for South Korea. The combined amount of exports and imports during 2009 was about $551 billion for South Korea, which was more than 150 times the combined amount ($3.6 billion) for North Korea. Secondly, there is a marked difference in the trend in trade balance between the two Koreas. In 1990, North Korea enjoyed a trade surplus of $58 million (i.e., $57,584,733), but the surplus turned into a chronic deficit by 1998 and reached $1.2 billion (i.e., $1,209,674,766) in 2009. In 1990, South Korea also enjoyed a trade surplus of $834 million (i.e., $834,181,297),

---

Economy 88, 1980, pp.464~957; J. M. Finger, "Trade Overlap and Intra-Industry Trade," *Economic Inquiry* 13, 1975, pp.581~589; R. E. Falvey and H. Kierzkowski, "Product Quality, Intra-Industry Trade and Imperfect Competition" in H. Kierzkowski (ed.), *Protection and Competition in International Trade*, New York: Basil Blackwell, 1987, pp.143~161; Carlo Filippini and Vasco Molini "The Determinants of East Asian Trade Flows: A Gravity Equation Approach," *Journal of Asian Economics* 14, 2003, pp.695~711; J. E. Gagnon and A. E. Rose, "Dynamic Persistence of Industry Trade Balances: How Pervasive is the Product Cycle?" *Oxford Economic Papers* 47, 1995, pp.229~248; Takashi Isogai, Hirofumi Morishita, and Rasmus Ruffer, "Analysis of Intra- and Inter-regional Trade in East Asia: Comparative Advantage Structures and Dynamic Interdependency in Trade Flows," International Department Working Paper Series 02-E-1, Bank of Japan, 2002; P. R. Krugman, "Increasing Returns, Monopolistic Competition, and International Trade," *Journal of International Economics* 9, 1979, pp.469~479; Keld Laursen, "The Impact of Technological Opportunity on the Dynamics of Trade Performance," *Structural Change and Economic Dynamics* 10, 1999, pp.341~357; Yang-Taek Lim, "Korea-China Industrial and Technological Cooperation and Further Development Strategy," *Journal of Asian Economics* 14, 2003, pp.283~309; and Anthony J. Venables and Nuno Limão, "Geographical Disadvantage: A Heckscher-Ohlin-von Thünen Model of International Specialisation," *Journal of International Economics* 58, 2002, pp.239~263.

Figure 1 Share of Trade with China: North Korea



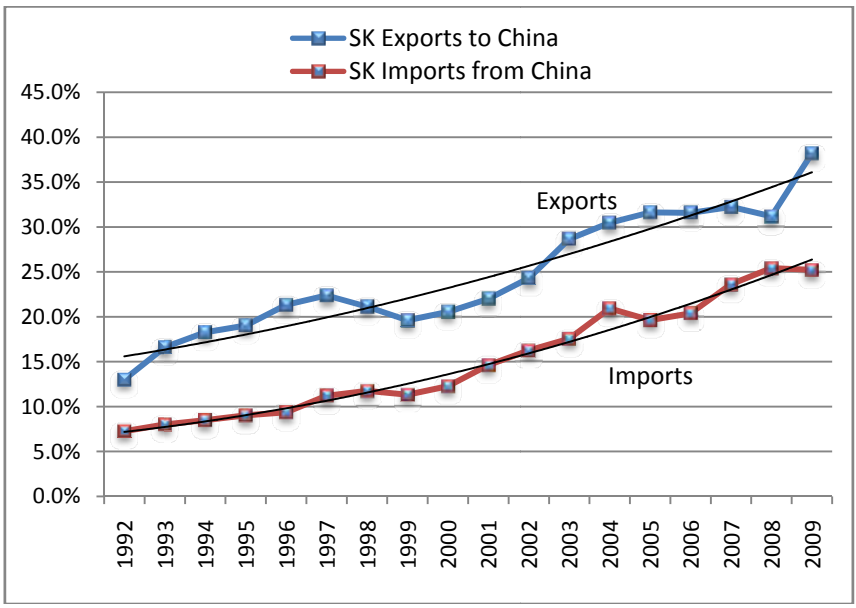
and the surplus increased dramatically to $77 billion (i.e., $76,534,600,551) in 2009.

The share of trade with China relative to total is graphed in Figure 1 for North Korea and Figure 2 for South Korea. Both graphs show polynomial trend lines as indicated. Figure 1 clearly indicates an alarmingly increasing dependency of North Korea on China in both imports and exports. Trend curves indicate the rapidly rising dependency in recent years. The percentage of exports to China relative to total exports of North Korea averaged 48.8 percent between 2006 and 2008, but was the highest in 2009 at 64.7 percent. More importantly, the percentage of imports from China relative to total imports of North Korea averaged 59.8 percent between 2006 and 2008, but was the highest in 2009 at 77.5 percent.

Figure 2 also indicates an increasing dependency of South Korea on China in both imports and exports. The increase, however, is more steady than alarming as indicated in trend curves that look more like lines. The percentage of exports to China relative to total exports of

South Korea averaged 33.3 percent between 2006 and 2008, but was the highest in 2009 at 38.2 percent. The percentage of imports from China relative to total imports of South Korea averaged 23.7 percent between 2006 and 2008, and increased to 25.2 percent in 2009.

Figure 2 Share of Trade with China: South Korea



3. Trends in Trade by Level of Technology

Lall classifies export products by four technology groups: resource-based, low technology, medium technology, and high technology.[5]

Resource-based products include primary products such as fresh fruit, meat, rice, cocoa, tea, coffee, wood, coal, crude petroleum, and gas; agro-based products such as prepared meats/fruits, beverages, wood products, and vegetable oils; and other resource-based products which include ore concentrates, petroleum/rubber products, cement, cut gems, and glass. Low technology manufactures are comprised of a textile/fashion

5 Lall (2000), pp.7~9.

cluster which includes textile fabrics, clothing, headgear, footwear, leather manufactures, and travel goods; and others such as pottery, simple metal parts/structures, furniture, jewelry, toys, and plastic products.

Medium technology products are comprised of (a) medium tech manufactures such as automotive products, which include passenger vehicles and parts, commercial vehicles, and motorcycles and parts; (b) medium tech process industries, which include synthetic fibres, chemicals and paints, fertilizers, plastics, iron, and pipes/tubes; and (c) medium tech engineering industries, which include engines, motors, industrial machinery, pumps, switchgear, ships, and watches. High technology products include electronic and electrical, which include office/data processing/telecommunications equipment, TVs, transistors, turbines, and power generating equipment; and other such products as pharmaceuticals, aerospace, optical/measuring instruments, and cameras.

Note that a study by the United Nations indicates that primary products and resource-based manufactures have steadily lost shares in world trade over the past several decades, falling below 50 percent in 1984 and reaching 28 percent by 2000.[6] In comparison, global exports have grown faster due to the more advanced level of technology and less reliance on natural resources (United Nations, 2003, p.145). These findings suggest that "sustained export growth tends to involve a move up the technology ladder–from simple to complex products–in addition to upgrading quality and efficiency in existing exports"[7] Based on 17 manufacturing sectors in 19 countries for the period 1965-1988, Laursen also finds that "there is a positive relationship between trade performance and the individual country's ability to move into technological sectors offering above average technological opportunity."[8]

To determine the trend of trade between North Korea and China, all 992 trade items from North Korea to China are reviewed and divided into the four technology groups proposed by Lall. Many of the 992 items, it should be noted, have not been traded every year. The trade trends of these products are graphed in Figure 3 for North Korea's

6 United Nations (2003), p.143.
7 United Nations (2003), p.146.
8 Laursen (1993), p.341.

exports to China and in Figure 4 for North Korea's imports from China. Data of North Korea's imports from China are available since 1995. The amount of trade between North Korea and China remained low until about 2000. When the volume of trade began to increase, the predominant export products from North Korea to China were resource-based as indicated in Figure 3. Exports of even low-tech products were minimal. North Korea's imports from China have also been dominated by resource-based products although imports of low to medium technology products began to increase since 2008. Trends of North Korea's imports from China are shown in Figure 4. If it is true that "sustained export growth tends to involve a move up the technology ladder," clearly North Korea is not likely to sustain export growth.

To determine the trend of trade between South Korea and China, all 1,023 trade items between South Korea to China are reviewed and divided into the four technology groups proposed by Lall. The trade trends of these products since 1992 are graphed in Figure 5 for South Korea's exports to China and in Figure 6 for South Korea's imports

Figure 3 NK Exports to China by Tech Level ($million)

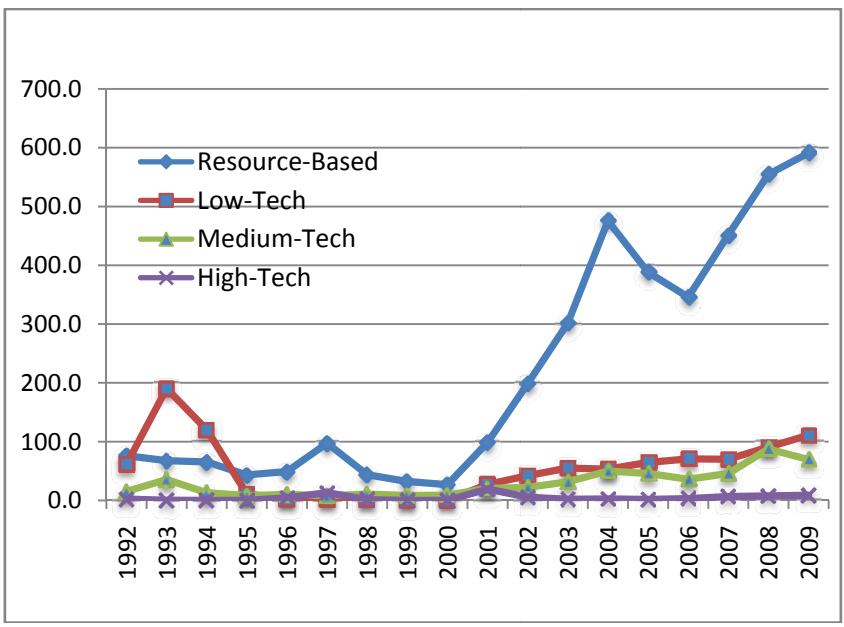
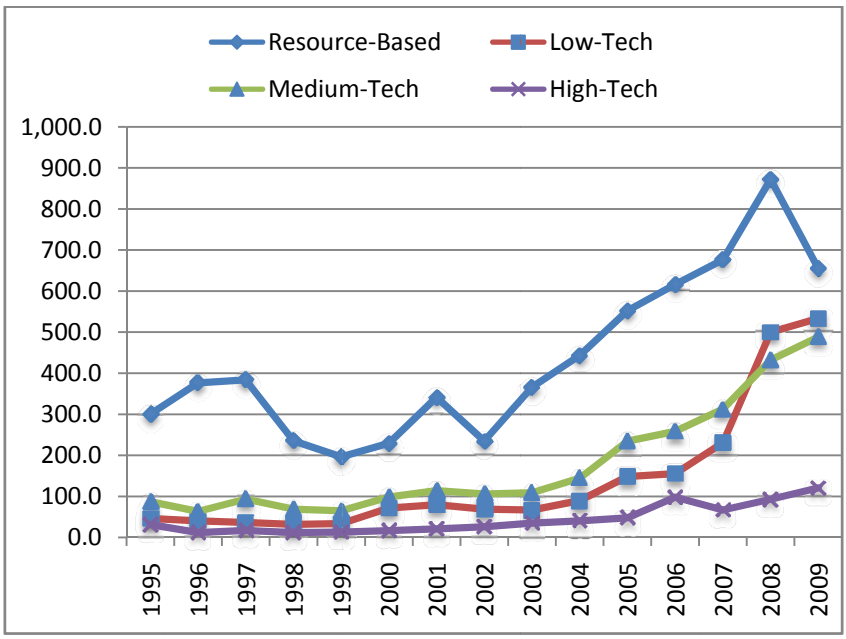


Figure 4 NK Imports from China by Tech Level ($millions)



from China. The amount of trade between South Korea and China remained low until about 2000, although they were more than 10 times the amount of trade between North Korea and China for the same period. When the volume of trade began to increase, the predominant export products from South Korea to China were high-tech items as shown in Figure 5, unlike export products from North Korea to China which were mostly resource-based items. Exports of medium-tech items have increased rapidly since about 2002. Interestingly, South Korea's imports from China have been dominated by all types of products, led by high-tech and low-tech products.

The review of the trade pattern between North Korea and China and that between South Korea and China leads to the observation that the volume of trade and the technology level of traded products are directly correlated, reinforcing the hypothesis that "sustained export growth tends to involve a move up the technology ladder."

Figure 5 SK Exports to China by Tech Level ($million)

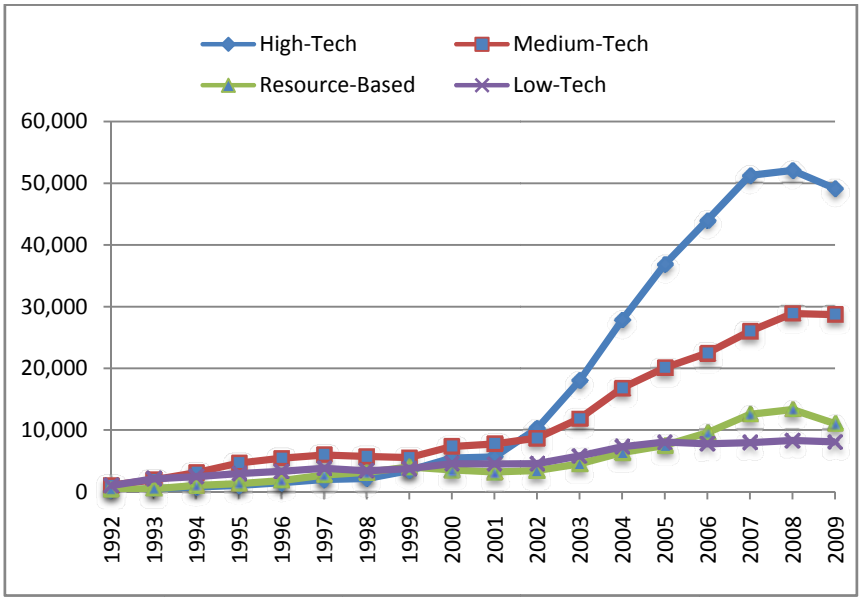
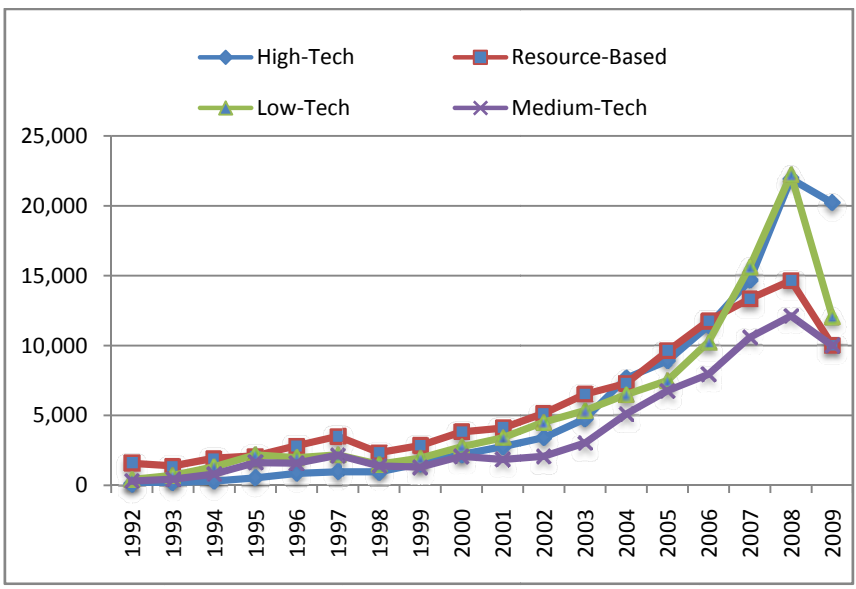


Figure 6 SK Imports from China by Tech Level ($millions)



4. KDI Study on the Quality of North Korea's Trade Data

It may be noted that a study by KDI (2010) expresses a serious doubt about the accuracy on North Korea's trade data, by stating on p.7 that "북한 무역 데이터들의 거의 전부가 사실은 오류로 가득 찬 잘못된 정보들의 집합일지도 모른다는 사실을 시사한다." The KDI study lists three primary sources of data on North Korea's trade on p. 16: KOTRA, UN Comtrade, and IMF Direction of Trade Statistics. Of the three, the study points out a similarity between data by Comtrade and IMF data. (p. 18 and p.80) The KDI study classifies North Korea's trade products into four groups: Class 1 trade items that are credible; Classes 2 and 3 in which trading countries or trading products may not be credible; and Class 4 in which neither trading countries nor trade products are credible. The KDI study then concludes that Class 1 products represent about 60 percent of total trade. (p.75)

Importantly for this study, the KDI study finds a similarity between KDI's Class 1 data and UN Comtrade data used in this study on trade between North Korea and China. ("북 · 중 무역의 경우 본 연구의 〈Class 1〉 자료와 UN Comtrade 원자료가 거의 일치하기 때문이다" p.116) The North Korea's trade deficit data against China shown in the KDI study (Tables 4-9 and 4-10 on p.142) are virtually identical to those used in this study based entirely on Comtrade data. Table 5-9 on page 180 of the KDI study has a table that appears very similar to the classification suggested by Lall, who is listed in the References at the end of the KDI study. North Korea's exports to China (and the amount as a percent of total exports of North Korea in the parentheses) during 2008 by technology level are indicated in Table 5-9 of the KDI study as $496.0 million (66.9%) for resource-based; $95.7 million (13.2%) for low-tech; $139.9 million (18.8%) for mid-tech; amd $2.8 million (0.0%) for high-tech products. Comparable figures employed in this study are $554.6 million (74.8%) for resource-based; $91.0 million (12.3%) for low tech; $87.7 million (11.8%) for mid-tech; and $7.9 million (1.1%) for high-tech products. The differences in figures between the KDI study and this study are likely based on different judgment of how individual products are classified within the Lall's classification

framework, assuming that Table 5-9 classification is based on Lall's classification of technology levels. Both the KDI study and this study convey the important message that North Korea's trade with China is dominated by resource-based and low tech products.

The point is that the KDI study is important in pointing out a possible lack of reliability in North Korea's trade data. As implied in the KDI study, however, the Comtrade data used in this study may be our best hope in analyzing the trend of North Korea's global trade for the sake of inter-temporal consistency as well as multi-country analysis.

5. Importance of Technology-Based Exports

Based on 17 manufacturing sectors in 19 countries for the period 1965-1988, Laursen finds that "there is a positive relationship between trade performance and the individual country's ability to move into technological sectors offering above average technological opportunity"[9] It should be interesting to see how North Korea's exports with China compares to South Korea's exports to China in terms of a shift toward higher technology products during the study period. In view of the importance of exports for a healthy economic growth, a simple model is tested to explore the hypothesis that the growth of exports to China from both Koreas is likely to require trade of technology-based products in both ways. The model tested is the following:

$$EXP^{NK\text{-}China}=f(EXPT^{NK\text{-}China}, IMPT^{NK\text{-}China}, GDP^{China}, XNK^{Won/Yuan})$$
$$EXP^{SK\text{-}China}=f(EXPT^{SK\text{-}China}, IMPT^{SK\text{-}China}, GDP^{China}, XSK^{Won/Yuan})$$

where

$EXP^{NK\text{-}China}$ total exports from NK to China ($)

$EXP^{SK\text{-}China}$ total exports from SK to China ($)

$EXPT^{NK\text{-}China}$ percent of medium to high tech to total exports from NK to China

9 Laursen (1999), p.341.

$EXPT^{SK\text{-}China}$ percent of medium to high tech to total exports from SK to China

$IMPT^{NK\text{-}China}$ percent of medium to high tech to total imports of NK from China

$IMPT^{SK\text{-}China}$ percent of medium to high tech to total imports of SK from China

GDP^{China} GDP growth rate of China

$XNK^{Won/Yuan}$ NK won (KPW) per yuan (CNY)

$XSK^{Won/Yuan}$ SK won (KRW) per yuan (CNY)

Sources of the annual data employed in estimation are: U.N. Comtrade for all import and export variables of the three countries; International Monetary Fund for GDP growth rate of China; and OANDA fxTrade for historical exchange rates between China and the two Koreas.

Estimates of the model are summarized below. For South Korea ($EXP^{SK\text{-}China}$), the number of observations is 17 from 1993 to 2009 with the exchange rate data being available from 1993. For North Korea ($EXP^{NK\text{-}China}$), the number of observations is 15 from 1995 to 2009 with Comtrade and exchange rate data being available from 1995. Figures in the parentheses are t-values, which are marked with "**" for statistical significance at 5% level, and "***" for statistical significance at 1% level.

$$EXP^{SK\text{-}China} = -225{,}364.3179 + 97{,}097.8326EXPT^{SK\text{-}China} + 312{,}920.3214IMPT^{SK\text{-}China}$$
$$(1.4687) \qquad (3.4662)^{***}$$
$$+ 6{,}959.1813GDP^{China} + 156.0182XSK^{Won/Yuan}$$
$$(3.4374)^{***} \qquad (1.0251)$$

$R^2 = 0.93$ D-W = 1.82

$$EXP^{NK\text{-}China} = +1{,}250.0471 - 2{,}709.7405EXPT^{NK\text{-}China} - 613.1127IMPT^{NK\text{-}China}$$
$$(3.1090)^{**} \qquad (0.5448)$$
$$-50.6805GDP^{China} + 21.0576XNK^{Won/Yuan}$$
$$(1.7765) \qquad (3.7375)^{***}$$

$R^2 = 0.84$ D-W = 1.97

Estimates for South Korea show trade pattern that is fairly predictable from the view of economic theory. Exports from South Korea are significantly related to the growth rate of China that tends to increase demand for imports, and also to imports of technology-based products from China most likely for intra-industry trades between the two countries in technology products. Even the other two variables, exports of technology-based products from South Korea to China and the exchange rate in South Korean won per Chinese yuan exhibit correct signs and almost significant at the 10% level.

Estimates for North Korea exhibit troubling patterns in that total exports and exports of technology-based products are inversely related if related at all. This means that North Korea's exports to China have not been technology-driven, keeping North Korea's exports from increasing. This also means that North Korea has not been able to take advantage of the China's growing economy that shows a negative relation to North Korea's exports. The only finding that makes an economic sense is that the devaluation of North Korea's currency against China's yuan had a positive impact on North Korea's exports to China.

6. Crystal-Balling the Trade Triangle

The trade relation between North Korea and China is more complicated than what may appear to a casual observer. Clearly, the majority of products traded between the two countries were low-tech products. "In 2009, China's major imports from North Korea included mineral fuels (coal), ores, woven apparel, iron and steel, fish and seafood, and salt/sulfur/earths/stone. China's major exports to North Korea included mineral fuels and oil, machinery, electrical machinery, vehicles, knit apparel, plastic, and iron and steel." Much of North Korea's mineral exports "have resulted from partnering with Chinese firms through which the Chinese side provides modern equipment in exchange for a supply of the product being mined or manufactured."[10]

10 Nanto and Manyin (2010), p.16.

However, "The juxtaposition of expanding monetary deficits with growing net transfers of energy and minerals from North Korea to China suggest that a de facto barter arrangement has emerged whereby Chinese oil, machinery, manufactured goods, and food are exchanged for North Korean coal electricity, minerals, and other natural resources."[11] Complication arises from pricing decisions on some of the traded products between the two countries. China is a major source for North Korean imports of petroleum. Interestingly, however, China "does not appear to be selling this oil to North Korea at concessionary prices. In 2008, the average price for Chinese exports of crude oil to North Korea was $0.78 per kilogram, while it was $0.71 for such exports to the United States, $0.66 for South Korea, $0.81 for Japan, and $0.50 for Thailand."[12]

Prices of iron ore that China reportedly paid for imports from North Korea were also reported to be lower than average prices paid by China for iron ore imports from all countries. "International iron ore prices rose and became more volatile after 2007. The average price of Chinese iron ore imports rose from $80 to $127 per tonne between 2009 and 2010, while the average price for North Korean iron ore rose from $55 to $93 over the same period. Four possible explanations for the persistent discount include: limited North Korean ability to access export markets, lower transport distances than other iron ore sources such as Brazil, lower iron content per tonne of ore, and/or intentionally agreed-upon discount pricing arranged between Beijing and Pyongyang." The price differential, however, "does not appear to be rooted in lower-quality North Korean iron ore. Whereas 65 percent of DPRK iron ore exports to China in 2010 had at least 60 percent iron content by mass (HS category 26011110), only 9 percent of gross Chinese iron ore imports had such high iron content over the same period. The 2010 price differential is also manifested in the high-iron-content ore (HS category 26011110) trade data: North Korea was paid

11 Aden (2011), p.252.
12 Nanto and Manyin (2010), p.17.

an average $111 per tonne while the average Chinese import price for all countries including the DPRK was $130 per tonne."[13]

Prices of coal that North Korea exports to China indicate the opposite trend, benefiting North Korea. "Disaggregation of coal trade reveals that North Korea actually earns above-market prices for their anthracite coal exports to China. In 2000 North Korean anthracite coal was exported to China for prices that were 28 percent higher than other Chinese anthracite coal imports."[14] "North Korean anthracite coal is exported to China at market or even premium prices; however, North Korean electricity is sold to China at highly discounted prices. However, the rate of discount for North Korean electricity relative to other sources of Chinese electricity imports is declining: it dropped from 50 percent in 2007 to 38 percent in 2009 as DPRK electricity export prices crept up from 28 to 32 Mills per kilowatt-hour over the same period."[15]

An analysis of production process by Jeong and Bang indicates that "the export of IT-related products has increased recently as a proportion of total exports. However, these products are found to be relatively low-level consumption goods, so the proportion of components is still low. During the period chosen for our analysis (1992-2006), the import of capital goods decreased, but the import of consumption goods increased. In other words, the trend shows that North Korean imports are merely being conducted to deal with short-term scarcity rather than to nurture industrial infrastructure. Unless North Korea normalizes the economy and enhances export competitiveness by importing capital goods, North Korea's international export will soon encounter limits. It is more likely that trade deficits will continue to worsen."[16]

To summarize the trade relations between North Korea and China, "Notwithstanding the caveats listed in the Data Sources for DPRK Trade section, Chinese customs data tell a coherent story about bilateral trade and the changing characteristics of North Korea's economy and energy system. There are four basic points in this story: net energy and

---

13 Aden (2011), pp.248~249.
14 Aden (2011), p.241.
15 Aden (2011), p.241.
16 Jeong and Bang (2010), p.27.

fuel flows have reversed with the DPRK's emergence as a coal and electricity exporter, the DPRK is "selling low and buying high" in energy trade with China in terms of unit prices (though the margins are shrinking), imports are becoming more industry intensive and exports more mineral- and resource-intensive, and aggregate bilateral trade deficits are large and growing. Chinese customs data suggest that North Korea is trading the regime's political present for the country's energy and economic future."[17] It may be noted that "North Korea's trade volume and pattern are not affected significantly by trade sanctions imposed by several countries. This is because most exported/imported goods are substitutable, and China does not participate in these sanctions. Therefore, even if country A imposes trade sanctions on North Korea, the latter can still import/export goods to and from China, respectively."[18] "Apparel and Clothing (HS Code 62) and Electrical Machinery (HS Code 85) are obvious examples illustrating North Korea's trade switch from Japan to China."[19]

The trade relation between South Korea and China follows a more predictable, albeit complicated, trend. The types of products traded between South Korea and China have changed significantly over the years. "In the early 1990s, trade from China to South Korea was often in primary goods, as well as labor-intensive products, while China imported technology-intensive and capital-intensive manufactured products from South Korea. In recent years, trade between the two countries is mostly in technology- and capital-intensive goods."[20] Regarding intra-industry trade between South Korea and China, Wang and Wang state that "key determinants of Sino-Korean IIT include FDI, R&D cost, per capita income, advertising cost and trade intensity"; "extent of firm scale has no significant impact on IIT, and similar indexes have varied statistical significance for these two countries"; and "advertising cost has emerged as a new factor of IIT, which, however, has not yet received due regard in the same line of inquiry in China."[21]

---

17 Aden (2011), p.253.
18 Oh and Ryu (2011), p.121.
19 Oh and Ryu (2011), p.123.
20 Zhou (2010), p. 1.
21 Wang and Wang (2011), p.1.

According to Nicolas, while South Korea used to export textile products to China in the 1990s, South Korea's exports to China in recent years are "increasingly concentrated in electronics products. Among those, of particular note are intermediate goods, comprising active components (SITC 776), as well as parts for electronic data processing and office equipment (759), and parts for telecom related devices (764)."[22] South Korea's imports from China "have also changed substantially, shifting away from clothing and primary products in the 1990s to electronic products such as computers, semi-conductors or telecommunication appliances."[23] Further, "The presence of electronic products and parts (776, 764, 778, 772, and 759) as export as well as import products points to a rise in intra-industry trade between the two economies. When diplomatic relations were established between the two nations in 1992, intra-industry trade accounted for 12.9% of total trade, but rose to 64% in 2006, reflecting a significant structural change in the trade between the two nations."[24] Nicolas also observes that the trade of intra-industry products between China and South Korea is "far less sensitive to exchange rate fluctuations than trade in finished products suggesting that exchange rate stabilization is less of an issue (and priority) in this part of the world."[25]

An interesting question relates to whether China is becoming a technology superpower. If it has, the adverse impact of China's high-tech exports on Korea's exports of the same products will become that much greater. Not everyone agrees on this issue, however. Some argue that "China's technology base remains limited and the capital infrastructure needed to produce advanced, high-tech goods largely absent." For instance, China's high-tech exports are mostly mature commodities, such as DVD players and laser printers, but the semiconductor chips that run these commodities are almost all imported or produced in China in the chip plants controlled by foreigners. The slow growth of the high-tech industries in China is blamed on the

---

22 Nicolas (2009), p.349.
23 Nicolas (2009), p.350.
24 Nicolas (2009), p.351.
25 Nicolas (2009), p.357.

poorly-managed state-owned enterprises as well as a "dysfunctional financial system".[26]

As to the issue of whether China represents a complementary economy or a competing threat to South Korea, some claim that "China's economic rise is viewed as largely a positive factor. China has emerged as the principal trading partner of South Korea, whose export-oriented economy has become increasingly dependent on the fast-growing China market. Notwithstanding the fear of growing Chinese competition, Korean industries tend to see the rise of China as a business opportunity rather than a threat."[27] In fact, "South Korea envisions building a Northeast Asian economic bloc by establishing a China-Korea-Japan Free Trade Agreement (FTA) in which Korea would play the role of a regional hub. The South Korean government expects a bilateral or a regional FTA will create synergy between the two most dynamic economies of the world by combining South Korea's advanced management and technology with China's abundant labor, low manufacturing costs and huge potential market. There are concerns of growing Chinese competition in the world market and trade disputes, especially over Chinese agricultural products. However, South Korea's business communities tend to see China's economic rise as a business opportunity rather than a threat."[28]

Others argue the opposite. "Most importantly, China's rise as a global economic power and a strong rival against South Korea in key export markets for products ranging from clothes to consumer electronics is most likely to intensify competition between the two countries in domestic and oversea markets. The increasing competitiveness of Chinese exports relative to Korean products has led to new trade frictions in bilateral trade, often represented by product (mainly food products) safety issues."[29]

Reports on conflicts in trade relations between South Korea and China have surfaced in recent years. According to Zhou, "The problem

---

26 *The Economist* (2003).
27 Sheen (2003), p.12-1.
28 Sheen (2003), p.12-3.
29 Zhou (2010), p.i.

was later aggravated by the "kimchi war" between the two countries. On 21 and 27 of October 2005, KFDA [Korea Food and Drug Administration] announced twice that kimchi imported from China contained parasite eggs in levels higher than permitted, most likely in connection with Chinese use of animal manure as fertilizers for growing cabbage. The products in question were recalled and destroyed. The subsequent national outcry among South Korea consumers dried up kimchi imports and, to some extent, confirmed Chinese suspicions that the Korean press and protectionist farmers were trying to manipulate Chinese access to the Korean kimchi market. According to a report of the Korea Restaurant Association, over half of Korea's restaurants were serving kimchi made in China in the first half of 2005, as a cost-saving measure." Zhou further states that "On 24 October 2005, South Korea's Minstry of Foreign Affairs and Trade (MOFAT) revealed that the Chinese government had warned the Korean embassy in Beijing that it might retaliate. Indeed, on 31 October 2005, the General Administration of Quality Supervision, Inspection and Quarantine of China (GAQSIQ) announced an import ban on 10 types of food products from major Korean manufacturers of kimchi, chili paste and meat barbeque sauces, claiming that these Korea-made products contained parasite eggs.[30] "To minimize the adverse impact of the economic crisis on bilateral trade, the two countries have adopted several proactive policies and measures. In November 2008, Beijing and Seoul agreed to strengthen bilateral cooperation on food safety amid escalating concerns about tainted imports by expanding information-sharing facilities between Chinese and South Korean health-related agencies."[31]

7. Conclusion

The slow growth of the North Korean economy, especially in the areas of high-tech industries, led to a very slow growth in the capacity

---

30 Shengqi Zhou, "Sino-South Korean Trade Relations: From Boom to Recession," EAI Background Brief, No. 508, 3 March 2010, p.9.

31 Zhou (2010), p.11.

of North Korea to increase exports. As exports of resource-based products continue and as these resources are depleted, North Korea will be under great pressure of paying for its imports of necessities. As the payment problem worsens, it would be interesting to see what changes China will make in evaluating the relative importance between the two Koreas to China's self interests. At least from the view of economics, it is difficult to imagine that China would value North Korea ahead of South Korea.

Extending the trade triangle to a political triangle, China and South Korea at this time "share common aversions in the sense that both countries wish to avoid war on the peninsula and prevent North Korea's further nuclearization. Therefore, both the ROK and China are faced with the respective tasks of striking a balance between the traditional Sino-North Korean friendship and cooperation and the new ROK-Chinese strategic cooperative partnership (on China's part), and a balance in the ROK-Chinese strategic partnership and the ROK-U.S. strategic alliance for the twenty-first century (on South Korea's part). For China, however, the North Korean factor' and its political pressure on China have relatively eased; the importance of the (South) Korean factor is increasing from a mid- to longer-term perspective. This shift in power dynamics will likely drive China to deepen the ROK-Chinese strategic partnership, and transform South Korea into a core sphere of influence for China."[32] In view of the changing trade triangle that favors South Korea over North Korea, it is interesting to speculate how long the China's support of North Korea will last if South Korea pursues a West-friendly neutral foreign policy toward China. North Korea may already be feeling the pressure from China for an economic, if not a political, reform.[33]

---

32 Lee (2010), p.297.

33 Page 1 of the 5 July 2012 issue of the daily『중앙일보』, printed in Atlanta (USA), had an article titled "중국, 북한 개혁-개방 강력요구" in which it cites diplomatic sources in Beijing as having stated that "중국은 북한이 개혁 · 개방을 하지 않을 경우 향후 한반도 평화와 안정이 보장되지 않는다," thus placing a heavy pressure on North Korea for an economic reform that may eventually lead to a political reform.

References

이석 · 이재호 · 김석진 · 최수영, 『1990~2008년 북한무역통계의 분석과 재구성』, 연구보고서 2010-07, 한국개발연구원, 2010.

Aden, Nathaniel, "North Korean Trade with China as Reported in Chinese Customs Statistics: 1995-2009 Energy and Minerals Trends and Implications," *The Korean Journal of Defense Analysis*, Vol. 23, No. 2, June 2011, pp.231~255.

Chang, Semoon, "Economic Cooperation between the Two Koreas," *North Korean Review*, forthcoming.

Chang, Semoon, "The Saga of U.S. Economic Sanctions on North Korea" *Journal of East Asian Studies* 20, 2006a, pp.109~139.

Chang, Semoon, "Should U.S. Economic Sanctions on North Korea Be Lifted?" *North Korean Review* 2, 2006b, pp.36~46.

Chang, Semoon and Hwa-Kyung Kim, "Inter-Korean Economic Cooperation," in Suk Hi Kim and Bernhard Seliger (eds.) *The Survival of North Korea*, Jefferson, N.C.: McGarland & Co., 2011, pp.86~98.

The Economist, "The Allure of Low Technology: China's Misguided Attempts to Become a High-Tech Economy," Vol. 369, Issue 8355, December 2003, p.99.

Gagnon, J. E., and A. E. Rose. "Dynamic Persistence of Industry Trade Balances: How Pervasive Is the Product Cycle?" *Oxford Economic Papers* 47, 1995, pp.229~248.

Jeong, Hyung-Gon and Hokyung Bang, "An Analysis of North Korea's Principal Relatiopns," Center for Asian Studies, July 2010.

Lall, Sanjaya, "The Technological Structure and Performance of Developing Country Manufactured Exports, 1985-1998," *Queen Elizabeth House Working Paper*, No. 44, University of Oxford, June 2000.

Laursen, Keld, "The Impact of Technological Opportunity on the Dynamics of Trade Performance," *Structural Change and Economic Dynamics* 10, 1999, pp.341~357.

Lee, Heeok, "China's Policy Toward (South) Korea: Objectives of and Obstacles to the Strategic Partnership," *The Korean Journal of Defense Analysis*, Vol. 22, No. 3, September 2010, pp.283~301.

Lee, Karin and Julia Choi, "U.S. Sanctions and Treasury Department Actions against North Korea from 1955 to October 2007," *North Koran Review* 4, Spring 2008, pp. 7~28.

Nanto, Dick K. and Mark E. Manyin, "China-North Korea Relations," Congressional Research Service, No. 7-5700, December 2010.

Nicolas, Francoise, "The Changing Econopmic Relations between China and Korea: Patterns, Trends and Policy Implications," *The Journal of the Korean Economy* 10, December 2009, pp.341~366.

Noland, Marcus, "The (Non) Impact of UN Sanctions on North Korea," Working Paper Series WP08-12, Peterson Institute, December 2008.

Oh, Jinhwan and Jiyong Ryu, "The Effectiveness of Economic Sanctions on North Korea: China's Vital Role," *The Korean Journal of Defense Analysis*, Vol. 23, No. 1, March 2011, pp.117~131.

Poon, Franklin, "Korea: China's WTO Impact," *Asia Vision*, August 2001, pp.5~12.

Sheen, Seongho, "Tilting toward the Dragon: South Korea's China Debate," *Special Assessment*, Asia-Pacific Center for Security Studies, December 2003, pp.12-1~12-8.

Wang, huanshi and Meiling Wang, "What Determines Sino-South Korean Intra-industry Trade? Theoretical Hypotheses and Empirical Evaluation," A paper presented during the 7th annual conference of the Asia-Pacific Economic Association, Busan Korea, 24 June 2011.

Zhang, Yushan, "Analysis on the Status and Further Trend of the Development between Sino Korean Economics and Trade Relations," *Northeast Asia Forum* 15 (1), Jan 2006.

Zhou, Shengqi, "Sino-South Korean Trade Relations: From Boom to Recession," EAI *Background Brief* 508, 3 March 2010.

United Nations, *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, UNCTAD/WIR/2002, New York and Geneva: UN Conference on Trade and Development, June 2003.

U.S. Congress, Congressional Budget Office, *The GATT Negotiations and U.S. Trade Policy*, Washington, D.C.: U.S. Government Printing Office, 1987.

U.S. International Trade Commission, *Assessment of the Economic Effects on the United States of China's Accession to the WTO*, Investigation No. 332-403, Publications 3229, September 1999.

CHAPTER 4

Is Income Growth in the United States Pro-Poor? A State Level Analysis

by
*Edinaldo Tebaldi**
(Department of Economics Bryant University)
*Jongsung Kim***
(Department of Economics Bryant University)

Abstract

The impact of economic growth on poverty varies greatly across regions and over time. In this paper, we use data from the Current Population Survey (CPS) and a to-two-point-in-time decomposition proposed by Datt and Ravallion (1992) and Kraay (2006) to assess the extent of the impacts of income growth and income distribution on poverty in each state in the United States. This study finds that between 1992 and 2011, the growth component was the major source of poverty reduction across U.S. states. This result is not sensitive to the measure of poverty (Headcount, Poverty Gap, or Squared Poverty Gap). Regression analysis shows that U.S. states with a larger share of its population with higher education have experienced larger changes in headcount poverty due to income growth rather than changes in income distribution. Export orientation is also found to positively affect the growth component.

* 1150 Douglas Pike, Suite H-229 Smithfield, RI 02917, USA etebaldi@bryant.edu
** 1150 Douglas Pike, Suite A-14 Smithfield, RI 02917, USA jkim@bryant.edu

1. Introduction

The impact of income growth on poverty has gained much research interests in recent years. Poverty reduction is regarded as one of the most important objectives of development policies across the globe such as the first Millennium Development Goal (MDG 1) of halving absolute poverty by 2015. In 2010, the U.S. poverty rate reached 15.1 percent[1], the highest level since 1983 when the rate stood at 15.2 percent.[2] The number of people in the U.S. living in poverty in 2010 also reached the historically highest level of 46.2 million people (U.S. Census Bureau 2011).

One classical policy recommendation to reduce poverty incidence is to rely on economic growth. Typically, the popular assumption follows that the trickle-down effects from economic growth generally improve the living standards of all individuals in the economy and, therefore, helps to alleviate poverty. However, the impact of economic growth on poverty varies greatly across regions and over time. Economic growth can lead to a substantial poverty reduction in one area, while the same economic growth may affect the poverty rate only marginally in another area.

Economic growth, especially growth in one sector, does not necessarily translate into an automatic benefit for the poor. The extent of pro-poorness of economic growth depends on the characteristics of growth such as its impacts on employment and productivity, the sectoral location of the poor and how mobile they are across sectors (Hull, 2009) and location of residence. Job creation is one of the important roles that economic growth plays to alleviate poverty. There is a wide variation in the employment intensity of economic growth across countries. Kapsos (2005) finds that between 1991 and 2003, the most employment-intensive growth occurred in Africa and the Middle East, possibly due to the large labor surplus of these regions. But, the low output and growth

1 This was the third consecutive annual increase in the poverty rate. Since 2007, the poverty rate has increased by 2.6 percentage points, from 12.5 percent to 15.1 percent (U.S. Census Bureau, 2011).

2 The poverty rate was 15.1% in 1993.

productivity of these regions hampered poverty-reducing potential to continue to work. On the other hand, rapid economic growth in East Asia produced large gains in productivity and robust employment growth.

The United States experienced a long-period of economic expansion in the 1990s, followed by a recession in 2001 and a subsequent economic recovery that lasted from 2002 to 2007, until another (the great) recession hit the economy in 2008. While non-poor individuals are affected by these business cycles, the popular belief is that poor people usually receive a smaller share of the "pie" when the economy grows and lose a much larger share of the "pie" when the economy experiences a recession.[3]

This perception is somewhat corroborated by empirical analysis. For example, Foster and Székelyi (2008) compare the growth rates for two income groups: the ordinary mean and a low-income-sensitive general mean. They find that the "incomes of the poor do not grow one-for-one with increases in average income"(p.1143), which suggests that the poorer income group experiences lower increases in their income compared to the general mean. On the other hand, Dollar and Kraay (2002) find that the average incomes of the poorest fifth of a country on average rise at the same rate as average income.[4]

Most strategies for poverty reduction acknowledge the importance of economic growth, but they can be improved by identifying the sources

---

3 The impact of the recession on the poor is technically difficult to measure because social, economic and demographic factors are jointly involved. However, the proportion of working families below 200 percent of the poverty threshold increased sharply in 2008 and again in 2009, as many middle-class families fell into the low-income trap (Roberts, Povich, and Mather, 2011).

4 Dollar and Kraay (2002: 196) define the poor as those in the bottom fifth of the income distribution in a country, and empirically examine the relationship between growth in average incomes of the poor and growth in overall incomes, using a large sample of developed and developing countries spanning the last four decades. Since average incomes of the poor are proportional to the share of income accruing to the poorest quintile times average income, this approach is equivalent to studying how a particular measure of income inequality – the first quintile share – varies with average incomes. They cannot reject the null hypothesis that incomes of the poor (the first quintile) rise equi-proportionately with average incomes.

of poverty reduction and the links between economic growth and poverty reduction. Despite the pervasive interests in pro-poor growth analysis, most research pertains to cross-county studies or country case study mainly focusing on African, Latin American and some Asian countries. To the authors' surprise, no research has focused attention to the pro-poorness of income growth across U.S. states. Moreover, poverty varies significantly across states in the United States,[5] but, surprisingly, very few studies analyze the dynamics of income distribution across states, particularly during the different stages of business cycles.

This paper fills a void in the literature by using data from the U.S. Current Population Survey (CPS) to examine empirically the impact of income growth on poverty across U.S. states. Thus, this paper contributes to the literature by conducting an empirical analysis of the dynamics of income distribution of poor and non-poor individuals across states in the U.S. during different stages of the business cycles from 1992 to 2011.

2. What is Pro-poor Growth?

Despite ongoing research and policy interests in pro-poor growth, there appears to be no consensus regarding the meaning of the term. Pro-poor growth focuses attention on the extent to which the poor benefit from economic growth. But when may growth be pro-poor? There are two main approaches to defining pro-poor growth. In both approaches, the poor are identified as those who are living below the poverty level such as a national poverty line.

The absolute definition of pro-poor focuses its attention on the absolute rate at which the incomes of the poor are rising. In other words, are the incomes of the poor rising fast enough to reduce the poverty headcount? If the answer to this question is yes, then growth is pro-poor (Datt and Ravallion, 1992; Kraay, 2006; Dollar and Kraay, 2002). The

5 For example, the 2008-2010 three year average poverty rate of New Hampshire is 7.1% whereas that of Mississippi is 21.3%.

relative definition of pro-poor growth focuses on whether the poor benefits more or less proportionately than the non-poor from growth. In this definition, pro-poor growth requires that incomes of the poor grow faster than those of the non-poor. Therefore, income inequality must fall.

White and Anderson (2001) argue that those who refer to pro-poor growth are implying that a given level of positive growth increases the absolute income of the poor *and* decreases income inequality. White and Anderson (2001) provide a simple example of pro-poor growth. In the example, the initial share of the poor (defined as the bottom quintile of income) is 6% and the initial share of the rich (top quintile of income) is 35%. If 7 cents of a dollar's worth of growth goes to the poor and 34 cents goes to the rich, this is pro-poor growth.

The findings from the cross country research examining the relationship between economic growth and poverty show that, on average, the incomes of the poor rise when average income rises. In some countries, poor people have witnessed their incomes to decline despite long spells of economic growth. According to Page (2006), income of the lowest quintile of the population grew at a similar pace to average income in developing countries between 1970 and 1990. However, in the early 1990s, per capita income of the lowest quintile declined about 2 percent annually on average in developing countries despite renewed average income growth. The income of the lowest quintile in developing countries also stagnated in the second half of the 1990s.

Other than aggregate growth, researchers have largely been unable to find any statistical regularity that explains the relatively high variation in long-run changes in poverty across countries (Dollar and Kraay, 2002). Kraay (2006) finds that cross-country differences in growth in average incomes are the dominant factor explaining the changes in poverty. On the other hand, distributional effects were found to be unimportant in affecting poverty outcomes. This conclusion suggests that "growth-promoting policies should lie at the center of pro-poor agenda" (p.198).

This study uses the absolute definition of pro-poor growth, as proposed by Datt and Ravallion (1992) and Kraay (2006). In particular, growth is considered pro-poor if the incomes of the poor rise fast enough to reduce the poverty rate.

3. Data

This paper uses CPS March supplement data from 1992 to 2011. The CPS variable cutoff is used to determine the poverty status of an individual. The variable *cutoff* records the official poverty threshold used by the Census Bureau to evaluate the poverty status of each family in the sample. If a family's total income for the previous calendar year (as reported in *ftotval*) is less than the poverty threshold (as reported in *cutoff*), all members of each CPS-identified unit are assumed to be in poverty.[6] For instance, for a family consisting of 2 individuals, both of whom are under 65, with no children, the poverty threshold in 2011 was $15,063. If a sampled family of this composition reported income below $15,063 in that year, then they would be coded as "below poverty".[7]

The time periods for which we analyze the changes in poverty are chosen according to the beginning and end of the business cycle as determined by the National Bureau of Economic Research (NBER). However, the March Supplement CPS surveys are available at the exact turning points announced by the NBER. We consider four time periods that most closely resembles the NBER turning points: March 1992 to March 2000, March 2000 to March 2002, March 2002 to March 2007, and March 2007 to March 2011.

---

6 The Current Population Survey (CPS) is a nationwide survey of about 60,000 households conducted monthly for the U.S. Bureau of Labor Statistics by the U.S. Census Bureau. The survey is representative of the civilian non-institutionalized population of the United States with sample located in more than 2,000 counties and independent cities and coverage in every state and in the District of Columbia. The CPS March supplements data used in this paper were obtained from the IPUMS data archives at http://cps.ipums.org/.

7 Poverty threshold (U.S. Census Bureau) at http://www.census.gov/hhes/www/poverty/data/threshld/index.html/.

4. Descriptive Analysis

The extent to which a given pattern of growth is pro-poor depends crucially on the poverty measure of interest (Kraay, 2006, p.203). To mitigate this issue, we utilize the three fundamental measures of poverty proposed by Foster-Greer-Thorbecke (FGT) named the Headcount Index, the Poverty Gap, and the Squared Poverty Gap. It is important to use all three measures when examining poverty because each of these measures provides unique information about poverty trends. The Headcount poverty rate measures the proportion of the population whose income is below the poverty line. The Headcount poverty rate is calculated using the equation:

$$H = q/n \tag{1}$$

where H is the Headcount Index; q is the number of poor people and n is the population.

An inherent problem with the Headcount Index is that it says nothing about how far people are from the poverty line. In addition, the Headcount Index is not sensitive to the growth of income of those people below the poverty line. This issue can be addressed by using the Poverty Gap, which measures how far households fall from the poverty line. The Poverty Gap is measured using the following equation:

$$PG = \sum_{i=1}^{q} \frac{[(z - y_i)/z]}{n} \tag{2}$$

where PG is the Poverty Gap, i indexes the individuals in the sample, y denotes personal income; n is the population and z is the poverty line. The Poverty Gap is sensitive to growth of income of both those people at the poverty line and also those people below the poverty line. The Squared Poverty Gap (P2) gives more weight to the poor, so that the severity of poverty is better accounted for. The Squared Poverty Gap is measured using the following formula:

$$P2 = \sum_{i=1}^{q} \frac{[(z - y_i)/z]^2}{n} \tag{3}$$

Table 1 lists Headcount poverty rates in the U.S. from 1992 to 2011. While the average rate rose 1.4 percentage points for this time period, the pattern of poverty varies significantly across states and business cycles. During the period, the average Headcount poverty rate fell for 12 states and rose for 39 states. New Mexico – the state with the second highest poverty rate in 1992 at 25.6% – experienced the largest decline in Headcount poverty with a 4.3 percentage points decrease (from 25.6 percent to 21.3 percent). Nevada and Hawaii experienced the largest increases in poverty with a 6.4 percentage points increase.

During the economic expansion from 1992 to 2000 – the longest economic expansion in the U.S. history – the Headcount poverty rate fell for 44 states. Mississippi, the state with the largest decline in poverty during this period, experienced a drop of 7.8 percentage points (from 25.8 percent to 18 percent). During the economic downturn in the early 2000s (2000 to 2002), the Headcount poverty rate rose in 43 states. The large fluctuation of the Headcount poverty rates across states in the U.S. during different economic cycles suggests that the labor market structures are vulnerable to business cycles.

During the economic recovery in the 2000s (2002 to 2007), the Headcount poverty rate fell for 37 states (with the largest decline of 6.8 percentage points in New Mexico). However, the great recession in 2008 caused the Headcount poverty rate to increase in 45 states + DC between 2007 and 2011. Georgia experienced the largest increase in poverty (7.9 percentage points). The Headcount poverty rate declined during this period in Arkansas, Iowa, Massachusetts, Nebraska and Wisconsin.

Table 1 Poverty Rate - Headcount, U.S. States, 1992-2011

State	Poverty Rate - Headcount					Change in Poverty Rate - Headcount					
	1992	2000	2002	2007	2011	1992 to 2000	2000 to 2002	2002 to 2007	2007 to 2011	2002 to 2011	1992 to 2011
Alabama	19.2%	15.7%	19.2%	16.3%	19.8%	-3.5%	3.5%	-2.9%	3.6%	0.7%	0.7%
Alaska	10.1%	8.4%	10.1%	10.6%	13.7%	-1.7%	1.7%	0.5%	3.0%	3.6%	3.6%
Arizona	18.0%	16.6%	18.0%	18.1%	20.9%	-1.4%	1.4%	0.1%	2.8%	2.9%	2.9%
Arkansas	17.8%	15.0%	17.8%	19.7%	18.0%	-2.8%	2.8%	1.9%	-1.7%	0.2%	0.2%
California	21.0%	17.2%	21.0%	15.3%	20.2%	-3.8%	3.8%	-5.6%	4.9%	-0.8%	-0.8%
Colorado	11.2%	10.1%	11.2%	11.8%	14.2%	-1.1%	1.1%	0.6%	2.4%	3.0%	3.0%
Connecticut	9.5%	8.9%	9.5%	9.7%	9.7%	-0.6%	0.6%	0.2%	0.0%	0.2%	0.2%
Delaware	9.7%	12.2%	9.7%	11.0%	14.5%	2.5%	-2.5%	1.3%	3.5%	4.8%	4.8%
DC	20.5%	15.0%	20.5%	19.2%	21.6%	-5.4%	5.4%	-1.2%	2.4%	1.1%	1.1%
Florida	17.3%	13.4%	17.3%	13.0%	18.1%	-4.0%	4.0%	-4.3%	5.1%	0.8%	0.8%
Georgia	18.1%	13.5%	18.1%	14.5%	22.3%	-4.7%	4.7%	-3.7%	7.9%	4.2%	4.2%
Hawaii	10.6%	12.2%	10.6%	12.2%	16.9%	1.7%	-1.7%	1.7%	4.7%	6.4%	6.4%
Idaho	15.6%	14.9%	15.6%	11.0%	17.5%	-0.6%	0.6%	-4.6%	6.5%	1.9%	1.9%
Illinois	15.0%	10.4%	15.0%	12.1%	16.1%	-4.6%	4.6%	-2.9%	4.0%	1.1%	1.1%
Indiana	14.9%	7.4%	14.9%	12.2%	19.5%	-7.5%	7.5%	-2.7%	7.4%	4.6%	4.6%
Iowa	10.2%	8.3%	10.2%	12.4%	12.3%	-1.9%	1.9%	2.2%	-0.2%	2.0%	2.0%
Kansas	12.5%	12.8%	12.5%	14.0%	16.1%	0.2%	-0.2%	1.5%	2.1%	3.6%	3.6%
Kentucky	19.5%	12.3%	19.5%	19.2%	19.4%	-7.1%	7.1%	-0.3%	0.2%	-0.1%	-0.1%
Louisiana	20.6%	19.2%	20.6%	20.5%	24.3%	-1.5%	1.5%	-0.2%	3.8%	3.6%	3.6%
Maine	14.4%	10.9%	14.4%	11.4%	14.0%	-3.5%	3.5%	-3.0%	2.6%	-0.4%	-0.4%
Maryland	10.9%	8.8%	10.9%	9.9%	12.5%	-2.0%	2.0%	-0.9%	2.6%	1.6%	1.6%
Massachusetts	12.2%	13.4%	12.2%	13.8%	12.8%	1.3%	-1.3%	1.7%	-1.0%	0.6%	0.6%
Mississippi	25.8%	18.0%	25.8%	23.8%	26.5%	-7.8%	7.8%	-1.9%	2.6%	0.7%	0.7%
Missouri	15.7%	12.2%	15.7%	12.9%	16.1%	-3.4%	3.4%	-2.7%	3.1%	0.4%	0.4%
Montana	15.2%	16.4%	15.2%	14.6%	15.3%	1.2%	-1.2%	-0.6%	0.8%	0.2%	0.2%
Nebraska	10.2%	11.6%	10.2%	11.1%	10.8%	1.4%	-1.4%	1.0%	-0.3%	0.7%	0.7%
Nevada	13.2%	13.0%	13.2%	12.0%	19.6%	-0.3%	0.3%	-1.2%	7.6%	6.4%	6.4%
New Hampshire	8.3%	8.4%	8.3%	6.1%	7.2%	0.1%	-0.1%	-2.2%	1.1%	-1.1%	-1.1%
New Jersey	11.5%	9.0%	11.4%	10.5%	11.6%	-2.5%	2.5%	-0.9%	1.1%	0.2%	0.1%
New Mexico	25.6%	21.9%	25.6%	18.8%	21.3%	-3.7%	3.7%	-6.8%	2.5%	-4.3%	-4.3%

Table 1 (Continue)

State	Poverty Rate - Headcount					Change in Poverty Rate - Headcount					
	1992	2000	2002	2007	2011	1992 to 2000	2000 to 2002	2002 to 2007	2007 to 2011	2002 to 2011	1992 to 2011
New York	18.9%	16.4%	18.9%	15.4%	18.1%	-2.5%	2.5%	-3.5%	2.7%	-0.7%	-0.8%
North Carolina	15.8%	14.3%	15.8%	15.4%	19.8%	-1.5%	1.5%	-0.4%	4.3%	3.9%	3.9%
North Dakota	15.0%	13.4%	15.0%	12.5%	14.3%	-1.6%	1.6%	-2.5%	1.8%	-0.7%	-0.7%
Ohio	14.3%	11.8%	14.3%	14.0%	17.1%	-2.5%	2.5%	-0.3%	3.1%	2.8%	2.8%
Oklahoma	18.3%	13.3%	18.3%	17.4%	18.3%	-5.0%	5.0%	-0.9%	1.0%	0.1%	0.0%
Oregon	14.8%	13.8%	14.8%	14.2%	16.7%	-0.9%	0.9%	-0.6%	2.6%	2.0%	2.0%
Pennsylvania	12.4%	9.9%	12.4%	12.9%	13.7%	-2.5%	2.5%	0.5%	0.8%	1.3%	1.3%
Rhode Island	12.1%	11.7%	12.1%	12.1%	15.4%	-0.4%	0.4%	0.0%	3.2%	3.3%	3.3%
South arolina	17.0%	12.9%	17.0%	13.7%	19.0%	-4.0%	4.0%	-3.2%	5.3%	2.1%	2.1%
South Dakota	14.5%	8.3%	14.5%	11.7%	13.9%	-6.2%	6.2%	-2.8%	2.3%	-0.5%	-0.5%
Tennessee	16.3%	11.9%	16.3%	15.5%	19.1%	-4.4%	4.4%	-0.8%	3.5%	2.8%	2.8%
Texas	22.8%	18.5%	22.8%	19.1%	22.0%	-4.2%	4.2%	-3.6%	2.9%	-0.7%	-0.7%
Utah	15.2%	7.6%	15.2%	11.4%	14.2%	-7.6%	7.6%	-3.8%	2.8%	-1.0%	-1.0%
Vermont	13.1%	10.4%	13.1%	8.1%	11.5%	-2.7%	2.7%	-5.0%	3.4%	-1.6%	-1.6%
Virginia	11.6%	8.7%	11.6%	9.9%	11.9%	-2.9%	2.9%	-1.8%	2.0%	0.3%	0.3%
Washington	11.0%	10.5%	11.0%	9.2%	14.5%	-0.5%	0.5%	-1.8%	5.3%	3.5%	3.5%
West Virginia	18.8%	15.9%	18.8%	16.6%	19.8%	-2.9%	2.9%	-2.2%	3.1%	1.0%	1.0%
Wisconsin	10.4%	9.1%	10.4%	11.8%	11.1%	-1.3%	1.3%	1.4%	-0.7%	0.7%	0.7%
Wyoming	10.3%	12.3%	10.3%	10.4%	11.8%	2.0%	-2.0%	0.1%	1.4%	1.5%	1.5%
Average	**15.0%**	**12.5%**	**15.0%**	**13.6%**	**16.4%**	**-2.5%**	**2.5%**	**-1.4%**	**2.8%**	**1.4%**	**1.4%**

Source : Authors' calculations using CPS data.

Table 2 and Table 3 list the Poverty Gap and the Squared Poverty Gap, respectively. The general patterns of the figures reported in these tables are comparable to the findings from Table 1. For example, both Table 2 and Table 3 show that approximately 40 states (41 states in Table 2, and 43 states in Table 3) experienced an increase in poverty rate from 1992 to 2011.

Table 2 Poverty Gap, U.S. States, 1992-2011

	Poverty Gap					Change in Poverty Gap					
State	1992	2000	2002	2007	2011	1992 to 2000	2000 to 2002	2002 to 2007	2007 to 2011	2002 to 2011	1992 to 2011
Alabama	8.58%	7.45%	7.96%	7.91%	8.51%	-1.1%	0.5%	0.0%	0.6%	0.6%	-0.1%
Alaska	4.44%	4.29%	4.56%	5.15%	7.48%	-0.1%	0.3%	0.6%	2.3%	2.9%	3.0%
Arizona	8.83%	9.32%	8.12%	10.15%	11.31%	0.5%	-1.2%	2.0%	1.2%	3.2%	2.5%
Arkansas	8.64%	6.90%	8.74%	9.12%	8.58%	-1.7%	1.8%	0.4%	-0.5%	-0.2%	-0.1%
California	9.56%	7.75%	7.21%	7.40%	10.57%	-1.8%	-0.5%	0.2%	3.2%	3.4%	1.0%
Colorado	5.25%	5.77%	4.83%	5.63%	6.83%	0.5%	-0.9%	0.8%	1.2%	2.0%	1.6%
Connecticut	3.70%	4.62%	4.22%	5.15%	5.43%	0.9%	-0.4%	0.9%	0.3%	1.2%	1.7%
Delaware	5.32%	6.16%	3.67%	5.21%	8.03%	0.8%	-2.5%	1.5%	2.8%	4.4%	2.7%
DC	9.61%	7.39%	11.34%	10.07%	12.32%	-2.2%	4.0%	-1.3%	2.3%	1.0%	2.7%
Florida	8.10%	6.04%	6.93%	6.62%	9.33%	-2.1%	0.9%	-0.3%	2.7%	2.4%	1.2%
Georgia	8.95%	6.82%	6.46%	7.59%	11.77%	-2.1%	-0.4%	1.1%	4.2%	5.3%	2.8%
Hawaii	4.52%	6.16%	7.75%	5.55%	8.43%	1.6%	1.6%	-2.2%	2.9%	0.7%	3.9%
Idaho	6.51%	6.60%	5.79%	4.91%	8.41%	0.1%	-0.8%	-0.9%	3.5%	2.6%	1.9%
Illinois	7.40%	5.14%	5.95%	6.47%	8.23%	-2.3%	0.8%	0.5%	1.8%	2.3%	0.8%
Indiana	6.60%	3.95%	4.90%	6.30%	10.00%	-2.7%	1.0%	1.4%	3.7%	5.1%	3.4%
Iowa	4.48%	3.59%	3.43%	5.48%	5.83%	-0.9%	-0.2%	2.0%	0.4%	2.4%	1.3%
Kansas	5.98%	5.40%	5.31%	6.81%	7.91%	-0.6%	-0.1%	1.5%	1.1%	2.6%	1.9%
Kentucky	9.80%	6.27%	6.26%	9.33%	9.83%	-3.5%	0.0%	3.1%	0.5%	3.6%	0.0%
Louisiana	11.18%	10.26%	10.39%	10.23%	13.22%	-0.9%	0.1%	-0.2%	3.0%	2.8%	2.0%
Maine	6.36%	4.85%	4.56%	5.59%	6.62%	-1.5%	-0.3%	1.0%	1.0%	2.1%	0.3%
Maryland	5.57%	3.76%	4.15%	5.17%	6.55%	-1.8%	0.4%	1.0%	1.4%	2.4%	1.0%
Massachusetts	5.53%	6.94%	4.75%	7.17%	6.34%	1.4%	-2.2%	2.4%	-0.8%	1.6%	0.8%
Michigan	7.14%	4.80%	5.33%	7.51%	8.94%	-2.3%	0.5%	2.2%	1.4%	3.6%	1.8%
Minnesota	5.62%	3.65%	3.47%	4.91%	6.27%	-2.0%	-0.2%	1.4%	1.4%	2.8%	0.7%
Mississippi	11.79%	8.51%	10.17%	12.70%	13.64%	-3.3%	1.7%	2.5%	0.9%	3.5%	1.9%
Missouri	6.20%	6.08%	5.47%	6.34%	7.84%	-0.1%	-0.6%	0.9%	1.5%	2.4%	1.6%
Montana	7.66%	7.90%	6.59%	6.41%	7.93%	0.2%	-1.3%	-0.2%	1.5%	1.3%	0.3%
Nebraska	5.36%	5.50%	4.75%	5.67%	4.96%	0.1%	-0.8%	0.9%	-0.7%	0.2%	-0.4%
Nevada	6.02%	5.96%	4.10%	6.47%	9.24%	-0.1%	-1.9%	2.4%	2.8%	5.1%	3.2%
New	5.17%	3.35%	3.21%	2.83%	3.58%	-1.8%	-0.1%	-0.4%	0.7%	0.4%	-1.6%
New Jersey	5.56%	4.66%	4.38%	4.83%	6.26%	-0.9%	-0.3%	0.4%	1.4%	1.9%	0.7%
New Mexico	11.75%	9.79%	10.27%	9.06%	11.26%	-2.0%	0.5%	-1.2%	2.2%	1.0%	-0.5%

Table 2 (Continue)

State	Poverty Gap					Change in Poverty Gap					
	1992	2000	2002	2007	2011	1992 to 2000	2000 to 2002	2002 to 2007	2007 to 2011	2002 to 2011	1992 to 2011
New York	9.02%	8.48%	8.07%	7.93%	9.55%	-0.5%	-0.4%	-0.1%	1.6%	1.5%	0.5%
North Carolina	7.34%	6.46%	6.18%	7.70%	9.62%	-0.9%	-0.3%	1.5%	1.9%	3.4%	2.3%
North Dakota	7.67%	6.44%	7.19%	6.12%	7.51%	-1.2%	0.7%	-1.1%	1.4%	0.3%	-0.2%
Ohio	6.73%	5.31%	6.13%	7.17%	8.95%	-1.4%	0.8%	1.0%	1.8%	2.8%	2.2%
Oklahoma	8.54%	6.16%	7.23%	8.88%	8.37%	-2.4%	1.1%	1.7%	-0.5%	1.1%	-0.2%
Oregon	6.74%	6.99%	6.48%	6.84%	7.87%	0.2%	-0.5%	0.4%	1.0%	1.4%	1.1%
Pennsylvania	5.50%	4.31%	5.54%	6.39%	6.47%	-1.2%	1.2%	0.8%	0.1%	0.9%	1.0%
Rhode Island	4.51%	4.83%	4.44%	5.39%	7.67%	0.3%	-0.4%	0.9%	2.3%	3.2%	3.2%
South Carolina	9.22%	5.84%	7.75%	6.23%	10.06%	-3.4%	1.9%	-1.5%	3.8%	2.3%	0.8%
South Dakota	6.67%	3.75%	5.57%	5.79%	7.55%	-2.9%	1.8%	0.2%	1.8%	2.0%	0.9%
Tennessee	8.72%	5.30%	7.86%	6.44%	9.17%	-3.4%	2.6%	-1.4%	2.7%	1.3%	0.5%
Texas	10.87%	8.89%	7.56%	9.44%	11.14%	-2.0%	-1.3%	1.9%	1.7%	3.6%	0.3%
Utah	7.70%	3.48%	5.44%	5.55%	6.53%	-4.2%	2.0%	0.1%	1.0%	1.1%	-1.2%
Vermont	5.75%	4.86%	4.71%	3.91%	5.01%	-0.9%	-0.2%	-0.8%	1.1%	0.3%	-0.7%
Virginia	5.08%	4.19%	4.96%	5.06%	6.45%	-0.9%	0.8%	0.1%	1.4%	1.5%	1.4%
Washington	4.84%	5.47%	6.51%	4.70%	7.46%	0.6%	1.0%	-1.8%	2.8%	0.9%	2.6%
West Virginia	8.64%	7.48%	7.99%	8.44%	9.94%	-1.2%	0.5%	0.4%	1.5%	2.0%	1.3%
Wisconsin	4.89%	5.70%	4.09%	5.36%	5.31%	0.8%	-1.6%	1.3%	0.0%	1.2%	0.4%
Wyoming	4.63%	5.51%	5.11%	4.58%	5.90%	0.9%	-0.4%	-0.5%	1.3%	0.8%	1.3%
Average	**7.1%**	**6.0%**	**6.2%**	**6.7%**	**8.3%**	**-1.1%**	**0.2%**	**0.5%**	**1.6%**	**2.1%**	**1.2%**

Source : Authors' calculations using CPS data.

Table 3 Poverty Gap Squared, U.S. States, 1992-2011

State	Poverty Gap Squared					Change in Poverty Gap Squared					
	1992	2000	2002	2007	2011	1992 to 2000	2000 to 2002	2002 to 2007	2007 to 2011	2002 to 2011	1992 to 2011
Alabama	5.65%	5.25%	5.30%	5.82%	5.53%	-0.4%	0.1%	0.5%	-0.3%	0.2%	-0.1%
Alaska	2.96%	3.21%	3.06%	3.64%	5.46%	0.3%	-0.1%	0.6%	1.8%	2.4%	2.5%
Arizona	6.33%	7.11%	5.91%	7.96%	8.51%	0.8%	-1.2%	2.1%	0.5%	2.6%	2.2%
Arkansas	5.92%	4.79%	5.80%	6.40%	6.08%	-1.1%	1.0%	0.6%	-0.3%	0.3%	0.2%
California	6.48%	5.24%	5.19%	5.25%	7.77%	-1.2%	-0.1%	0.1%	2.5%	2.6%	1.3%
Colorado	3.36%	4.41%	3.50%	4.05%	4.98%	1.0%	-0.9%	0.5%	0.9%	1.5%	1.6%

Table 3 (Continue)

State	Poverty Gap Squared					Change in Poverty Gap Squared					
	1992	2000	2002	2007	2011	1992 to 2000	2000 to 2002	2002 to 2007	2007 to 2011	2002 to 2011	1992 to 2011
Connecticut	2.01%	3.62%	2.96%	4.02%	4.16%	1.6%	-0.7%	1.1%	0.1%	1.2%	2.2%
Delaware	3.69%	4.67%	2.58%	3.70%	6.06%	1.0%	-2.1%	1.1%	2.4%	3.5%	2.4%
DC	6.72%	4.82%	8.39%	7.18%	9.50%	-1.9%	3.6%	-1.2%	2.3%	1.1%	2.8%
Florida	5.30%	4.20%	5.14%	4.93%	6.88%	-1.1%	0.9%	-0.2%	1.9%	1.7%	1.6%
Georgia	5.88%	5.11%	4.61%	5.66%	8.64%	-0.8%	-0.5%	1.1%	3.0%	4.0%	2.8%
Hawaii	3.15%	4.27%	6.66%	3.72%	6.17%	1.1%	2.4%	-2.9%	2.4%	-0.5%	3.0%
Idaho	4.72%	4.40%	3.90%	3.22%	5.97%	-0.3%	-0.5%	-0.7%	2.7%	2.1%	1.2%
Illinois	4.83%	3.56%	4.44%	4.80%	5.96%	-1.3%	0.9%	0.4%	1.2%	1.5%	1.1%
Indiana	4.46%	2.84%	3.70%	4.61%	7.28%	-1.6%	0.9%	0.9%	2.7%	3.6%	2.8%
Iowa	2.98%	2.40%	2.22%	3.76%	4.27%	-0.6%	-0.2%	1.5%	0.5%	2.1%	1.3%
Kansas	4.28%	3.42%	3.78%	4.85%	5.58%	-0.9%	0.4%	1.1%	0.7%	1.8%	1.3%
Kentucky	6.67%	4.29%	4.24%	6.45%	7.20%	-2.4%	-0.1%	2.2%	0.7%	3.0%	0.5%
Louisiana	8.06%	7.82%	8.39%	7.42%	9.96%	-0.2%	0.6%	-1.0%	2.5%	1.6%	1.9%
Maine	3.64%	3.24%	2.95%	3.90%	4.61%	-0.4%	-0.3%	1.0%	0.7%	1.7%	1.0%
Maryland	4.08%	2.51%	3.51%	3.84%	4.98%	-1.6%	1.0%	0.3%	1.1%	1.5%	0.9%
Massachusetts	3.71%	4.89%	3.17%	5.44%	4.58%	1.2%	-1.7%	2.3%	-0.9%	1.4%	0.9%
Michigan	4.76%	3.13%	3.97%	5.33%	6.56%	-1.6%	0.8%	1.4%	1.2%	2.6%	1.8%
Minnesota	3.48%	2.58%	2.77%	3.56%	4.27%	-0.9%	0.2%	0.8%	0.7%	1.5%	0.8%
Mississippi	8.04%	5.74%	7.03%	9.55%	10.02%	-2.3%	1.3%	2.5%	0.5%	3.0%	2.0%
Missouri	3.70%	4.60%	4.06%	4.46%	5.55%	0.9%	-0.5%	0.4%	1.1%	1.5%	1.8%
Montana	5.62%	5.29%	4.82%	4.32%	5.93%	-0.3%	-0.5%	-0.5%	1.6%	1.1%	0.3%
Nebraska	4.27%	3.93%	3.23%	4.00%	3.32%	-0.3%	-0.7%	0.8%	-0.7%	0.1%	-0.9%
Nevada	3.90%	4.48%	3.02%	4.95%	6.48%	0.6%	-1.5%	1.9%	1.5%	3.5%	2.6%
New Hampshire	4.51%	2.14%	2.24%	2.08%	2.80%	-2.4%	0.1%	-0.2%	0.7%	0.6%	-1.7%
New Jersey	3.88%	3.44%	3.13%	3.51%	4.68%	-0.4%	-0.3%	0.4%	1.2%	1.6%	0.8%
New Mexico	7.85%	6.84%	7.47%	6.52%	8.30%	-1.0%	0.6%	-1.0%	1.8%	0.8%	0.4%
New York	6.12%	6.18%	5.82%	5.68%	7.08%	0.1%	-0.4%	-0.1%	1.4%	1.3%	1.0%
North Carolina	5.22%	4.50%	4.31%	5.26%	6.97%	-0.7%	-0.2%	0.9%	1.7%	2.7%	1.7%
North Dakota	6.07%	5.53%	4.67%	4.10%	5.42%	-0.5%	-0.9%	-0.6%	1.3%	0.7%	-0.7%
Ohio	4.54%	3.46%	4.38%	5.16%	6.44%	-1.1%	0.9%	0.8%	1.3%	2.1%	1.9%
Oklahoma	6.20%	4.23%	5.04%	6.66%	5.76%	-2.0%	0.8%	1.6%	-0.9%	0.7%	-0.4%
Oregon	4.56%	5.31%	4.54%	4.71%	5.62%	0.7%	-0.8%	0.2%	0.9%	1.1%	1.1%
Pennsylvania	3.46%	3.04%	4.11%	4.60%	4.63%	-0.4%	1.1%	0.5%	0.0%	0.5%	1.2%

Table 3 (Continue)

State	Poverty Gap Squared					Change in Poverty Gap Squared					
	1992	2000	2002	2007	2011	1992 to 2000	2000 to 2002	2002 to 2007	2007 to 2011	2002 to 2011	1992 to 2011
Rhode Island	2.56%	2.97%	2.96%	3.53%	5.44%	0.4%	0.0%	0.6%	1.9%	2.5%	2.9%
South Carolina	6.66%	4.83%	5.43%	4.46%	7.49%	-1.8%	0.6%	-1.0%	3.0%	2.1%	0.8%
South Dakota	4.53%	3.12%	4.22%	4.18%	5.72%	-1.4%	1.1%	0.0%	1.5%	1.5%	1.2%
Tennessee	6.23%	3.57%	5.88%	4.24%	6.42%	-2.7%	2.3%	-1.6%	2.2%	0.5%	0.2%
Texas	7.35%	6.33%	5.33%	6.74%	8.09%	-1.0%	-1.0%	1.4%	1.3%	2.8%	0.7%
Utah	5.73%	2.27%	4.04%	3.98%	4.59%	-3.5%	1.8%	-0.1%	0.6%	0.6%	-1.1%
Vermont	3.78%	3.46%	3.23%	2.95%	3.47%	-0.3%	-0.2%	-0.3%	0.5%	0.2%	-0.3%
Virginia	3.14%	3.01%	3.84%	3.83%	4.86%	-0.1%	0.8%	0.0%	1.0%	1.0%	1.7%
Washington	2.95%	4.03%	5.23%	3.46%	5.49%	1.1%	1.2%	-1.8%	2.0%	0.3%	2.5%
West Virginia	5.69%	5.21%	5.49%	6.08%	7.27%	-0.5%	0.3%	0.6%	1.2%	1.8%	1.6%
Wisconsin	3.69%	4.75%	2.84%	3.81%	3.68%	1.1%	-1.9%	1.0%	-0.1%	0.8%	0.0%
Wyoming	3.24%	3.87%	3.83%	3.16%	4.36%	0.6%	0.0%	-0.7%	1.2%	0.5%	1.1%
Average	**4.8%**	**4.3%**	**4.4%**	**4.8%**	**6.0%**	**-0.6%**	**0.2%**	**0.4%**	**1.2%**	**1.6%**	**1.2%**

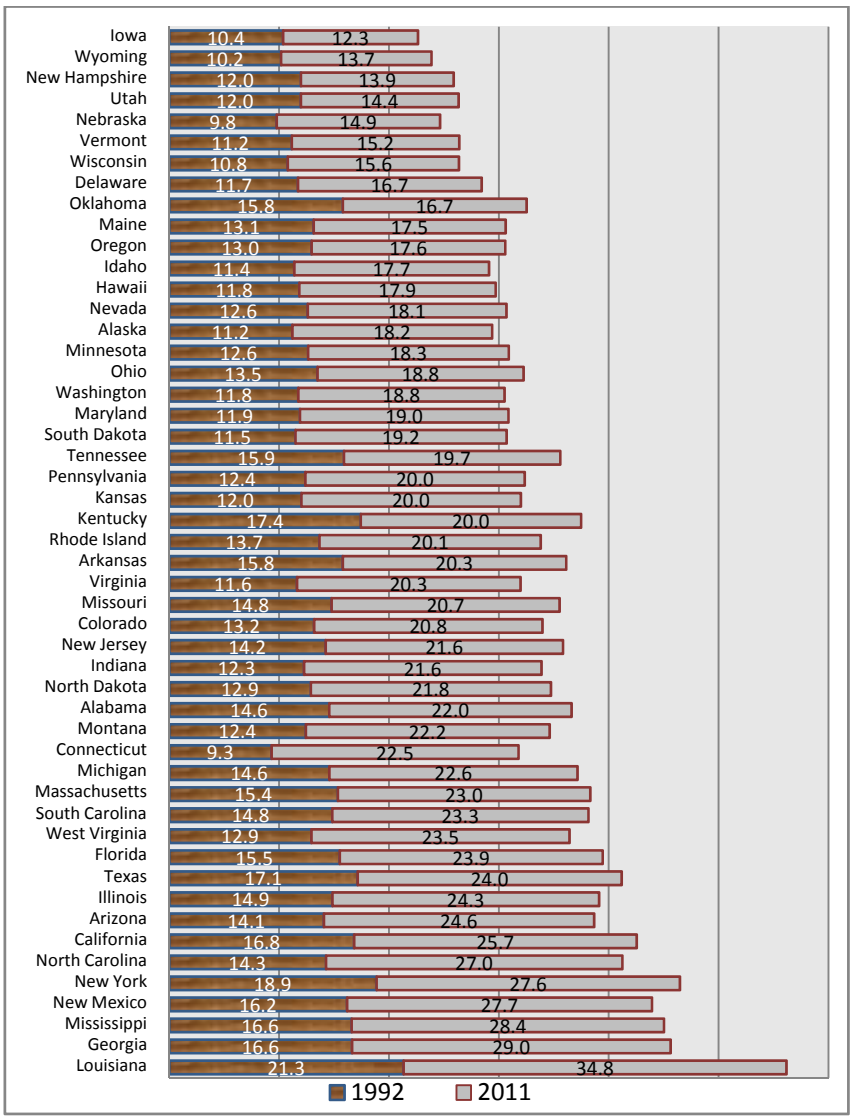
Source : Authors' calculations using CPS data.

Between 1992 and 2011, U.S. states experienced large fluctuations in poverty – as discussed above – together with a significant increase in income inequality. Figure 1 shows that the income of the richest 10% Americans have increased much faster than the income of the poorest 20% Americans and this phenomenon is generalized across U.S. states. However, there are large variations in the degree of income inequality and also in the change in income inequality across states. Moreover, the states with high income inequality are also the states at which income inequality has increased the most. For instance, in Louisiana, – the state with highest income inequality in 1992 and in 2011 – the richest 10% people earned about 35 times more than the poorest 20% people in 2011, compared to 21 times in 1992. On the other hand, income inequality increased much less in states with low income inequality, e.g. in Iowa, Wyoming and New Hampshire.

This finding, however, does not imply that the rich are getting richer and the poor are getting poorer. Even though the poor have experienced

a decrease in their relative income, it is possible that economic growth have lowered the poverty rate and/or reduced the poverty gap.

Figure 1 Ratio of Aver. Income of the Richest 10% to Aver. Income of the Poorest 20%, 1992 and 2011



Source : Authors' calculations using CPS data.

Table 4 shows the correlations between income growth and the change in the poverty rate (Headcount), Poverty Gap, and Squared Poverty Gap across U.S. states for different periods of time.

The all negative correlations suggest that there is a negative relationship between income growth and poverty reduction in the United States. Figure 2 shows graphically the relationship between income growth and Headcount poverty. It is obvious from both Figure 2 and Table 4 that the relationship between income growth and poverty reduction has weakened significantly in the 2000s, particularly between 2007 and 2011. More precisely, between 1992 and 2000, the correlations between income growth and poverty rate (Headcount), Poverty Gap, and Squared Poverty Gap were all above 0.5, but they decreased to about 0.3 between 2007 and 2011.

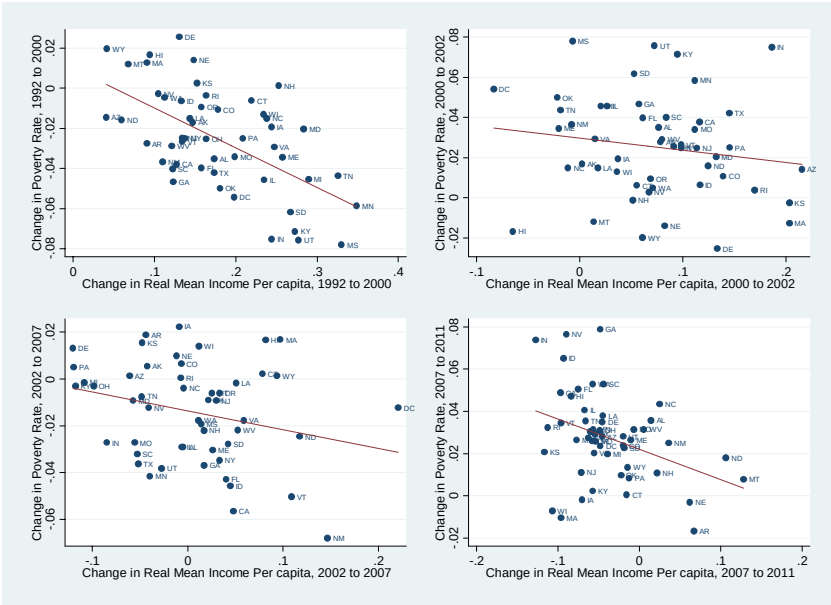
Table 4 Correlations of Poverty Change and Mean Income Growth

	1992 to 2000	2000 to 2002	2002 to 2007	2007 to 2011	1992 to 2011
Headcount Poverty Rate	-0.594	-0.160	-0.266	-0.370	-0.663
Poverty Gap	-0.558	-0.467	-0.523	-0.312	-0.564
Squared Poverty Gap	-0.517	-0.490	-0.436	-0.231	-0.497

Source : Authors' calculations using CPS data.

Table 4 also suggests that between 2000 and 2007, the correlation between income growth and Poverty Gap and Squared Poverty Gap was much larger than that observed between income growth and Headcount Poverty rate. This implies that while growth in income during this period was not enough to lift people above the poverty threshold, income growth did contribute to reduce the gap between the income of the poor and the poverty threshold.

Figure 2 Income Growth and Poverty Change, U.S. States



Source : Authors' calculations using CPS data.

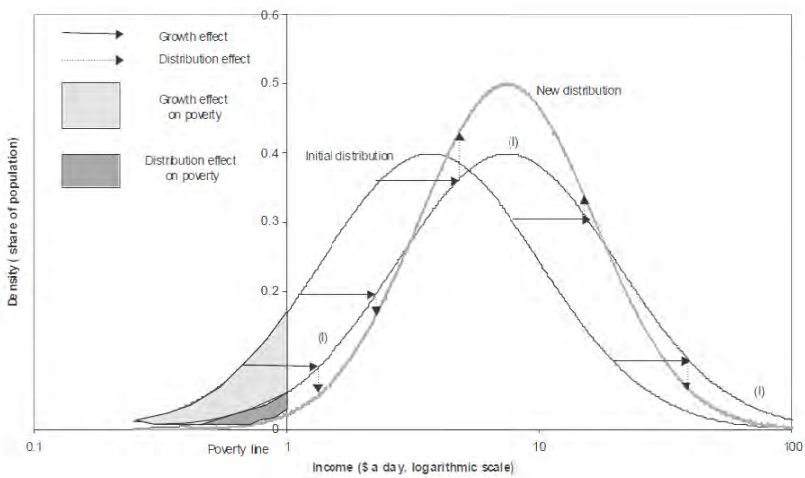
5. The Sources of Poverty Change

The figures above corroborate the view that income inequality is increasing in the U.S., but at the same time income growth has contributed to reduce poverty across U.S. states. However, the relationship between income growth and poverty reduction has weakened considerably in the 2000s. The question that remains is whether the observed changes in poverty are mostly due to changes in average income or in income inequality.

Changes in poverty can be shown to be a function of growth and the change in distribution (Bourguignon, 2004). In Figure 3, the poverty headcount is the area under the density curve at the left of the poverty line (set at $1 a day). The move from the initial to the new distribution goes through an intermediate step.

The horizontal translation of the initial curve to curve (I) represents the intermediate step for the move from the initial to the new distribution. Since the horizontal axis is in the logarithmic scale, the move "corresponds to the same proportional increase of all incomes in the population and thus stands for the pure 'growth effect' with no change taking place in the distribution of relative incomes" (Bourguignon, 2004, p.7). The curve (I) and the new distribution curve share constant mean income. Therefore, the move from curve (I) to the new distribution curve represents the distribution effect, a change in the distribution of relative income.

Figure 3 Decomposition of Changes in Distribution and Poverty into Growth and Distributional Effects



Source : Bourguignon (2004).

We use Datt and Ravallion (1992) and Kraay (2006) method to decompose the change in poverty into two components: a growth component and a distribution component. Consider the following equation:

$$\Delta P_{i,t} = \Delta G_{i,t} + \Delta D_{i,t} \quad (4)$$

where ΔP denotes change in a measure of poverty, $\Delta G = \frac{P(\mu_{t,i}, L_{t-1,i}) - P(\mu_{t-1,i}, L_{t-1,i})}{P(\mu_{t-1,i}, L_{t-1,i})}$ denotes the change in poverty due to mean income growth and $\Delta D = \frac{P(\mu_{t-1,i}, L_{t,i}) - P(\mu_{t-1,i}, L_{t-1,i})}{P(\mu_{t-1,i}, L_{t-1,i})}$ denotes the change in poverty due to growth in relative income (distribution effect), L denotes Lorenz curve, μ denotes average income, t and i index time and states, respectively.

The components ΔG and ΔD are calculated using hypothetical poverty measures. More precisely, the growth component(ΔG) is calculated as the proportional difference between poverty in $t-1$ and a hypothetical poverty measure in time t calculated holding income distribution constant over the two time periods (same Lorenz curve). The distribution component (ΔD) is calculated as the proportional difference between poverty in time $t-1$ and a hypothetical measure of poverty calculated holding mean income constant (the Lorenz Curve is the only factor that changes). However, this decomposition generates a residual term due to the use of discrete approximations (see Kraay, 2006, p.209). All proportional measures are calculated as log differences and normalized by the number of years of the interval to obtain annual percent changes in all measures considered.

The relative importance of these two sources of variations in poverty is determined by applying a simple variance decomposition method proposed by Kraay (2006). The relative importance of the growth component (ΔG) can be determined by:

$$\frac{VAR(\Delta G) + COV(\Delta G, \Delta D)}{VAR(\Delta G) + VAR(\Delta D) + 2COV(\Delta G, \Delta D)} \tag{5}$$

Table 5 reports the results of this variance decomposition for all time periods considered in this study. Panel A shows that between 1992 and 2011 the growth component accounted for two thirds of the variations in Headcount poverty and for 84 percent and 92 percent of the variations in the Poverty Gap and the Squared Poverty Gap, respectively. However, there are significant variations in how income growth affected poverty over time. Between 1992 and 2000 – a period of significant income growth in the U.S. – income growth accounted for only half of the

observed reduction in poverty while income distribution explains the other half. This indicates that there was a non-trivial improvement in income distribution for poor U.S. residents between 1992 and 2000. However, from 2007 to 2011 (Panel E), – a period of economic turmoil and poverty increase – income growth accounted for one third of the variations in poverty headcount while the deterioration in income distribution accounted for two thirds. This suggests that during the Great Recession, the increase in Headcount poverty was mostly because of a deterioration in income distribution. However, during the same period, the variations in the Poverty Gap and the Squared Poverty Gap were mostly due to changes in mean income.

Table 5 Growth vs. Distribution (ΔG vs. ΔD), 1992-2011

	VAR(ΔG)	VAR(ΔD)	COV (ΔG, ΔD)	Share of Variance due to ΔG
Panel A: 1992-2011				
Headcount	0.0071	0.0026	0.0013	0.679
Poverty Gap	0.0061	0.0067	0.0012	0.836
Squared Poverty Gap	0.0134	0.0094	0.0010	0.918
Panel B: 1992-2000				
Headcount	0.0330	0.0334	0.0120	0.498
Poverty Gap	0.0498	0.0284	0.0142	0.733
Squared Poverty Gap	0.0787	0.0425	0.0071	0.895
Panel C: 2000-2002				
Headcount	0.3205	0.6158	0.1174	0.374
Poverty Gap	0.8933	0.2142	0.1598	0.776
Squared Poverty Gap	1.3094	0.2240	0.2797	0.733
Panel D: 2002-2007				
Headcount	0.3199	0.0368	0.0589	0.798
Poverty Gap	0.1154	0.0403	0.0246	0.760
Squared Poverty Gap	0.1571	0.0357	0.0414	0.700
Panel E: 2007-2011				
Headcount	0.0513	0.1112	0.0358	0.372
Poverty Gap	0.1521	0.0310	0.0383	0.705

Source : Authors' calculations.

We further decompose the growth component (ΔG) into two parts: growth in average income (μ) and sensitivity of poverty to growth in average income (η).[8] The *growth in average income* component measures how the growth component (ΔG) changes due to variations in average income. The sensitivity of poverty measures how the growth component (ΔG) changes due to changes on the entire distribution of income.

Table 6 Average Growth and Sensitivity to Average Growth component, 1992-2011

	VAR (|μ|)	VAR (|η|)	COV (|μ|,|η|)	Share of Variance due to |μ|
Panel A: 1992-2011				
Headcount	0.3589	0.0230	0.0186	0.901
Poverty Gap	0.3589	0.0317	0.0670	0.812
Squared Poverty Gap	0.3589	0.0370	0.0671	0.804
Panel B: 1992-2000				
Headcount	0.2115	0.0271	0.0002	0.886
Poverty Gap	0.2115	0.0882	0.0704	0.640
Squared Poverty Gap	0.2115	0.0898	0.6602	0.660
Panel C: 2000-2002				
Headcount	0.9235	0.1196	0.1537	0.798
Poverty Gap	0.9235	0.2260	0.1842	0.730
Squared Poverty Gap	0.9235	0.1767	0.1846	0.754
Panel D: 2002-2007				
Headcount	0.9194	0.0068	0.0579	0.938
Poverty Gap	0.9194	0.1312	0.1774	0.780
Squared Poverty Gap	0.9194	0.1215	0.1984	0.778
Panel E: 2007-2011				
Headcount	0.6139	0.0502	0.0346	0.884
Poverty Gap	0.6139	0.1072	0.0743	0.791
Squared Poverty Gap	0.6139	0.0719	0.0611	0.835

Source : Authors' calculations.

8 See Kraay (2006) for details about this decomposition. Our notation is slightly different from Kraay (2006). More precisely, in our study μ denotes the annual *growth* in average income instead of average income as in Kraay (2006).

Table 6 reports the variance decomposition for these two components. It shows that growth in average income (μ) has been the major factor explaining changes in poverty across U.S. states. More precisely, between 1992 and 2011, 90 percent of the changes in the growth component of the Headcount poverty rate and more than 80 percent of the changes in the growth component of the Poverty Gap and Squared Poverty Gap were due to μ. This implies that the variation of the growth component changes very little to differences in sensitivity of poverty to average income growth. In addition, the results show that the participation of average growth (μ) in explaining the growth component (ΔG) is fairly stable during different stages of the business cycles.

6. The Determinants of the Growth Component

The previous analysis separates the changes in poverty into two major components, but it provides no guide into which factors may determine such a decomposition of poverty. This section of the paper uses regression analysis to examine how human capital, socio-economic factors and export orientation (a measure of overall competitiveness) affect the growth component (ΔG) across U.S. states. This analysis is expected to shed light on why the growth component is relatively more important in certain states, but not in others. The following model is estimated:

$$\Delta G_{i,t} = \alpha + \beta x_{i,t-1} + \mu_i + \varepsilon_{i,t} \qquad (6)$$

where i indexes states, t indexes time, ΔG is the growth component, x is a vector of explanatory variables (see Table 7 for a list of variables), α and β are parameters, ε is the error term, and μ measures time-invariant unobserved characteristics. The analysis in the previous sections suggests that the use of different poverty measures do not change the results, so we focus solely in examining the determinants of the growth component extracted from the headcount poverty measure.

Our dataset includes all fifty states (District of Columbia is excluded) and measures the growth component (ΔG) over four periods of time:

changes from March 1992 to March 2000, from March 2000 to March 2002, from March 2002 to March 2007, and from March 2007 to March 2011. Moreover, ΔG is regressed against explanatory variables that are lagged one period and, therefore, pre-determined.[9] This method is used because it minimizes endogeneity problems and allows using standard econometric techniques to obtain parameter estimates. This approach also deals with a potential omitted variable bias that plagues cross-sectional regressions by combining time series and cross sectional data. The use of panel data also allows controlling for time-invariant unobserved characteristics.

Table 7 List of Variables, Definition and Sources

Variable	Definition	Source
% Pop 25+ with BA Degree	Percentage of the population 25 years or older who have a BA degree	U.S. CPS
% Pop 25+ with Graduate Degree	Percentage of the population 25 years or older who have a MA or higher degree	U.S. CPS
Exports Share of GSP	Percentage of exports in Gross State Product (GSP)	U.S. Department of Commerce
% Hispanic Population	Percentage of the Population who identity their origin as Hispanic or Latino	U.S. CPS
% Manufacturing Employment	Share of manufacturing employment	U.S. BLS
% Tax Burden	State and local tax burden rate	Tax Foundation

7. Results

The unobserved component can be treated as either fixed or random effects. While random effects (RE) estimates are statistically more efficient than those of the fixed effects (FE), they are prone to biases if the unobservable state-specific factors are correlated with the explanatory variables. Therefore, the FE results are preferable unless

9 This approach is consistent with several studies including Gittell and Tebaldi (2010) and Forbes (2000).

efficiency is a problem. We use the Hausman test to determine what is the best specification (whether fixed or random effects).

Table 8 reports both the RE and FE results and the Hausman test statistics for five different regressions. It provides evidence that in each case the RE estimates are statistically different from those of the FE. According to the Hausman test statistics reported in Table 8, the FE results are statistically preferable to those of the RE in all specifications, so we discuss only the FE estimates below.

Table 8 shows that in all specifications, the estimates of the coefficients of the variables for the percentage of population 25 or older with BA degree (% Pop 25+ with BA Degree) and with Graduate Degree (% Pop 25+ with Graduate Degree) are positive and statistically significant in the FE Model. Thus, an increase in the share of the population with higher education would increase the change in headcount poverty due to income growth. This finding suggests that the benefits usually enjoyed by those who attain higher education did not trickle down to the poor population. In fact, the impacts of growth were smaller in terms of poverty reduction in states with a higher share of the population with higher education. The workers with high education tend to be more skilled, adaptable and nimble in the labor market, so that they are more likely to secure better-paying jobs compared with workers with low education when the economy picks up.

The coefficient estimates of the Exports Share of GSP are positive and statistically significant in all Fixed Effects regressions. Since the export share of GSP can be viewed as a proxy for the states' competiveness, the positive estimates of this variable conforms to the belief that competition will reward those who are qualified and prepared to enter in a highly competitive labor market. Hence, because the poor are usually those who lack those skills, they may be left out when income expands due to an increased export orientation.

Table 8 Regression Output for the Determinants of the Growth Component Dependent Variable: Growth Component of Poverty Headcount

	(1)		(2)		(3)		(4)		(5)	
	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE
% Pop 25+ with BA Deg.	1.205**	1.067***	1.048**	1.066***	1.167**	0.876***	1.271**	0.939***	1.170*	0.843***
	[2.66]	[3.51]	[2.17]	[3.50]	[2.02]	[2.77]	[2.41]	[3.01]	[1.72]	[2.64]
% Pop 25+ with Grad. Deg.	5.784***	0.413	5.724***	0.430	5.741***	0.288	5.751***	1.092*	5.622***	1.036
	[4.31]	[0.72]	[4.31]	[0.74]	[4.01]	[0.50]	[4.28]	[1.75]	[3.93]	[1.61]
Exports Share of GSP	2.901***	0.523	2.851***	0.525	2.890***	0.680*	2.824***	0.478	2.653***	0.579
	[2.96]	[1.41]	[2.87]	[1.40]	[2.93]	[1.80]	[2.82]	[1.38]	[2.69]	[1.58]
% Hispanic Population			0.621	-0.0157					0.721	-0.0721
			[1.53]	[-0.16]					[1.67]	[-0.69]
% Manufacturing Emp.					-0.105	-0.542*			-0.0316	-0.295
					[-0.13]	[-1.95]			[-0.04]	[-1.03]
% Tax Burden							0.925	-3.447***	2.232	-3.101***
							[0.27]	[-3.38]	[0.59]	[-2.99]
Constant	-1.024***	-0.396***	-1.046***	-0.395***	-0.998***	-0.282***	-1.118***	-0.0982	-1.269**	-0.0643
	[-10.80]	[-6.24]	[-11.07]	[-6.22]	[-3.86]	[-3.26]	[-2.96]	[-0.85]	[-2.49]	[-0.52]
Hausman χ^2	144.37		148.69		134.71		117.84		119.88	
p-value	0		0		0		0		0	
Observations	200	200	200	200	200	200	200	200	200	200
Adjusted R^2	0.465	-	0.468	-	0.462	-	0.462	-	0.464	-

Note: t statistics in brackets, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.0$.

We also include Hispanic variable since Hispanics is the fastest growing minority group in the U.S. and is known to face social and economic difficulties.[10] An increase of Hispanic population, who are experiencing economic difficulties, is likely to raise the poverty rate. But how the increase affects the growth component (ΔG) of poverty changes is unknown. It was found that none of the estimates of the % of Hispanic population variable is statistically significant.

Structural transformation of employment towards manufacturing is found to contribute to poverty reduction. Since the manufacturing sector employment influences the income of the poor, a variable controlling for the % of manufacturing employment in a state is also included in Models (3) and (5). None of the coefficient estimates of this variable is statistically significant, implying that the role of poverty reduction played by the manufacturing employments is only tenuous in explaining the impact of manufacturing employment on the growth component. The tax system, such as the federal Earned Income Tax Credit (EITC), plays an important role in antipoverty policy. To see how the local fiscal structure affects the growth component, a variable controlling for the % of tax burden in a state is included in Models (4) and (5). Likewise, the coefficient estimates of this variable in the Fixed Effects Model are not statistically significant.

8. Conclusion

The recent years have witnessed an increasingly strong interest in the impact of economic growth on poverty in the United States. What has been the main driver of poverty change in the U.S.? Is it the distribution of income or income growth? Has the U.S. experienced pro-poor growth or not?

---

10 Although the poverty rate of African Americans is slightly higher at 27.4% than that of Hispanics at 26.6% in 2010, the headcount below poverty is much higher for Hispanics (13,243 vs. 10,675 thousands) than that of African Americans (U.S. Census Bureau, 2010, Table 4).

This study finds that between 1992 and 2011, the growth component was the major source of poverty reduction across U.S. states. Hence, policies that contributed to increase average income were pro-poor because increases in average income were associated with poverty reduction. This result is not sensitive to the measure of poverty (Headcount, Poverty Gap, or Squared Poverty Gap). However, this relationship changes during economic downturns. More precisely, during the early 2000's recession and after the Great Recession in 2008, the growth component explained only about one third of the variations in the Headcount poverty rate, while the distribution component explained two thirds of the variations in the Headcount poverty. This suggests that the poor or the marginally poor are disproportionally affected by adverse economic conditions and are more likely to fall below the poverty line during times when income is not growing. However, the growth component for the Poverty Gap and Squared Poverty Gap are less sensitive to business cycles and no major differences in the source of pro-poor growth were observed during the different phases of business cycles for these two measures of poverty.

The regression analysis to examine how human capital, socio-economic factors and export orientation affect the growth component (ΔG) across U.S. states finds that the attainment of higher education would increase the change in headcount poverty due to income growth. The variable controlling for state's competitiveness is also found to positively affect the growth component.

References

Bourguignon, Francois, “The Poverty-Growth-Inequality Triangle,” The World Bank, 2004.

Datt, Gaurav and Martin Ravallion, “Growth and Redistribution Components of Changes in Poverty Measures: A Decomposition with Applications to Brazil and India in the 1980s,” *Journal of Development Economics* 38(2), 1992, pp.275~295

Dollar, David and Aart Kraay, “Growth is Good for the Poor,” *Journal of Economic Growth* 7, 2002, pp.195~225.

Duclos, Jean-Yves and Audrey Verdier-Chouchane, “Analyzing Pro-Poor Growth in Southern Africa: Lessons from Mauritius and South Africa,” *African Development Review* 23(2), 2011, pp.121~146.

Forbes, Kristin J., “A reassessment of the Relationship between Inequality and Growth,” *American Economic Review* 90(4), 2000, pp.869~887.

Foster, James and Miguel Székelyi, “Is Economic Growth Good for the Poor? Tracking Low Income Using General Means,” *International Economic Review* 49(4), 2008, pp.1143~1172.

Foster, James, Joel Greer, and Erik Thorbecke, “A Class of Decomposable Poverty Measures,” *Econometrica*, 81, 1984, pp.761~766.

Gittell, Ross and Edinaldo Tebaldi, “Poverty in the U.S. Metropolitan Areas: What Are the Key Determinants and What Is the Role of Local Fiscal Structure?” *Public Finance and Management* 10(3), 2010, pp.411~442.

Hull, Katy, “Understanding the Relationship between Economic Growth, Employment and Poverty Reduction.” Promoting Pro-Poor Growth: Employment, OECD, 2009, pp.69-94.

Kakwani, N. and K. Subbarao, “Rural Poverty in India: 1973-87,” in The World Bank, *Including the Poor*, 1993.

Kapsos, Steven, *The Employment Intensity of Growth: Trends and Macroeconomic Determinants*, International Labour Office, 2005.

Kraay, Aart, “When is Growth Pro-Poor? Evidence from a Panel of Countries,” *Journal of Development Economics* 80(1), 2006, pp.198~227.

Negre, Mario, “Concepts and Operationalization of Pro-Poor Growth,” United Nations University Working Paper, No. 2010/47, UNU-WIDER, 2010.

Page, John, “Strategies for Pro-poor Growth: Pro-poor, Pro-growth, or Both?” *Journal of African Economies* 15(4), 2006, pp.510~542.

Ravallion, M., “Pro-Poor Growth: A Primer,” Mimeo, Washington DC: World Bank, 2004.

Roberts, Brandon, Deborah Povich, and Mark Mather, “Great Recession Hit Hard at America’s Working Poor,” The Working Poor Families Project, 2011, Available at www.workingpoorfamilies.org/pdfs/policybrief-winter2011.pdf.

Shorrocks, Anthony, “Decomposition Procedure for Distributional Analysis: A Unified Framework Based on the Shapley Value,” mimeo, University of Essex, 1999.

U.S. Census Bureau, “Income, Poverty, and Health Insurance Coverage in the United States: 2010, Current Population Reports P60-239, U.S. Census Bureau, 2011.

White, Howard and Edward Anderson, “Growth versus Distribution: Does the Pattern of growth Matter?” *Development Policy Review* 19(3), 2001, pp.267~289.

CHAPTER 5

Support System over the Lifecycle: A Cross-Country Comparison

by
*Sang-Hyop Lee**
(Department of Economics, University of Hawaii at Manoa)

Abstract

I describe the complex support systems around the world, focusing on their importance for economic growth and fiscal sustainability. A special attention is paid to Korea vs. other countries. Familial transfers for old age support are somewhat significant in some Asian economies including Korea, although they deteriorate quite rapidly. Public transfer systems are less significant in Korea compared with most OECD member countries. This is important because Korea has had the opportunity to develop sustainable systems less encumbered by obligations made to current and future generations. However, this is changing very rapidly. In particular, the healthcare cost will rise rapidly that is often heavily subsidized by the public sector. There will a growing demand for more public protection either due to economic downturn, population aging, or due to political pressure. How well Korea tackles these challenges will determine whether the country will be able to continue to grow.

* This paper was prepared for the "Shared Growth and Sustainable Development", Orga nized by KDI & KAEA , held on June 22, 2012 in Seoul. The author thanks Dr. Yeon Soo Kim for her valuable comments.
Email: Leesang@hawaii.edu Phone: 1-808-956-8590 Fax: 1-808-956-4347

1. Introduction

In most societies children and elderly consume much more than they produce through labor. The pattern of the lifecycle deficit varies a lot across countries because countries vary greatly in per capita economic lifecycles as well as population age structure. Hence the gaps between consumption and labor income, lifecycle deficit, should be filled by reallocations from working adults. Both public and private sectors mediate the resource reallocation. The public sector reallocates resources relying on social mandates and implemented by governments. Education, public pensions, and healthcare programs are important examples of public reallocations. Private sector reallocations are usually governed by voluntary contracts and behavior patterns that are mediated mostly by families. The reallocation system also varies greatly across countries. An understanding of the pattern of economic lifecycle and reallocations is of great interest to both academics and policy makers in large part due to a huge policy challenge; countries need to develop social systems and institutions that can provide economic security to their citizens and sustain strong economic growth.

The purpose of this paper is to examine the current state of support system around the world, with a special reference to public support for the children and elderly. Protecting the children and elderly is a high and growing priority for all countries since their limited participation in the labor market makes them particularly vulnerable to poverty, lack of access to health care, and other risks. In particular, I highlight the results for Korea with respect to the results for other countries. From the results, I emphasize the difference of reallocation systems for economic growth, fiscal sustainability, and other policy issues.

This study will utilize the data set of national transfer accounts (NTA). The accounts system measure how people at each age in the lifecycle acquire and use economic resources.[1] The NTA represent a significant advance compared with previous studies because they provide a comprehensive set of measures of production, consumption,

1 NTA were developed as an international project led by Ronald Lee of the University of California at Berkeley and Andrew Mason of the East-West Center.

savings, and transfers in a manner consistent with national income and product accounts.[2] The NTA also consider the public and private sectors, both of which mediate economic flows across ages, which in turn can be used to study the implications of demographic change. I use the data from 32 countries, which range from very poor countries to most advanced countries. More detailed information on the NTA and methodology for calculating NTA is available from Mason, Lee et al (2009); from Lee, Lee, and Mason (2008); or on the project website, www.ntaccounts.org.

2. Consumption

Consumption in NTA is a broad measure that includes the value of all goods and services consumed by individuals and by governments on their behalf. This measure is generally consistent with the notion that consumption is a critical measure of economic wellbeing.[3] Consumption

---

2 NTA are estimated relying on a variety of data sources. In addition to national income and product accounts, government financial statistics and government administrative records are used to estimate economy-wide aggregates. Age profiles are estimated by making extensive use of administrative records and nationally representative income and expenditure surveys, labor force surveys, health expenditure surveys, and special-purpose household surveys.

3 The NTA project builds on these estimates by providing comprehensive estimates of consumption by one year age groups. NTA disaggregates consumption into three components—education, healthcare, and other consumption—and distinguishes two forms of consumption: private consumption, the goods and services purchased by individuals and families; and public consumption, goods and services provided directly by the government. Public expenditures on education and healthcare are allocated by age, primarily from administrative records. Education consumption is based on budget data to construct estimates of spending per student at each level of schooling. These estimates are combined with school enrollment records to estimate public education consumption for one-year age groups. The sources of information used to allocate public spending on healthcare are more varied and more subject to error. In some economies, government agencies or provider surveys give detailed estimates of public spending on healthcare by age. In other economies, the number of patients at each age is combined with records of costs per patient. Most other public consumption—such as defense, infrastructure, and the operating costs of government—is divided evenly among all individuals. Estimates of private

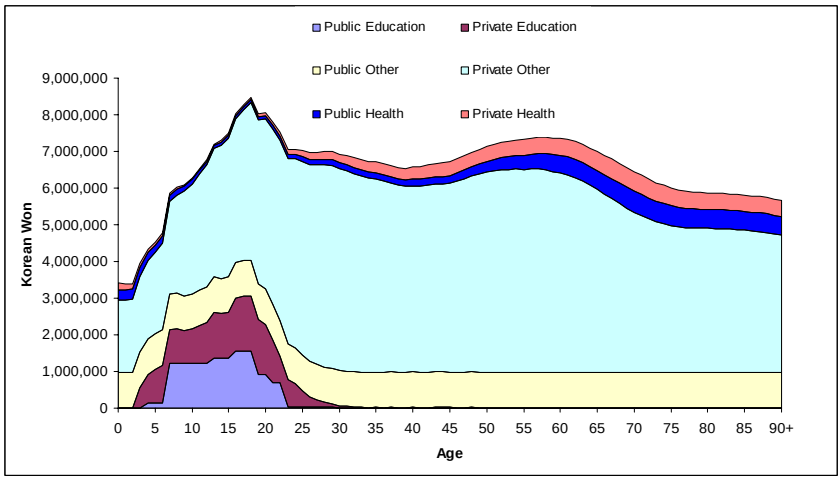
varies by age due to individual need, behaviors, institutions, and market forces. It also depends on many other historical, cultural, political, social, and economic factors. For the purpose of this paper, it is important to examine how children and elderly differ across countries in terms of their consumption. In particular, it is important how both families and government support the education, healthcare, and other consumption needs of children and the elderly.

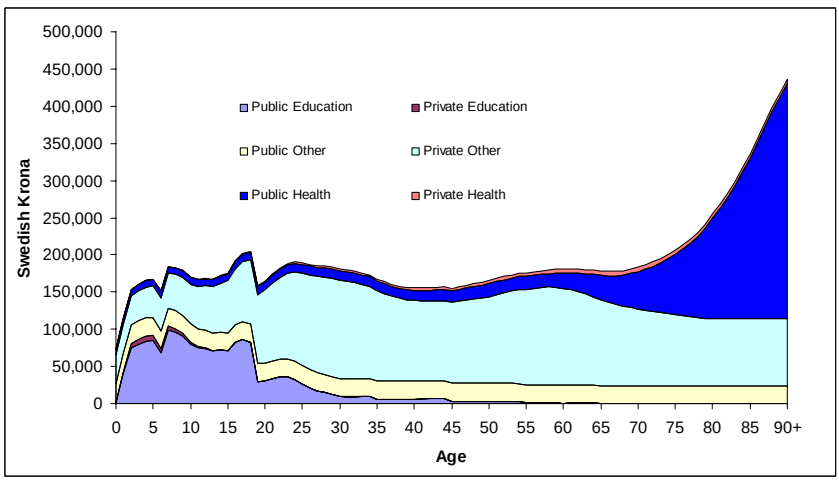
Figure 1 illustrates the component of consumption for two countries, Korea and the Sweden by age. In both countries, per capita consumption increases steadily until it reaches peak between ages 17 and 18. The consumption decreases thereafter until age 40. However, the major difference between two countries starts around age 60. In Korea, the consumption start to decline around age 60 while in Sweden it increases very rapidly until the end of lifecycle. Another major difference between Korea and Sweden is whether the resource is provided by family or government. For example, the education is mainly provided by Swedish government, while in Korea, a great deal of the cost of education is borne by families. In particular, the Swedish government provides considerable support for daycare and hence the consumption increases at very early ages. This is true for healthcare consumption. In Sweden, the rapid increase in healthcare consumption for the old is entirely due to the provision of publicly provided healthcare. The steep rise in consumption among the oldest age groups in Sweden is also evident in the US, Japan, and other developed countries, while Korea does not show this pattern.

---

consumption are constructed from income and expenditure surveys, health expenditure surveys, and special-purpose household surveys. Private consumption of education and healthcare by households is allocated to household members of different ages based on regression analysis of survey data. Other private consumption—the largest category—includes food, clothing, housing, transportation, recreation, and consumer durables. This is allocated among household members using a scale that ranges from 0.4 for children under age five to 1.0 for adults age 20 and above. Again, for more detailed information on the methodology for calculating per capita consumption is available from Mason, Lee *et al*. (2009); from Lee, Lee, and Mason (2008); or on the project website, http: //www.ntaccounts.org/.

Figure 1 Age Consumption Profiles by Component (Korea, 2000 and Sweden, 2003)





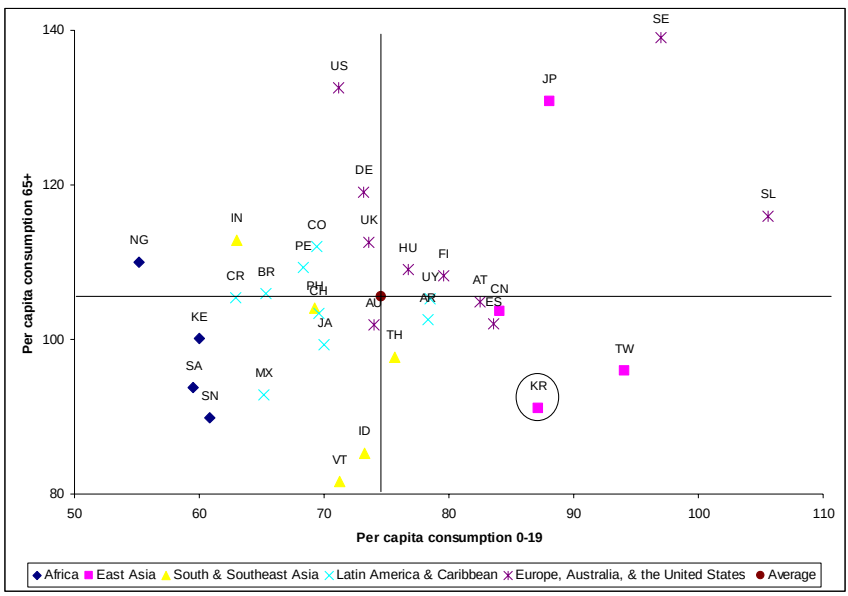
Source: National Transfer Accounts Database.

Table 1 summarizes the measure of consumption by component for children and elderly.[4] To compare across countries, consumption at each age is normalized by the consumption of working-age population aged 20 to 64. In almost all 32 NTA member countries children ages 0-19

4 The analysis of Table 1 draws upon the NTA bulletin 4 (forthcoming) and Tung (2011).

consume less than working age adults and the elderly ages. However, there is considerable variation in children's consumption levels, especially compared with that of the elderly. Figure 2 presents the average values for consumption by children and the elderly in all 32 economies, divided into four quadrants.[5] In developing economies, per capita consumption is low for children, which might be due to their high fertility. This contrast between the four African economies and the four East Asian economies is especially striking, where data points for the four African economies lie well to the left of the overall average, while data points for the four East Asian economies lie well to the right. A child in Africa consumes about 60 percent of consumption by a prime-

Figure 2 Per Capita Consumption for Children (ages 0-19) vs. for the Elderly (ages 65 and older)



Note : AT=Austria (2000), BR=Brazil (1996), CH=PRC (2002), CL=Chile (1997), CR=Costa Rica (2004), DE=Germany (2003), ES=Spain (2000), HU=Hungary (2005), IN=India (2004), JP=Japan (2004), KR=Korea (2000), MX=Mexico (2004), PH=Philippines (1999), SE=Sweden (2003), SI=Slovenia (2004), TH=Thailand (2004), TW=Taiwan (1998), US=United States (2003), UY=Uruguay (2006).

Source : National Transfer Accounts Database.

5 For intergenerational equity issue in more detail, see Mason, Lee, and Lee (2010).

Table 1 Per Capita Consumption by Children and the Elderly

	Per Capita Consumption by Children and the Elderly (% per capita consumption of 20–64)								Per Capita Human-Capital Spending (% average annual labor income of age 30–49			Importance of per Capita Healthcare Consumption Age 65+ (% all per capita consumption age 65+)		
	Private		Public		Combined		Percent public		Private	Public	Combined	Private	Public	Combined
	Age 0–19	Age 65+	Age 0–19	Age 65+	Age 0–19	Age 65+	Age 0-19	Age 65+						
Africa	**49**	**98**	**124**	**99**	**59**	**98**	**71**	**50**	**86**	**86**	**171**	**8**	**3**	**10**
Kenya, 1994 (KE)	50	101	140	95	60	100	74	49	17	60	78	1	2	3
Nigeria, 2004 (NG)	52	111	95	95	55	110	65	46	191	21	212	15	1	15
Senegal, 2005 (SN)	54	89	120	97	61	90	69	52	46	65	111	5	2	6
South Africa, 2005 (ZA)	40	90	140	110	59	94	78	55	89	196	285	10	7	17
East Asia	68	94	168	152	88	105	71	61	210	240	450	8	14	22
China, 2002 (CN)	64	94	148	136	84	104	70	59	166	156	322	15	13	28
Japan, 2004 (JP)	58	109	219	227	88	131	79	68	140	389	529	5	23	27
South Korea, 2000 (KR)	71	85	160	121	87	91	69	59	225	202	427	8	9	16
Taiwan, 1998 (TW)	80	87	143	126	94	96	64	59	307	213	520	6	11	17
South & Southeast Asia	**59**	**94**	**171**	**114**	**70**	**96**	**74**	**55**	**108**	**132**	**240**	**9**	**3**	**12**
India, 2004 (IN)	54	109	135	141	63	113	72	56	68	107	175	11	8	18
Indonesia, 2005 (ID)	62	82	214	120	73	85	78	59	84	137	221	3	3	5
Philippines, 1999 (PH)	58	104	155	107	69	104	73	51	124	111	235	6	2	8
Thailand, 2004 (TH)	56	97	206	105	76	98	79	52	80	251	331	18	4	22
Vietnam, 2008 (VN)	65	80	144	99	71	82	69	55	186	52	239	6	1	7
Latin America & Caribbean	**54**	**101**	**161**	**124**	**70**	**104**	**75**	**55**	**123**	**215**	**338**	**8**	**8**	**16**
Argentina, 1997 (AR)	56	96	153	125	78	103	73	57	98	229	327	6	13	19

Table 1 (Continue)

	Per Capita Consumption by Children and the Elderly (% per capita consumption of 20–64)								Per Capita Human-Capital Spending (% average annual labor income of age 30–49			Importance of per Capita Healthcare Consumption Age 65+ (% all per capita consumption age 65+)		
Brazil, 2002 (BR)	47	105	128	110	65	106	73	51	82	218	300	9	8	17
Chile, 1997 (CH)	55	99	184	139	70	103	77	58	99	193	292	8	7	15
Colombia, 2008 (CO)	50	106	171	144	69	112	77	58	139	248	388	7	10	17
Costa Rica, 2004 (CR)	50	99	136	144	63	105	73	59	72	252	324	4	15	19
Jamaica, 2002 (JM)	57	95	166	130	70	99	74	58	180	169	349	6	7	12
Mexico, 2004 (MX)	54	90	164	118	65	93	75	57	100	232	333	2	7	9
Peru, 2007 (PE)	54	112	175	92	68	109	76	45	139	194	334	8	2	11
Uruguay, 2006 (UY)	63	104	176	114	79	105	74	52	201	196	397	19	6	25
Europe, Australia, & the United States	**53**	**93**	**178**	**187**	**82**	**115**	**77**	**66**	**51**	**350**	**401**	**5**	**24**	**29**
Australia, 2004 (AU)	56	87	165	173	74	102	75	66	108	247	355	7	18	25
Austria, 2005 (AT)	52	90	193	158	83	105	79	64	23	360	384	4	18	22
Finland, 2004 (FI)	51	91	155	153	80	108	75	63	17	344	361	4	17	21
Germany, 2003 (DE)	52	105	149	168	73	119	74	61	37	290	327	5	18	23
Hungary, 2005 (HU)	46	97	149	139	77	109	76	59	33	361	394	7	19	26
Slovenia, 2004 (SI)	64	90	252	206	106	116	80	70	45	460	505	5	30	35
Spain, 2000 (ES)	60	89	181	158	84	102	75	64	61	333	395	3	20	23
Sweden, 2003 (SW)	49	84	219	280	97	139	82	77	17	525	542	2	47	49
United Kingdom, 2007 UK)	55	86	142	209	74	113	72	71	63	295	359	1	30	31
United States, 2003 (US)	49	112	174	227	71	133	78	67	100	287	387	12	21	33
Grand Mean	**56**	**96**	**164**	**143**	**75**	**106**	**74**	**59**	**104**	**231**	**336**	**7**	**12**	**19**

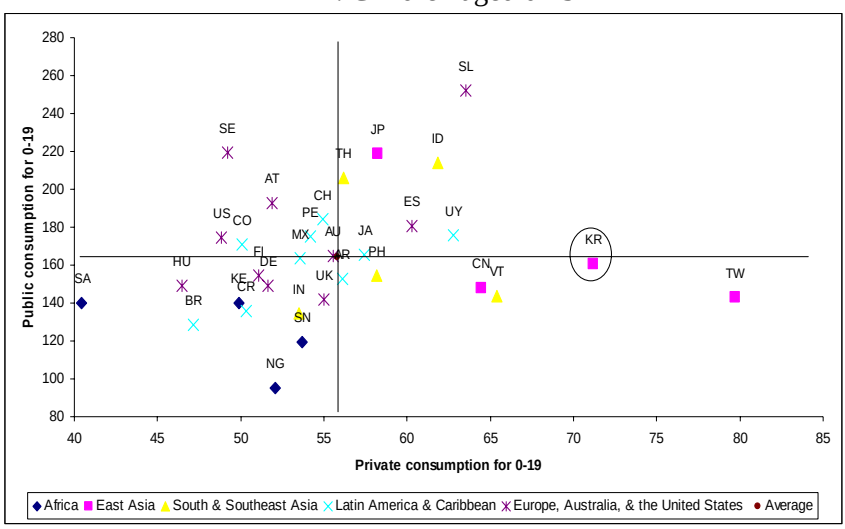
Source : NTA Bulletin #4 (forthcoming). Originally calculated using the National Transfer Accounts Database.

age adult, while a child in East Asia consumes 88 percent of a prime-age adult's consumption on average. Since this consumption includes consumption for human capital, such as education and health, the low consumption by children may also inhibit their development into fully productive members of these countries. Per capita consumption for people aged 65 and older is higher than per capita consumption for working-age adult. It is particularly high in Japan, Sweden, and the US. It is particularly low in South Asia and Latin America.

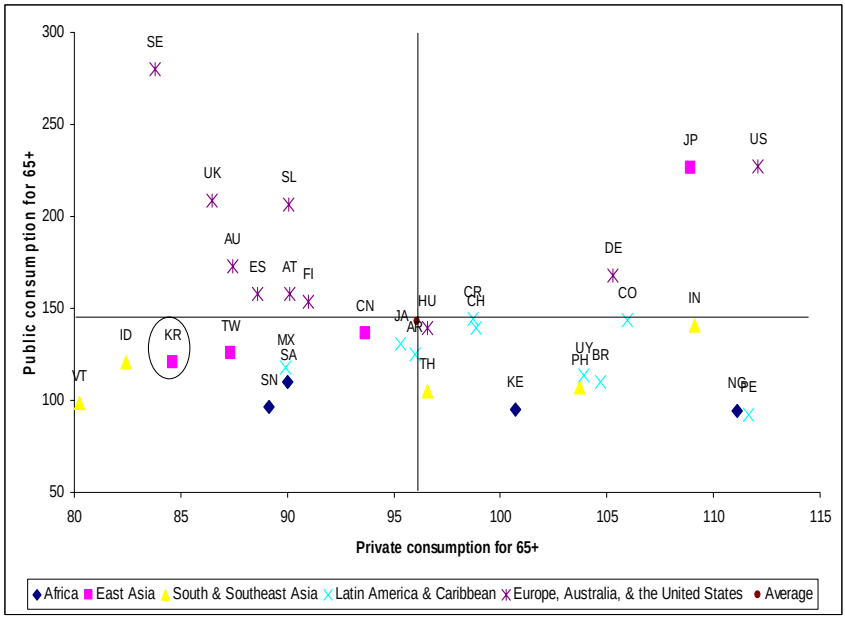
The role of the government vs. family varies substantially too. Figure 3 present the per capita consumption for children and elderly by public vs. private provision, again divided into four quadrants. Korea and Taiwan stand out with particularly high private consumption by children because of high education spending. By contrast, children's public consumption is particularly high in Slovenia, Japan, Indonesia, Sweden, and Thailand. Thus, it does not appear to be the level of development which leads to higher level of public consumption for children, while all East-Asian countries have higher private consumption for children,

Figure 3 Per Capita Private Consumption vs. Public Consumption for Children and the Elderly

A. Children aged 0-19



B. Elderly aged 65 and older



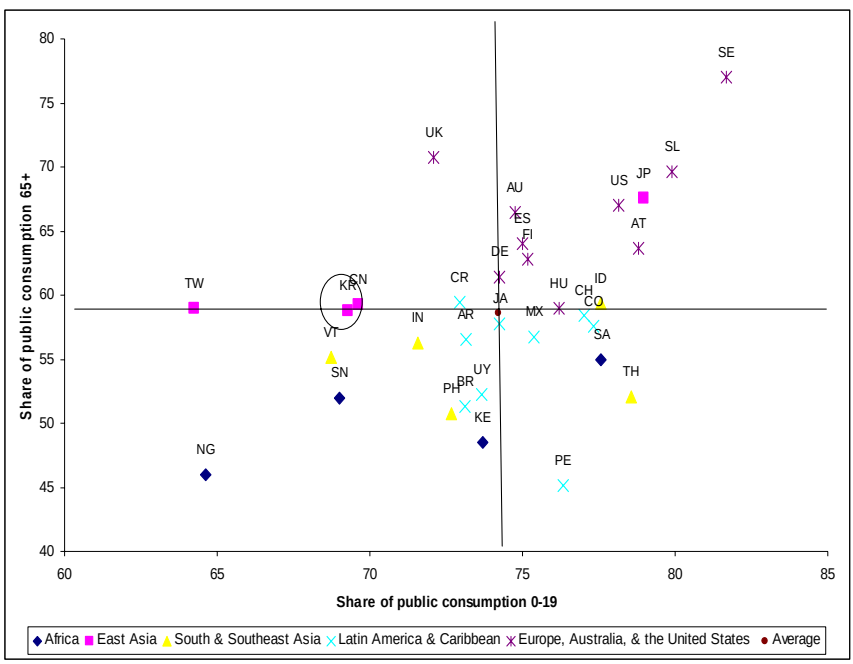
Source: National Transfer Accounts Database.

again due to high education spending. Private consumption for children tends to be low for children in many European countries, but these are balanced by their high public consumption. Per capita consumption for elderly tends to be higher than that by working-age adults. Public consumption for elderly is high in all European countries and US while it is low in Africa, Asia, and Latin American countries. On the other hand, private consumption is particularly low in Vietnam, Indonesia, and Korea. Again, the level of private consumption for elderly is low in many European countries compared with the working population, but these are balanced by their high public consumption.

Figure 4 shows the share of public consumption for children and the elderly. In all European countries and in the US and Japan, their governments provides more than 60 percent of the consumption for elderly. It is particularly high in Sweden where the government provides over 75 of the consumption of the elderly. Governments of Korea, China, and Taiwan provide about 60 percent of consumption for the

elderly. In almost every African and Latin American countries, the public sector provides a much smaller proportion of elderly consumption. For children the picture is a little bit more mixed. In most European countries and in the US and Japan, government consumption is still the dominant form of consumption for children, accounting over 73 percent of the children's consumption. However, in Asia, public consumption accounts for over 77 percent of children's consumption for Thailand and Indonesia, while it is lower than 70 percent in Korea, Taiwan, and China. It might be that the private education consumption is too high in these three economies. This is also closely related with the low fertility in the region. As fertility comes down and the number of children diminishes, families and governments have an opportunity to invest more in each child, trying to enhancing the productivity of future workers.

Figure 4 Per Capita Private Consumption vs. Public Consumption for Children and the Elderly



Source: National Transfer Accounts Database.

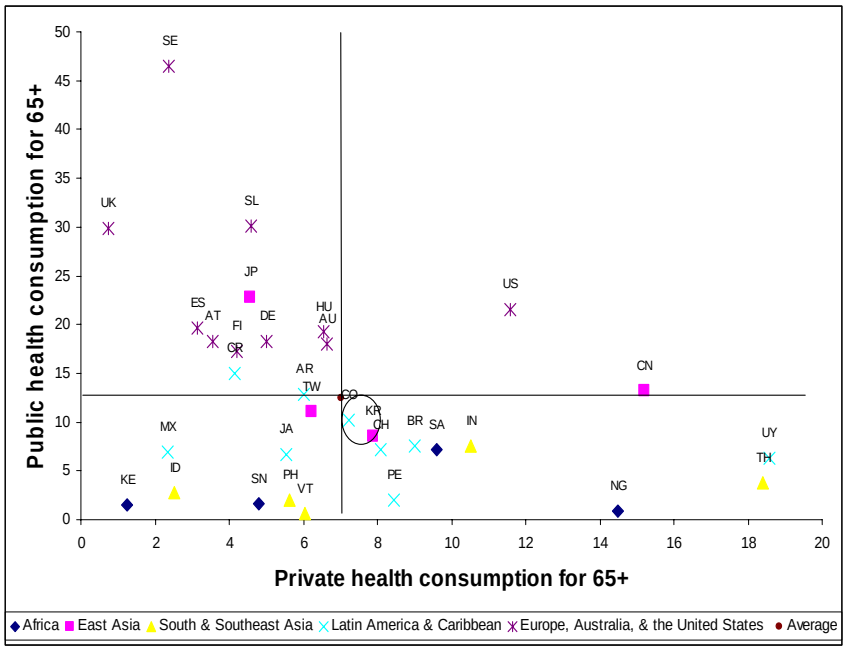
Needless to say, these cross country results should be interpreted with caution in part because the public consumption includes other public consumption such as defense, which also varies a lot across countries. Since the NTA allocates the other consumption evenly amongst population, it may bias the true measure of individual wellbeing. But it should be also noted that the other consumption is actually a very small share of consumption especially for developed economies. Figure 5 presents the private vs. public health consumption for the elderly which is measured as the percentage of per capita consumption for people aged 65 and older. The figure shows the enormous public healthcare consumption for the elderly in many European countries as well as in Japan and the US, largely due to their long-term healthcare. Sweden is an extreme case where the publicly provided healthcare consumption accounts for almost 50 percent of all consumption for people aged 65 and older. In general, the elderly tend to consume much more for publicly provided healthcare in high-income economies. However, there is wide variation too. For example, Korea and Brazil are close to India in terms of its importance of publicly provided healthcare spending for the elderly, but importance of private health consumption for Korea and Brazil are much less than India.[6] The same variation could be found amongst countries in the same region. An elderly Nigerian consumes much more healthcare than an elderly Kenyan, provided more by the private sector.

Children and the elderly consume more than they produce, so economic mechanisms are required to shift resources from the surplus working ages to the deficit ages. The economic system that fulfills this critical need is called the age reallocation system. Countries differ considerably in the ways that they deal with age reallocations with important implications on their economies. The next section describes this in detail.

---

6 The year is 2000 for Korea and 1998 for Taiwan. The healthcare spending has increased very rapidly for both economies, and hence the picture will be somewhat different now. This issue is addressed in the next session.

Figure 5 Importance of per Capita Healthcare Consumption for Ages 65 and older (as % all per capita consumption age 65+)



Source: National Transfer Accounts Database.

3. Economic Resources to Fund Consumption

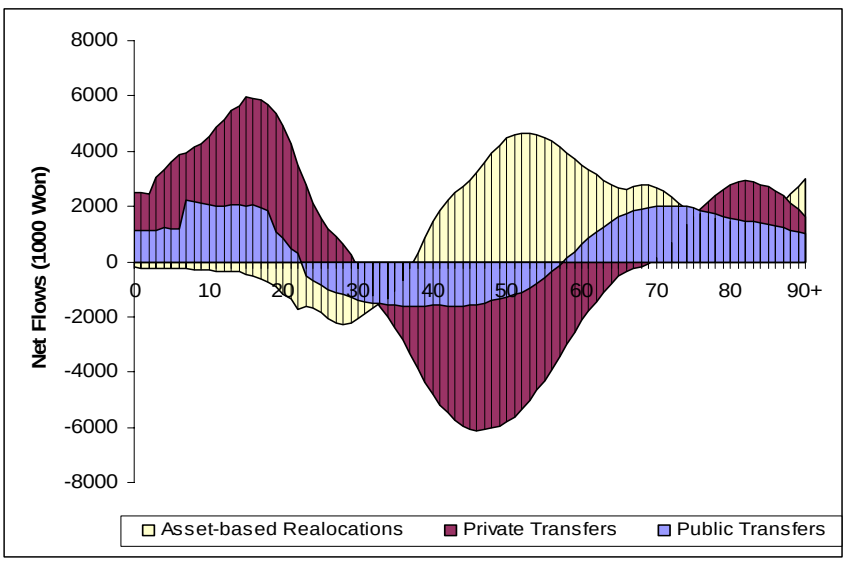
There are three ways to fund the consumption needs. First the consumption needs can be met through their own labor income. Second, the consumption needs can be met through transfers, which involve no explicit *quid pro quo*. Resources flow from one party to another either voluntarily in the case of most private transfers or involuntarily in the case of public transfers. Third, the consumption needs can be met through asset-based reallocation which rely on inter-temporal exchanges.[7] Individuals can accumulate personal savings during their working years and rely on income from it or dispose those assets or

7 For a comprehensive explanation about transfers vs. asset-based reallocations, see Lee (1994).

savings during retirement. Likewise, if individuals can borrow to finance their consumption needs, they are relying on asset-based reallocations to consume more than their current labor income. Governments play an important role by taxing working-age adults and providing benefits to the young and the old. Families perform a similar role by using their resources to support children and often the elderly too.

The main features of the age reallocation system are illustrated in Figure 6 which reports per capita net economic flows by age in Korea in 2000. Flows to both children and the elderly are shown to emphasize that transfers go in both directions—upward to the elderly and downward to the young. Children depend mostly on a combination of public and private transfers. The support system for older adults varies considerably with age in Korea as it does in most countries. Those 60 and older rely primarily on assets while private transfers are more important for the very old. Public transfers increase until early 70s but decreases thereafter. Both private and public transfers are negative for

Figure 6 Per Capita Net Flows by Age in Korea in 2000



Source: National Transfer Accounts Database.

prime age adults suggesting that they provide more to children and the elderly by paying tax or through familial transfers. Two features of Figure 6 are notable. First is the substantial difference in the composition of transfers to the elderly versus transfers to young. Per capita private transfers to the young are much more important than per capita public transfers. For the old, both private and public transfers are important. The second feature is the importance of assets for the very old people. As we shall see in the next, however, support systems vary considerably from country to country.

Labor Income

Labor income in NTA is a broad measure consisting of earnings and benefits received by employees and the estimated value of the labor of the self-employed, including unpaid family workers. Individuals younger than 20 do not support themselves through their labor to any significant degree. However, it is more important source to meet the consumption needs of the young in poor countries. In more developed countries, the young tend to invest more in human capital and realize greater incomes in the future. The picture changes as they enter their 20s. In Japan, those in their early 20s contribute the least to their own support funding only half of their consumption, but in their late 20s they are funding all of their consumption through their labor. Individuals in their 20–24 fund mostly between 50 percent 80 of their consumption through their labor income. Labor income is especially high relative to consumption among Chinese workers in their 20s, a feature driven in large part by the high savings rates and low levels of consumption at all ages in China. Austria is an exception perhaps due to well spread apprentice systems (Lee and Ogawa, 2011). The low percentage in Nigeria is also surprising which might be in part related with the low productivity of young workers.

Labor income drops below consumption around age 55. Labor income accounts for mostly 10 to 30 percent of their consumption for the elderly ages 65 and older. Note that this is not due to their difference in survival rate since this is a synthetic cohort measure. That is the numbers presented in Table 2 are free from the different survival rates

Table 2 Ratio of Labor Income to per Capita Consumption of Children and Elderly

Labor/Consumption	0-19	20-24	65+	65-74
Austria (2000)	11.79	119.9	2.0	3.4
Brazil (1996)	5.5	46.8	14.7	23.6
Chile (1997)	5.5	59.3	18.5	29.3
China (2002)	10.7	95.6	23.0	26.7
Costa Rica (2004)	6.2	62.0	21.1	33.9
Finland (2004)	3.3	59.1	3.9	6.4
Germany (2003)	3.2	59.3	2.4	4.1
Hungary (2005)	0.5	46.7	5.4	9.8
India (2004)	9.5	62.9	22.7	31.1
Indonesia (2005)	9.0	65.3	41.1	46.9
Japan (2004)	1.0	50.0	11.2	18.5
Kenya (1994)	4.9	78.7	27.6	43.6
Mexico (2004)	7.3	50.3	23.2	35.5
Nigeria (2004)	1.3	19.1	44.8	62.4
Philippines (1999)	6.9	59.0	30.8	46.8
Slovenia (2004)	2.3	60.8	3.1	5.8
S. Korea (2000)	4.8	72.7	17.7	29.6
Spain (2000)	3.2	52.9	6.7	12.4
Sweden (2003)	3.7	75.2	7.2	16.1
Taiwan (1998)	3.0	64.7	8.7	14.6
Thailand (2004)	6.9	65.5	13.4	21.7
Uruguay (2006)	6.0	85.2	21.1	35.1
US (2003)	2.5	60.7	25.1	37.4

Note : These are synthetic cohort values that are calculated using recent data on survival weights of the United States. Values are the ratio of the sum of per capita labor income at each single year of age and the sum of per capita consumption at each single year of age within the age group.

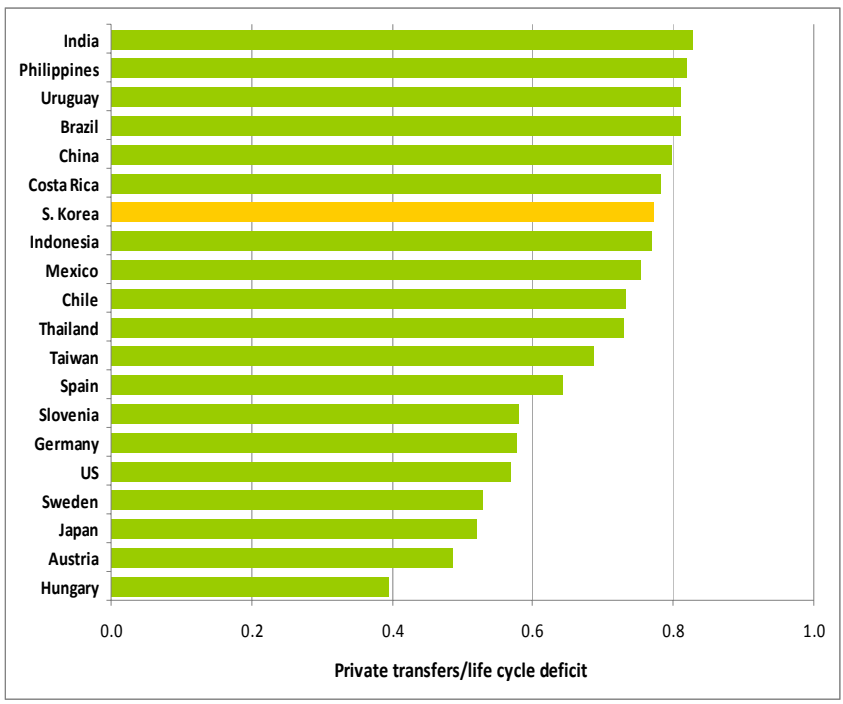
Source : National Transfer Accounts database accessed 1 May 2012.

across countries. In Korea, they are somewhat high, compared with other advanced countries. This is not surprising given the very high labor force participation rates of the elderly in Korea. As Lee and Ogawa (2011) argue the problem of Korea is that the productivity of the elderly is low in general, because they are employed in low-productivity sectors, or because they have less education than young workers, or because they are forced into low-productivity jobs by mandatory retirement provisions.

Public vs. Private Transfers for Children

In most countries, the gap between consumption and labor income for children is filled almost entirely by a combination of public and private transfers since children do not accumulate a lot of assets. Figure 7 shows the varying importance of public transfers across countries. Although public transfers to children are high in European economies, the same is not true in Latin America. This is quite interesting since public transfers for the elderly are very high in Latin American countries as we will see in the next section. In a few high-income economies outside of Asia, net public transfers to children are larger than net private transfers, i.e., the state bears the cost of children to a greater extent than families do. Two examples are Hungary and

Figure 7 Private Transfers as a Proportion of the Lifecycle Deficit for Ages 0–19



Note : These are synthetic cohort values calculated by summing per capita consumption for ages 0 to 19 and dividing by the sum of the per capita lifecycle deficit for ages 0 to 19.
Source : Lee and Mason (2011). Originally calculated using the National Transfer Accounts Database.

Austria.[8] In most rich economies, however, private transfers to children fund more than half of their lifecycle deficit. In Japan, for example, private transfers cover 52 percent of the cost of raising a child.[9] In the six European economies in Figure 7, private transfers as a percentage of the lifecycle deficit over the childhood years vary from a low of 40 percent in Hungary to a high of 64 percent in Spain. In Latin America and in Asia, Japan aside, families bear a higher share of the cost of children, and the public sector plays a less important role. In Taiwan, private transfers to children are just under 70 percent of the total resources they require. In India, the private share is the highest at 83 percent of the total, followed by the Philippines.

Clearly there is a close relationship between development level and the importance of private transfers. The simple correlation between purchasing power parity adjusted per capita income and the private transfer share is -0.79. That is, an increase in per capita income of US$1,000 is associated roughly with a decline in the share of the deficit funded through private transfers by 0.8 percentage points. Korea and the US have high private transfers relative to the predicted level. The size of private transfers to children in Asia is potentially important for a number of reasons. In some Asian economies, private transfers seem to be substitutes for public transfers. The per capita consumption of children in India, Indonesia, and Philippines, is on the low side relative to consumption by adults aged 20–64 while in China, Korea, and Taiwan private consumption by children is higher relative to consumption by adults than in any other NTA economy. Moreover, total consumption by children in these economies tends to be relatively high compared with others (Tung, 2011). An interesting possibility is that the high private transfer burden in Asia may serve to depress childbearing, which is intuitive. However, a simple correlation between the total fertility rate and the private transfer proportion is positive, i.e., high

8 Public transfers are broadly measured here and include children's pro rata share of all public consumption in addition to education and healthcare spending that is more directly consumed by children.

9 This is a synthetic cohort value calculated by taking the ratio of the sum of age-specific per capita net private transfers from ages 0 to 19 to the sum the lifecycle deficit, i.e., consumption less labor income, from ages 0 to 19.

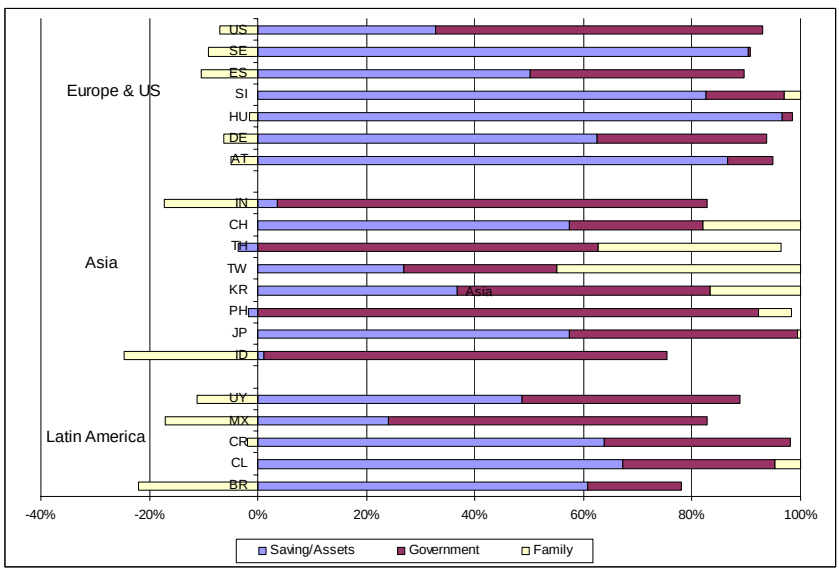
fertility is associated with families bearing a higher share of the cost of children. Thus, it appears that families bear more the burden of raising children in a country with high fertility.

Economic Resources for the Old

Figure 8 shows the relative importance of the three sources of old-age support—assets, private transfers and public transfers—in Asian, Latin American, and European economies and the US. All indicators are measured as net; transfers received less transfers made and asset income less savings relative to consumption in excess of labor income for those 65 and older. The lifecycle deficit, consumption less labor income, must equal net public transfers plus net private transfers plus asset-based reallocations; hence, the three components of the support systems must sum to 100 percent.

There are interesting regional patterns in the support systems. Familial transfers for old age are much more significant in Asia than in the other economies. Familial transfers fund about 45 percent of the

Figure 8 Support Systems for Population Aged 65 and Older



Source: National Transfer Accounts Database accessed 1 July 2011.

lifecycle deficit for the elderly in Taiwan, one thirds in Thailand, and slightly below 20 percent in China and Korea. In Japan and the Philippines, however, the elderly provide as much support to their children and grandchildren as they receive. India and Indonesia are distinctive in that their net private transfers are negative for those 65 and older. Net familial transfers are quite small or negative in Europe, Latin America, and the US. In comparison with Europe and Latin America, the public sector is less important to the elderly in Asia, except as noted below. In the Philippines and Thailand, for example, net public transfers are zero, i.e., the elderly pay as much in taxes as they receive in benefits, while in Indonesia, the elderly pay somewhat more in taxes than they receive in benefits. None of these economies has large public pension programs or healthcare systems that target the elderly. In Korea and Taiwan, net public transfers are funding nearly one third of the lifecycle deficits of the elderly. Social programs for the elderly are also similar in their net effect to those found in Mexico or the US, but they are relatively small in comparison with programs in Europe and South America. Assets are an important source of support in all Asian economies except China and Taiwan. In Indonesia and the Philippines, the elderly rely entirely on assets. Certainly some elderly in those countries depend on familial and public transfers, but as a group net transfers to the elderly are zero or negative and asset-based reallocations are equal to or exceed the lifecycle deficit. Thailand's elderly also rely heavily on assets.

How support systems are likely to change in the future is a very important question about which there is relatively limited information. Korea and Taiwan have both implemented more generous public pension programs. As these programs mature, net transfers to the elderly are likely to rise. In the absence of pension reform, these programs will be increasingly difficult to sustain in the face of the dramatic population aging anticipated in Korea and Taiwan. This issue will be discussed in more detail in the next section.

4. Public Support and Sustainability

Changes in age structure have a strong effect on public finances due to the age patterns of public transfer inflows and outflows apparent from the figures presented above. Miller (2011) calculated the fiscal support ratio to assess the pressures on fiscal sustainability arising from public transfers. He held age-specific public transfer inflows and outflows constant while allowing the population age structure to change in accordance with historical estimates and projections. Table 3 shows the evolution of the fiscal support ratio for the NTA member countries using the age profiles of public transfers in the NTA data sets. The effective number of taxpayers is calculated by weighting the population in each year using the age profile of per capita taxes paid. The effective

Table 3 Fiscal Support Ratios (%): 1950–2050

	1950	2000	2020	2030	2040	2050
Austria	106	100	95	87	82	78
Brazil	100	100	94	86	77	69
Chile	95	100	95	86	81	77
China	89	100	97	89	84	82
Costa Rica	89	100	97	91	83	76
Germany	111	100	94	84	79	75
Hungary	106	100	97	93	83	77
India	97	100	102	103	103	102
Indonesia	79	100	106	110	109	108
Japan	91	100	92	87	79	74
Mexico	86	100	102	99	92	86
Philippines	87	100	106	111	114	116
S. Korea	76	100	97	89	83	80
Spain	94	100	96	87	78	73
Sweden	115	100	96	90	88	86
Thailand	66	100	104	104	104	104
Uruguay	108	100	100	98	95	90
US	99	100	96	92	90	89
Slovenia	100	100	90	81	75	72
Taiwan	68	100	100	94	85	78

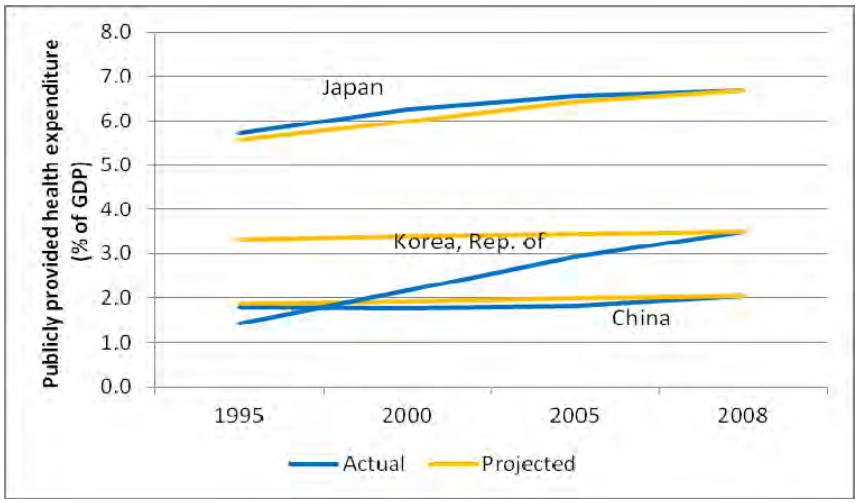
Note : Recalculated based on Miller (2011).
Source : NTA database accessed 1 May 2012.

number of beneficiaries is calculated using per capita benefits in the base year to weight the population age distribution. The ratio is set to 100 in the base year of 2010 so that all values are expressed relative to the fiscal position in 2010. As the population age distribution changes, the fiscal support ratio increases if the effective number of taxpayers rises relative to the effective number of beneficiaries and declines if the effective number of taxpayers declines relative to the effective number of public transfer beneficiaries. The change in the fiscal support ratio indicates the relative size of the tax hikes or benefit cuts needed to return to the initial fiscal position.

It is not surprising that the fiscal impact of population aging is projected to be biggest in Japan. Population aging combined with the current tax and benefit policies would lead to a 26 percent decline in the fiscal support ratio by 2050 in Japan. Thus, either taxes must increase, benefits must decrease, deficits must increase, or some combination of the three must occur. Korea also shows somewhat smaller but big fiscal impacts with 22 reductions in the fiscal support ratio by 2050. The danger, of course, is that economies with favorable demographics or a lot of political pressure will implement generous transfer systems that ultimately prove to be unsustainable.

Lee and Mason (2011) projects the healthcare expenditure for Asian countries. The assumptions underlying these calculations are such that the shapes of the age profiles of benefits are fixed over time with their levels but population change over time and consumption increases at the same rate as the gross domestic product (GDP). The values for 2008 were the actual expenditures as a percentage of GDP for each economy. Figure 9 documents the projected and actual expenditures on healthcare in China, Japan and Korea from 1995 to 2008. The projections present the effects of demographic change; hence, the difference between actual and projected spending can be attributed to factors other than population change such as an increase in the level of benefits holding GDP constant. In other words, GDP growth alone should not affect the results because the level of benefits is assumed to be constant regardless of changes in GDP or other macroeconomic factors. The results show that the actual and projected expenditures in Japan were very similar suggesting that the increase in publicly funded healthcare spending

Figure 9 Projected and Actual Publicly Funded Health Expenditures for China, Japan, and Korea from 1995 to 2008



Note : See the manuscript for methodology.
Source : Lee and Mason (2011).

during the period can be almost entirely explained by the change in population structure. In contrast, the projected and actual changes for Korea were quite different in that actual spending increased much more rapidly. For example, about 90% of the change in publicly funded health expenditures between 1995 (5.7% of GDP) and 2008 (6.7%) in Japan is explained by change in population structure while the increase in Korea for the same period (from 1.4% to 3.5%) is almost unrelated to changes in population age structure.

The rapid growth in government expenditures for the elderly in Korea is surprising. According to An *et al.* (2011), the medical insurance benefits rose 15.3% per annum between 2000 and 2005 and public pension benefits grew by 9% annually during the same period. This sharp rise during a short time span is somewhat exceptional. One might argue this change in Korea could be due to year-specific macroeconomic swings that might have affected specific government expenditures; however, given that health and pension transfers are much less affected by short-run macroeconomic swings, the effect is likely due to a more fundamental change in the scope of public sector

programs. Also I do not see the political regime is particularly related with this change. Again, this is confirmed by other sources of information by age for Korea. Specifically, there was a sharp increase in benefits for those over age 55 owing to increases in public pension and medical insurance benefits. The sharp rise in public pension benefits for those aged 60–64 reflects a rise in the number of newly entitled national pension benefit recipients. Higher benefits for those aged 65 and older were mainly due to an increase in benefits paid out by occupational pensions. Recent changes in medical insurance policies also substantially raised the medical insurance benefits for the older age groups. Changes in Korea mirror a growing concern in many countries that transfer programs will grow extremely rapidly due to increases in the number of elderly and due to changing patterns of public consumption that are mainly due to the rapid increase in per capita public transfers to the elderly. Some countries increase public transfers to their elderly populations as they get richer. For example, in 2009, the Chinese government committed itself to building a universal public pension system in rural areas funded by individual premiums and government subsidies. Also in China, public health insurance was available to urban employees in 1998, to rural citizens in 2003, and to urban citizens in 2007 (Li, Chen, and Jiang, 2011). This seems to work so far, given the high growth of China, but as we can see from recent slowdown of the Chinese economy, it is quite uncertain if this rapid expansion of public transfers will be feasible in the future China.

5. Implication for Korea's Sustained Growth

The elderly in Korea are relying less on their families than they did in the past. The question is, what strategy should be used to compensate for the decline in this traditional source of old-age support: developing extensive social welfare systems as in Europe and parts of Latin America or relying more on accumulating personal assets as in the Philippines, Thailand, and the US? The strategy must simultaneously meet both challenges of providing economic security for the elderly and sustaining economic growth.

One strategy emphasizes capital accumulation. Many of the fundamental insights were established by Modigliani and Brumberg (1954) and Tobin (1967) who explored the implications of the economic lifecycle for savings and investment. The lifecycle has implications for both because the old-age deficit is funded in part by asset-based reallocations. Population aging will lead to an increase in the demand for assets for three reasons. First, to the extent that longer life expectancy leads to longer retirements, the incentive to accumulate more during the working years will increase. Second, because fertility is lower, fewer resources may be devoted to childrearing and more to saving for retirement. The third reason is simply due to age composition. Older individuals are wealthier than before because they have had longer to accumulate wealth; hence, a population composed of more old people will have greater wealth per capita. The strength of the relationship between age structure and savings depends, however, on the nature of the old-age income support system. This idea has been explored in many industrialized countries and to a more limited extent in developing countries. The primary focus has been the possibility that public transfers will crowd out savings (Feldstein, 1998; Gale, 1998; and Munnell, 1974). These and similar studies inform efforts to evaluate existing transfer systems, to guide the development of new systems, and to anticipate the implications of alternative reform proposals. Social security reform, in particular, has been the subject of an enormous amount of research (Feldstein and Samwick, 2001; Feldstein, 1998; and Krueger and Kubler, 2002). Previous studies and the following analysis show that through this mechanism, changes in age structure can lead to the second demographic dividend (Mason and Lee, 2007), i.e., to higher standards of living that persist long after the favorable effects of the first dividend have ended. Of course, the big question of whether increase in savings necessarily leads to productive investment remains.

Healthcare for the elderly is a large and increasing cost that is often heavily subsidized by the public sector. Korea has had some advantage so far since the cost has been kept low. However, this may not be sustainable as the cost of healthcare will rise due to aging. People may live longer, but there is little evidence that they live healthier for the extended life. The huge long term care cost observed in many developed

countries might be inevitable. Thus, aging in Korea will eventually lead to large implicit debts that are shared by taxpayers and the adult children of the elderly.

A recent analysis by Lee and Mason (2010) showed that the impact of spending on human capital, such as education, is strong enough to offset the adverse effects of population aging, but this conclusion depends on the effectiveness of the investment. The investment response to population aging naturally integrates sustaining economic growth and providing economic security to the elderly. This is because the high rate of investment is a consequence of workers saving more for their retirement. The situation is very different with human capital. Retirees do not own the human capital in which they have invested; instead it is owned by the children who received it. The only way to recoup the investment is through expanded public transfers. Given current trends in private transfers, it seems unlikely that parents who invest more in their children will be compensated by old-age support directly from their children. The compensation is more likely to take the form of public transfers intermediated by the government. Smaller cohorts of workers would thus pay higher taxes to support the elderly as compensation for the higher levels of human capital investment they received. The question is whether the huge education investment is effective in Korea, leading to an increase in productivity of the economy, which in turn can cancel out the negative effect of population aging.

The two paths, investing in physical capital and human capital, are not actually mutually exclusive. Ideally, an approach to sustaining economic growth *and* providing economic security would strike the right balance between assets and public transfers while promoting high rates of human capital investment. Finally, although this discussion has centered on economic growth and average standards of living, poverty and inequality are also inextricably linked each other. Although studies are limited, enriched microeconomic data will shed light on this issue.

6. Conclusion

Korea is facing fundamental challenges in social policy. The first hurdle is the challenge of population aging. The second hurdle is the

imbalance in the labor market. The third hurdle is that the traditional familial support for the old has been rapidly deteriorating. Impacts of changing support systems on other means of support will be significant. If labor income and familial transfers play a limited role in the future, Koreans have to rely on accumulating assets or public transfers. Thus, without any doubt there will a growing demand for more public protection either due to economic downturn, population aging, or due to political pressure. It is important to design the public support over the lifecycle effectively and efficiently. How well Korea tackles these challenges will determine whether the country will be able to continue to grow.

References

An, C-B., Y-J Chun, E-S Gim, N. Hwang, and S-H Lee, "Intergenerational Resource Allocation in the Republic of Korea," in R. Lee and A. Mason (eds.), *Population Aging and the Generational Economy*, UK: Edward Elgar, 2011, pp.381~393.

Feldstein, M. (ed.), *Privatizing Social Security*, University of Chicago Press, 1998.

Feldstein, M. and A. Samwick, "Potential Paths of Social Security Reform," *NBER Working Papers* 8592, 2001.

Gale, W. G., 1998. "The effects of pensions on household wealth: A reevaluation of theory and evidence," *Journal of Political Economy* 106(4): 706-723.

Krueger, D. and F. Kubler, 2002. "Intergenerational risk-sharing via social security when financial markets are incomplete," *American Economic Review* 92(2): 407-410.

Lee, R. D., 1994. "The formal demography of population aging, transfers, and the economic life cycle" in L.G. Martin and S. H. Preston *Demography of Aging*, Washington, D.C.: National Academy Press, 8-49.

Lee, R. D., S.-H. Lee, and A. Mason, 2008. "Charting the economic lifecycle," *Population Aging, Human Capital Accumulation, and Productivity Growth*, a supplement to A. Prskawetz, D. E. Bloom and W. Lutz, *Population and Development Review 33*. New York Population Council, 208-237.

Lee, R. and A. Mason, 2010. "Fertility, human capital, and economic growth over the demographic transition," *European Journal on Population* 26(2): 159-182.

Lee, S.-H. and A. Mason, 2011. "The Economic Lifecycle and Support System in Asia," ADB Economics Working Paper Series, Manila: Asian Development Bank.

Lee, S.-H. and N. Ogawa, 2011. "Labor income over the lifecycle," *Population Aging and the Generational Economy*. R. Lee and A. Mason (eds.), Edward Elgar, 109-135.

Li, L., Q. Chen, and Y. Jiang, 2011. "The changing pattern of China's public services," *Population Aging and the Generational Economy*. R. Lee and A. Mason (eds.), Edward Elgar, 408-420.

Mason, A. and R. Lee, 2007 "Transfers, capital, and consumption over the demographic transition," *Population Aging, Intergenerational Transfers and the Macroeconomy*,

R. Clark, N. Ogawa, and A. Mason (eds.), Edward Elgar, 128-162.

Mason, A., R. Lee, and S-H Lee, 2010. “Population dynamics: Social Security, markets, and families,” *International Social Security Review* 63 (3): 145-75.

Mason, A., R. Lee, A.-C. Tung, M. S. Lai, and T. Miller, 2009. “Population Aging and Intergenerational Transfers: Introducing Age into National Income Accounts,” *Developments in the Economics of Aging*, D. Wise (ed.), National Bureau of Economic Research: University of Chicago Press, 89-124.

Mason, A. and S-H Lee, “Population, Wealth, and Economic Growth in Asia and the Pacific,” ADB Economics Working Paper Series, Manila: Asian Development Bank, 2011.

Miller, T., 2011. “The rise of the intergenerational state: aging and development”, *Population Aging and the Generational Economy*. R. Lee and A. Mason (eds.), Edward Elgar, 161-184.

Modigliani, F. and R. Brumberg, 1954. “Utility analysis and the consumption function: An interpretation of cross-section data.” *Post-Keynesian Economics*. K. K. Kurihara (ed.), Rutgers University Press, 388-436.

Munnell, A. H., 1974. The Effect of Social Security on Personal Savings, Cambridge, MA: Ballinger.

National Transfer Accounts, Forthcoming 2012. *NTA Bulletin*, No. 4. Available at http://www.ntaccounts.org/

Tobin, J., “Life cycle saving and balanced economic growth,” W. Fellner (ed.), *Ten Economic Studies in the Tradition of Irving Fisher*, New York: Wiley, 1967, pp.231~256.

Tung, A. C., 2011. “Consumption over the lifecycle: an international comparison,” *Population Aging and the Generational Economy*. R. Lee and A. Mason (eds.), Edward Elgar, 136-160.

CHAPTER 6

Joblessness among the Highly Educated Youth: The Causes of and Policy Implications*

by
*Yong-seong Kim **
(Research Fellow, Korea Development Institute)

Abstract

Despite strenuous efforts of the government, youth joblessness in Korea has remained as a top policy priority to solve. At this end, this study focuses on the causes of the youth labor market problems and tries to search for policy directions. While the previous research attempted to explain youth joblessness based on the labor demand and supply framework, this study applies a job search model which emphasize a job matching process. A theoretical model and empirical results predict that a mean duration of unemployment could decrease if an implicit income of unemployment declines or a rate of job offer rises. From policy point of view, raising incentives for labor demand and strengthening employment services are suggested because a policy to lower an implicit income of unemployment may not secure policy target efficiency.

* This paper is a revised and abridged version of the same titled article which will be published in the forthcoming KDI Journal of Public Policy (2012).

1. Introduction

Joblessness among the youth has become one of the most serious issues in Korean labor market. For the past decade, the unemployment rate of the youth recorded 7~8% on average which was twice as high as that of the prime age group. According to recent studies, the number may rise up to about 20% if one include discouraged and inactive young people,

Improving labor market conditions for the youth has been a top policy priority of the government. To alleviate joblessness for the youth, the government has announced massive plans (called 'The comprehensive package') and introduced various programs such as vocational training, job search assistance, direct job creation, and internship programs. The plans costs the government 1.32 trillion KRW in 2009 increased from 361.2 billion KRW in 2003.

In spite of all these efforts, there are still doubts on the effectiveness of these policies and programs as the youth labor market shows no signs for improvement. Graduates from a high school and a college still have difficulties in finding jobs and some of them give up job-seeking after several failures of job search. The situation will not be improved in a short-run period because various economic forecasts appear to be unfavorable to the youth labor market. Thus, at it is timely to reexamine the problems of joblessness among the youth and to search for the direction of effective policies for future.

This paper investigates the causes of joblessness among young people based on a job search theory and tries to analyze the data empirically. The approach adopted in this paper is not new and a few studies attempted. Previous studies, however, mostly focus on theoretical explanations with less attention to test them empirically. This study is different from others in that it derives s testable relationship from a theoretical model and carries out empirical analysis using available data. This enables us to understand the causes of joblessness among the youth and to give policy directions to address the problem.

The paper consists of four sections. In the next section, previous studies on the youth unemployment are briefly reviewed. In section 3, a simple model of job searching is presented. Based on the model,

empirically testable relations are drawn. Section 4 consists of two parts. It starts by explaining the data sets used in the paper. In the second part, the empirical methods are explained and the results are presented. Section 5 concludes the paper.

2. Literature Review[1]

Previous studies can be grouped by following four categories in the causes of the youth unemployment: ① lack of decent job creation for the youth due to the recent slowdown in the economy and changes in industrial structure; ② excess labor supply of college graduates; ③ change in recruitment policy emphasizing labor market experiences as uncertainty of workers' quality increases; ④ the problems in job matching process.

On the labor demand side, studies point out that the economic growth tends to decline and the job creation capacity becomes weakened (Lee, 2004). Thus, newly created decent jobs for the highly educates youth are in short. For example, large firms which the unemployed youth prefer become passive in new recruitment (Chung, 2004).

Some studies focus on labor supply side. Since 1990s, the advancement rate of post-secondary school rose and has recorded the highest in the OECD countries. With this trend continues, the labor supply of the highly educated youth exceeds labor demand, resulting in a youth unemployment (Won *et al*., 2005). The explanation has its validity because the relative wage for college graduate continuously declines (Lee *et al*., 2005).

Change in firms' recruitment pattern is pointed out as a cause for the youth unemployment (Yun, 2004). As more become college graduates, the uncertainty of a worker's quality increases. Facing this, a firm prefers a job applicant with labor market experience to a new entrant (Kim, 2004). The chance of having a job for newly graduates without any labor market experiences decreases.

1 This section is a summary of Kim (2008).

Recently, studies start to pay attention to a job matching process as a cause of the youth unemployment (Park, 2008; Oh, 2012). According to the studies, there are several reasons for the youth unemployment. Frist, job seekers may have difficulties in finding their prospective employers due to imperfect information. As a supportive evidence, it is observed that both job-seeking rate and job vacancy rate increase together. Second, a job seeker may expect a wage higher than a wage that employers could offer (Kim, 2003). Lack of available wage can make a job applicant fail to adjust his expectation. In recent studies, Oh (2012) found that the reservation wage of a job applicant is typically higher than the labor market afford.

The causes of the youth unemployment seem to be complicated so that the explanations mentioned above are not exclusive to each other. In fact, the youth unemployment has an aspect that could be explained better by combined theories rather than single one.

3. Job Search Theory

3.1. Model

The job searching theory emphasizes a matching process between job-seekers and employers (Mortensen, 1986; Pissarides, 2000). The theory assumes a decentralized labor market where participants have imperfect information. Let $F(w)$ be a wage offer distribution, and λ be the arrival rate of job offer given exogenously. Assume that a job-seeker knows the distribution of wage offer but does not have information on which wage offer he will get. Once a job is offered, an job applicant makes a decision on whether to accept the offer or not by comparing the offered wage with his reservation wage (ξ). If the offered wage is higher that the reservation wage, he will accept the job offer. Otherwise, he will reject it. Therefore, the probability that a job matching (θ) occur can be written as:

$$\theta = \lambda\bar{F}(\xi), \quad \text{where} = \bar{F}(\xi) = 1 - F(\xi) \qquad (3\text{-}1)$$

Let denote income from unemployment by b. Assume that existing jobs are destroyed with the probability of s, and a discount rate is r. Denote the expected present value of accepting a job offer with wage x by $V_E(x)$. If an individual rejects a job offer (and remains unemployed), he will get V_U, the expected present value of unemployment. $V_E(x)$ and V_U can be written as (Lancaster and Chesher, 1983; Lynch, 1983):

$$V_E(x) = \frac{x}{1+r} + (1-\mathrm{s})\frac{V_E(x)}{1+r} + s\frac{V_U}{1+r} = \frac{1}{r+s}[x + sV_U] \tag{3-2}$$

$$V_U = \frac{b}{1+r} + \theta\frac{V_E(x)}{1+r}(1-\theta)\frac{V_U}{1+r} = \frac{1}{r(r+s+\theta)}[r+s)b + \theta x] \tag{3-3}$$

By definition, at the reservation wage $V_E(\xi) = V_U$ and $x = E(w|w \geq \xi)$. Using this relationship, the following equation holds:

$$\xi = b + \frac{\lambda}{(r+s)}\int_{\xi}^{\infty} \bar{F}(w)dw \tag{3-4}$$

It is worth noting the implication of the equation (3-1) and (3-4). By (3-1), θ depends on λ and ξ. The reservation wage ξ is determined by b, λ, and $\bar{F}(w)$. Thus, the effect of b, and λ on θ will be examined in a comparative statics.

3.2. Comparative Statistics

From the model, it is easy to show that the elasticities of ξ with respect to b and λ take the following forms:

$$\epsilon_1 = \frac{\partial \ln \xi}{\partial \ln b} = \frac{b(x-\xi)}{\xi(x-b)} \in (0,1) \tag{3-5}$$

$$\epsilon_2 = \frac{\partial \ln \xi}{\partial \ln \lambda} = \frac{(\xi-b)(x-\xi)}{\xi(x-b)} \in (0,1) \tag{3-6}$$

Two elasticities have the value between 0 and 1 because $0 < b < \xi < x$ holds in general. From the elasticities, ξ increases with b, and λ but the rate of increase in ξ is smaller than those of b and λ.

Note that the unemployment survival function in the model follows an exponential distribution. In the case, the average duration of unemployment is simply $1/\theta$ (Greene, 2000). Thus, the elasticities of the average duration of unemployment with respect to b and λ can be expressed by (Lancaster, 1979):

$$\frac{\partial \ln (1/\theta)}{\partial \ln b} = \frac{\partial \ln (\theta)}{\partial \ln b} = -\epsilon_3 > 0 \tag{3-7}$$

$$\frac{\partial \ln (1/\theta)}{\partial \ln \lambda} = \frac{\partial \ln (\theta)}{\partial \ln \lambda} = -\epsilon_4 \in (-\infty, \infty) \tag{3-8}$$

where ϵ_3 and ϵ_4 are:

$$\epsilon_3 = \frac{\partial \ln \theta}{\partial \ln b} = \frac{\partial \ln \bar{F}(\xi)}{\partial \ln \xi}\frac{\partial \ln \xi}{\partial \ln b} = \frac{\partial \ln \bar{F}(\xi)}{\partial \ln \xi} \times \epsilon_1 < 0 \tag{3-9}$$

$$\epsilon_4 = \frac{\partial \ln \theta}{\partial \ln \lambda} = 1 + \frac{\partial \ln \bar{F}(\xi)}{\partial \ln \xi}\frac{\partial \ln \xi}{\partial \ln \lambda} = 1 + \frac{\partial \ln \bar{F}(\xi)}{\partial \ln \xi} \times \epsilon_2 \tag{3-10}$$

An unemployment income (b) raises the average duration of unemployment ($-\epsilon_3 > 0$). The reason is straightforward. An increase in an unemployment income raises the reservation wage and hence it lowers the probability of accepting job offers ($\bar{F}(\xi) = 1 - F(\xi)$)

The effect of a job offer rate (λ) on the average duration of unemployment is indeterministic because λ has two opposite impacts. A frequent job offer can raises the probability of employment (θ) by (3-1). On the other hand, a frequent job offer lowers the probability of accepting job offers ($\bar{F}(\xi) = 1 - F(\xi)$) by raising the reservation wage (see 3-6). Thus, the effect of a job offer rate on the average duration of unemployment is determined by which impact is larger.

4. Empirical Results

4. 1. Data

The main data sets in this paper come from two different sources: ‘2008 Graduates Occupational Mobility Surveys(henceforth, ‘GOMS’)’

collected by the Korea Employment Information Service and '2009 Korean Educational and Employment Panel (henceforth, 'KEEP')' from the Korea Research Institute for Vocational Education and Training.

The 'GOMS' surveyed 18,000 prospective college graduates and gathered information such as individual characteristics, labor mobility, and school life. The 'KEEP', a long term panel, contains many variables about educational attainment and labor market activities as well as school-to-work information. The observations of the data sets are limited by 20~29 age group.

Table 1 Summary Statistics of the GOMS Data

Variables		Mean	Std. Dev.	Min	Max
Gender (male=1)		0.5834163	0.493008	0	1
Employment (employed=1)		0.7767479	0.4164389	0	1
Age (in years)		25.82502	1.962459	20	29
Location of school (Seoul=1)		0.2101891	0.4074555	0	1
GPA (converted 100 scale)		81.90375	9.050694	30	100
Vocational training (yes=1)		0.2112466	0.4082056	0	1
Certification (yes=1)		0.7102513	0.4536598	0	1
Language study (yes=1)		0.1787758	0.3831764	0	1
Household head (yes=1)		0.2969644	0.4569349	0	1
Unemployment rate (%)		3.4860290	1.158656	0.9	5.1
Major	Humanities and liberal arts	0.1100398	0.3129491	0	1
	Social science	0.1988057	0.3991139	0	1
	Education	0.0790620	0.2698438	0	1
	Engineering	0.2970888	0.4569902	0	1
	Natural science	0.1420129	0.3490743	0	1
	Medical	0.0577258	0.2332315	0	1
	Arts, music and athletics	0.115265	0.3193514	0	1

Note : Number of observations = 16,076. Local unemployment rates are drawn from the regions where the respondents reside.

Source : 1) Korea Employment Information Service, 'GOMS', 2009.
2) National Statistical Office, 'Economically Active Population Survey,' Sep 2009.

Table 2 Summary Statistics of the KEEP Data

Variables		Mean	Std. Dev.	Min	Max
Location of school (Seoul=1)		0.1942675	0.3959511	0	1
Vocational training (yes=1)		0.0684713	0.2527543	0	1
Certification (yes=1)		0.0286624	0.1669889	0	1
Language study (yes=1)		0.1242038	0.3300768	0	1
Major	Humanities and liberal arts	0.1003185	0.3006636	0	1
	Social science	0.2563694	0.4369762	0	1
	Education	0.0605096	0.2386186	0	1
	Engineering	0.2675159	0.4430166	0	1
	Natural science	0.116242	0.3207704	0	1
	Medical	0.089172	0.285219	0	1
	Arts, music and athletics	0.1098726	0.3129802	0	1
Household income (in 10,000 KRW)	99 or less	0.0159236	0.1252797	0	1
	100~199	0.1130573	0.3169153	0	1
	200~299	0.2324841	0.4227527	0	1
	300~399	0.2643312	0.441328	0	1
	400~499	0.1417197	0.3490405	0	1
	500~699	0.1369427	0.3440609	0	1
	700~999	0.0366242	0.1879871	0	1
	1,000 or more	0.0589172	0.2356574	0	1
Father's Education (college and more=1)		0.9267516	0.2607515	0	1
Educational expenses funded from:	Parental supports	0.6910828	0.4624152	0	1
	Self supports	0.0414013	0.1993753	0	1
	Loans	0.1369427	0.3440609	0	1
	Scholarships	0.1194268	0.3245485	0	1
	Others	0.0111465	0.1050706	0	1
Cohabitation with parents (yes=1)		0.6289809	0.4834626	0	1

Note : Number of observations = 628.
Source : Korea Research Institute for Vocational Education and Training, 'KEEP', 2009.

For the empirical analysis, several variables need to be available including an individual's reservation wage (ξ), the level of income while being unemployed (b), and an expected wage (x). Since the 'GOMS' and the 'KEEP' have only part of information needed for the analysis, it is inevitable to combine both data sets to obtain the full set of variables.

Table 1 and Table 2 present the summary statistics of the variables. Briefly, 58 percent of the sample are men, and the average age turns out to be 25.8 in the 'GOMS' sample. Among 16,076 individuals, about 78 percent are employed and about 20 percent had experiences in having vocational training or taking language courses in foreign schools. The sample shows that about 20 percent attended colleges located in Seoul. Majors are diverse, from art and music to engineering.

The 'KEEP' data are used for the estimation of an implicit income for the unemployed youth and the summary of statistics is presented in Table 2. The sample size of the 'KEEP' is 2,270 observations. In the estimation, only 628 observations are used because the rest observations fail to have a full set of relevant variables in the analysis.

4. 2. Results

Information on the reservation wage is directly obtained from the 'GOMS' question, "How much is your the lowest wage for accepting a job offer?" An expected wage is the expected value of all wages that a job-seeker is willing to accept. Unfortunately, this information is not available directly from the data and this paper estimates it. Assume that (log) wage for an individual with his characteristics z is determined by the following equation:

$$\ln w|z \sim N(\mu_{w|z},\ \sigma^2_{w|z}) \text{or } t = (\ln w|z - \mu_{w|z})\sigma_{w|z} \sim N(0,1) \quad (4\text{-}1)$$

where $\mu_{w|z}$ and $\sigma^2_{w|z}$ are the mean and the variance of a wage distribution, respectively. The normalized value of a wage is denoted by t.

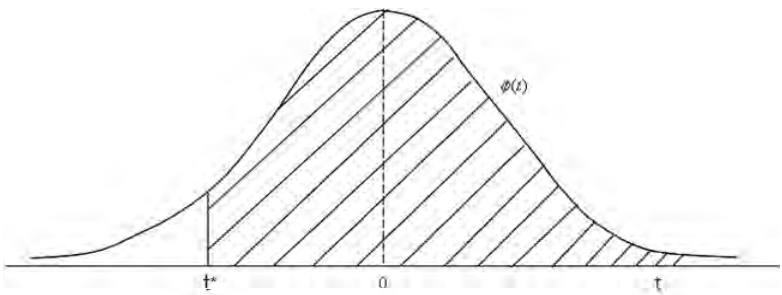
Figure 1 illustrates the relationship between the reservation wage and an expected wage. Any offered (ln) wage less than $t^* = (\ln\zeta - \mu_{w|z})/\sigma_{w|z}$ is rejected because it is lower than the reservation

wage($\ln w_0 - \mu_{w|z})/\sigma_{w|z} < \ln\zeta|z - \mu_{w|z})/\sigma_{w|z}$. The range of acceptable wages for a job-seeker is the shaded area, and the expected value of wages in this range can be written by(Johnson and Kotz, 1970, p.81):

$$\ln x = \mu_{w|z} + \frac{\phi(t^*)}{1-\Phi(t^*)}\,\sigma_{w|z}, \tag{4-2}$$

where ϕ and Φ are a standard normal density function and a standard cumulative density function.

Figure 1 Range of Acceptable Wages



Calculating (4-2) requires $\mu_{w|z}$ and $\sigma_{w|z}$ that could be obtained based on the following assumptions. First, each individual is assumed to have precise knowledge on the relationship between his wage and determinants characterized in wage equation. Second, the unemployed is assumed to infer their wage distribution by observing that of the employed. Under this assumption, the inference of wage distribution (and its mean and variance) can be summarized by the following equations:

$$\ln w_i = \begin{cases} \beta z_i + \epsilon_i & \text{if} \ln w_i \geq \ln \zeta_i \\ 0 & \text{if} \ln w_i < \ln \zeta_i \end{cases} \tag{4-3}$$

$$\widehat{\mu_{w|z}} = E(\ln w|z_i,\ \rho_i) \qquad \widehat{\sigma^2_{w|z}} = N^{-1}\,\hat{e}'\,\hat{e}, \tag{4-4}$$

where, N is the number of observations used in the estimation, and $\hat{e}$ is a deviation between a predicted and actual value ($\hat{e} = \ln w - \widehat{\mu_{w|z}}$).

The ‘GOMS’ does not contain the information on an implicit income (b) for the unemployed and the ‘KEEP’ is used. An implicit income is defined as the sum of stipends, various expenses including on housing and education and is regressed on individual and family characteristics. Using the regressed relationship, an implicit income for the unemployed in the ‘GOM’ is estimated by the following:

$$\ln b_i^{KEEP} = \beta^{KEEP} z_i^{KEEP} + \epsilon_i \rightarrow \ln b_i^{GOMS} = \beta^{\widehat{\mathrm{KEEP}}} z_i^{GOMS} \quad (4\text{-}5)$$

The relationship of $x > \xi > b$ is checked for the consistency of the model. Those who have missing values and violate the above relationship are excluded from the final sample (N=3,136). The amounts of reservation wage, the expected wage and the implicit income for the unemployed are presented in Table 3.

Table 3 Mean Values of Expected, Reservation Wages and Implicit Income

(unit: 10,000KRW/month)

	Overall	Men	Women
Expected wage (x)	273.0	284.9	257.3
reservation wage (ξ)	211.0	218.1	201.6
implicit income for the unemployed (b)	93.6	94.3	92.7
Number of observations	3,136	1,790	1,346

Note : Amounts are in 2009 constant price.

Source : 1) Korea Employment Information Service, ‘Graduates Occupational Mobility Survey (GOMS),’ 2009.
2) Korea Research Institute for Vocational Education and Training, ‘Korean Educational and Employment Panel (KEEP),’ 2009.

A few points merit to note in Table 3. First, the reservation wage turns out to be about 77% of the expected wage and it does no show a sizable difference between men and women. The previous research reports that the level of the reservation wage is 80~85%, which is somewhat higher than this study (Lynch, 1983; Lancaster and Checher, 1983). The implicit income for the unemployed appears to be 43~44% of the expected wage. The number seems to be quite close to those reported (30~40%) in the previous studies.

Second, all of the reservation wage, the expected wage and the implicit income for men are higher than those for women. This is probably because of differences in labor market attachment between men and women documented in many studies.

Table 4 presents the calculated elasticities and they have the same signs predicted by the model.

Table 4 Calculated Elasticities of Interests

	Elasticity of reservation wage(ξ) with respect to:		Elasticity of average duration of unemployment with respect to:	
	b	λ	b	λ
Overall	0.219 (0.212~0.226)	0.179 (0.177~0.180)	0.622 (0.600~0.645)	-0.356 (-0.375~-0.338)
Men	0.215 (0.205~0.224)	0.185 (0.183~0.188)	0.531 (0.507~0.554)	-0.417 (-0.439~-0.395)
Women	0.225 (0.214~0.236)	0.170 (0.167~0.172)	0.745 (0.704~0.785)	-0.276 (-0.305~-0.246)

Note : Numbers in the parentheses are for 95% confidence interval.
Source : 1) Korea Employment Information Service, 'Graduates Occupational Mobility Survey(GOMS),' 2009.
2) Korea Research Institute for Vocational Education and Training, 'Korean Educational and Employment Panel (KEEP),' 2009.

Before interpreting the results, it is useful to compare the results of this study with those found in other studies. From Table 4-4 to Table 4-5, the elasticity of the reservation wage with respect to the implicit income (ϵ_1) is slightly higher in this study than the previous ones while the elasticity of the reservation wage with respect to job offer rate (ϵ_2) is found to be close. The magnitudes of two elasticities ($-\epsilon_3$ and $-\epsilon_4$) are quite close between this study and Lynch (1983) but somewhat different from Lancaster and Chesher (1983).

Table 5 Comparison of Results between This Study and Others

	ϵ_1	ϵ_2	$-\epsilon_3$	$-\epsilon_4$
This study	0.219	0.179	0.622	-0.356
Lancaster and Chesher (1983)	0.135	0.107	1.030	-0.190
Lynch (1983)	0.106	0.146	0.483 ~ 0.559	-0.252 ~ -0.298

Note : Lancaster and Chesher (1993).
Source : 1) Korea Employment Information Service, 'Graduates Occupational Mobility Survey(GOMS),' 2009.
2) Korea Research Institute for Vocational Education and Training, 'Korean Educational and Employment Panel(KEEP),' 2009.

Results in Table 4 have several interesting points. Frist, the results hint that the effects of implicit income and job offer rate on the reservation wage are limited. Given that ϵ_1 and ϵ_2 are 0.219 and 0.179, an increase in implicit income or job offer rate by 1 percent raises the reservation wage by less than 1 percent.

Second, the elasticity of the average duration of unemployment with respect to implicit income $(-\epsilon_3)$ is 0.622. The elasticity is positive because a decrease in the implicit income raises the probability to accept a job offer $(\bar{F}(\xi) = 1 - F(\xi)$ by lowering the reservation wage, and hence the duration of unemployment could fall.

Third, the elasticity of the average duration of unemployment with respect to job offer rate $(-\epsilon_4)$ is -0.356, which is negative. As mentioned, the rate of job offer has two opposite effects on the duration of unemployment. On the one hand, a frequent job offer could lengthen the duration of unemployment because it indirectly raises the reservation wage. On the other hand, it could directly shorten the duration of unemployment because the unemployed could be exposed to more job offers. The empirical result indicates that the latter effect dominates the former so that a frequent job offer can lower the duration of unemployment.

Known that the highly educated experience 26.64 weeks of unemployment, the average duration of unemployment could be reduced by 1.66 week with 10 percent (930 thousands KRW → 842 thousands KRW) decrease in an implicit income. As a policy for youth

unemployment, lowering implicit income is difficult for the government to implement because of the following two points. First, the policy instrument is not clear. Most of the unemployed youth finances their expenses informally such as from their parents and relatives rather than formal unemployment benefits in Korea. Such an inter-vivo transfer might hardly change with the government intervention. Second, the target of the policy is not clear because it is almost impossible for the government to tell who are receiving an excessive income from those who are not.

The size of the impact a job offer rate might have on the duration of unemployment can not be measured directly because there is no appropriate data on a job offer rate. Once positive relationship between job offer rate and job vacancies is assumed, the monthly statistics of job vacancies (and presumably job offer rate) shows substantially variations from 1.7 percent to 23 percent over the period of 2003~2008. Although this sizable variations are mainly due to economic cyclicality, there are still a role for the government. It is witnessed that job vacancy and job seeking exist at the same time throughout the past several cycles. This implies that the public and private employment services need to be improved. Moreover, the labor demand for the youth may increase by the governmental subsidies and the provision of job experiences (internships) as evidenced by some programs.

5. Conclusion

Numerous policies have been introduced and substantial fiscal resources have been spent in order to address joblessness among the youth in our society. Unfortunately, the outcomes of such efforts have not been proven.

This paper tries to seek an answer for this puzzle by looking at the possible causes of joblessness among the youth and suggesting future policy directions.

Based on a simple search model, the paper identifies elements that affect youth unemployment and carries out empirical analysis. The paper finds that the levels of the reservation wage, the expected wage

and implicit income are generally consistent with the findings in the previous literature.

The results shows that an lowering an implicit income of the unemployed and facilitating a job offer may reduce the duration of unemployment. However, an policy to lower an implicit income for the unemployed may not guarantee the effect because policy target is not well defined and its instrument is limited. In contrast, raising a job offer rate could be a candidate for the government policy. To achieve this, policies boosting the labor demand though better employment services, subsidies and the provisions for job experience to the unemployed youth are recommended.

References

In Korean

Kim, Daeil, “Changes in and causes of the youth unemployment since the Financial Crisis,” in Gyeongjoon You (ed.), *Strucutral Change in Korean Economy and Emplyoent*, Korea Development Institute, 2004.

Kim, Ankook, “Issues and Causes of the Youth Unemployment in Korea,” *Journal of Korean Labor Economics*, Vol. 26, No. 1, 2003, pp. 23~52.

Kim, Yong-seong, “The Causes of and Policy Responses for the Youth Unemployment in Korea,” KDI Policy Study Series 2008-09, 2008.

Park, Sungjoon, “Unemployment for the Highly Educated Youth: Labor Supply Side Story”, Joint International Confernece on Economics, 2008.

Won, Jonghak, Jongmyun Kim, Hyungjoon Kim, *Unemplyoent and Its Long-term Fiscal Impacts: Youth Unemployment*, Korea Institute for Public Financ, 2005.

Oh, Hoyoung, “Youth Unemployment: Difficulties in Finding Jobs and Mismatch,” *Occupation and Human Resource Development*, Vol. 15. No. 1, 2012.

Yun, Sukchun, “Changes in Youth Labor Market and Occupational Choices since the Financial Crisis,” Presented Material in the Conference of ‘The Korea Society for the Study of Career Education,’ 2004.

Lee, Byunghee, “Structural Changes in the Youth Labor Market,” presented material in the Conference for Youth Unemployment, 2004.

Lee, Byunghee, Joosup Kim, Juyeop Ahn, Jinho Chung, Keekon Nam, Jangsoo Ryu, Soomyung Jang, and Kangsik Choi, “Study on Education and labor market,” Research paper 2005-02, Korea labor Institute, 2005.

Chung, Bonggeun, “Educational Policies and Youth Unemployment,” The Korea Society for the Study of Career Education, 2004.

In English

Heckman, James, “Sample Selectin Bias As a Specification Error,” *Econometrica*, Vol. 47, No. 1, 1979.

Johnson, Norman and Samuel Kotz, *Continuous Univariate Distributions-I Distributions in Statistics: Wiley Series in Probability and Mathematical Statistics*, Wiley-Interscience Publication, 1970.

Lancaster, Tony and Andrew Chesher, "An Econometric Analysis of Reservation Wages," *Econometrica*, Vol. 51. No. 6, 1983, pp.1661~1676.

Lynch, Lisa M., "Job Search and Youth Unemployment," *Oxford Economic Papers*, New Series, Vol. 35, Supplement: The Cause of Unemployment, 1983, pp.271~282.

Mortensen, Dale, *Job Search and Labor Market Analysis in Handbook of Labor Economics*, eds by Ashenfelter and Layard Vol. 2, Chapter 15, 1986.

Pissarides, Christopher A., *Equilibrium Unemployment Theory*, second edition, Cambridge: The MIT Press, 2000.

CHAPTER 7

‘연줄’인가, ‘연결’인가? 인적 네트워크의 노동시장 효과 분석*

김 영 철
(한국개발연구원 부연구위원)

〈초 록〉

본 논문은 한국노동패널(KLIPS) 자료를 활용하여 국내 노동시장에서의 인적 네트워크 활용의 효과성을 검증하고 임금근로자 개인의 구직 네트워크 가치를 추정하였다. 흔히 인적 네트워크를 활용한 이직을 ‘연줄’ 혹은 ‘정실 인사’라고 하여 부정적으로 보는 견해가 많으나, 본 연구는 인적 네트워크가 이직자와 구인자 사이의 정보전달 기능을 수행함으로써 사회 전반의 일자리 매치(Job Match)의 적합성을 증대시키는 긍정적 기능을 수행하고 있음을 입증하고 있다. Propensity Score Matching 방법론을 활용하여 검증한 결과, 자발적 이직자들의 이직을 네트워크형 이직과 비네트워크형 이직으로 구분하여 보았을 때, 네트워크형 이직만이 교육수준 및 기술수준의 적합도를 각기 (100점 만점에서) 2.13점과 2.52점만큼 개선시키는 것으로 확인되었으며, 이러한 적합도의 개선은 월 4.074만원(2010년 기준)의 임금상승효과로도 재확인되었다. 덧붙여, 이를 활용하여 임금근로자 개인의 구직 네트워크의 가치를 추정해 보면, 구직 네트워크의 생애 금전적 가치는 1,872.0만원으로 집계되었으며, 여기에 주관적 만족도에 대한 보상 측면까지 고려하면, 만족도 1점의 현금가치를 n만원으로 환산할 때, 대략 (1872.0+758.2n)만원에 이르

는 것으로 집계되었다.

1. 서 론

인간은 사회적 동물(Social Animal)이다. 최근 불고 있는 SNS(Social Network Service) 열풍은 새삼 이를 실감케 한다. 이직과 취업 등 노동시장에서도 인적 네트워크는 매우 중요한 역할을 담당하고 있다(류석춘 외[2008]). 한 취업전문 포털업체가 직장인 2천여 명을 대상으로 진행한 한 설문조사에 따르면, 2007년 한 해 동안 응답자의 40.1%가 이직에 나선 반면, 실제 이직에 성공한 이들은 응답자의 14.3%에 머물렀다. 이직에 성공한 이들의 37.2%가 '기존 직장에서 능력을 인정받고 입지를 다진 것'을 성공요인으로 꼽은 데 이어, 무려 27.8%가 '동종·관련 업계 사람들과 두루 인맥을 맺고, 잘 관리한 것'을 성공요인으로 제시한 바 있다.[1] 이러한 인적 네트워크의 광범위한 영향력에도 불구하고, 국내 노동시장의 인적 네트워크 활용도와 그 효과성을 체계적으로 분석한 자료는 매우 드물다(김용학[2003]). 김성훈(2005)이 한국노동패널조사 3차연도의 청년층 부가자료를 활용하여 청년층 첫 취업에서의 인적 네트워크 효과를 분석한 바 있으나, 첫 취업에서 '공개채용'이 교육이나 기술 수준 적합도 측면에서의 긍정적 효과가 크다는 것을 밝혔을 뿐, 인적 네트워크의 순효과를 규명하지는 못하였다.[2] 그리고 이병훈(2002)이 같은 패널의 3차연도 자료를 활용하여 신규 취업자의 구직방법에 대한 영향요인을 분석한 바 있다.[3]

---

1 취업전문기관 인크루트가 리서치기관 엠브레인에 의뢰하여 직장인 2,243명을 대상으로 수행한 2008년 조사(『매일경제 Citylife』, 제114호).

2 김성훈(2005)은 인적 네트워크를 활용한 취업이 공개채용보다 사회적 차원에서 더 비효율적임을 보이고자 하였다. 이를 위해, 공개채용으로 취업하는 이들의 기술적합도나 교육적합도가 인적 네트워크를 통해 채용하는 이들에 비해 높다는 것을 증거로 제시하였다. 그러나 이것은 공개채용이 주로 대형기업을 중심으로 경쟁을 통하여 우수 인재를 선발하는 기능을 수행하고 있다는 것을 간과한 결과이다. 첫 취업에서 인적 네트워크에 의존하는 이들은 주로 이 경쟁에서 1차적으로 탈락한 이들에 해당한다. 이러한 선택편의(Selection Bias)의 문제가 우선 해소되어야, 김성훈(2005)의 결론이 타당성을 확보할 수 있을 것이다.

3 이병훈(2002)은 구직자의 학력이 높을수록 구직과정에서 인적 네트워크에 대한 의존도가 하락하고, 유력인사와의 친인척관계가 구직자의 구직방법을 보다 다양하게 할 수 있

반면, 해외에서는 이에 대한 체계적인 연구가 다각적으로 진행되어 왔다. Blau and Robins(1992)는 구직활동에서 친구나 친지를 활용하였을 때 구직에 성공할 확률이 더 높고, 보다 좋은 조건의 고용제의를 받을 가능성이 크다는 것을 입증한 바 있으며, Datcher(1983)는 인적 네트워크를 활용한 입사인 경우, 그렇지 않은 경우에 비해 같은 기간 내의 퇴사 가능성이 현저히 낮아진다는 것을 보였다.[4] 또한 Marmaros and Sacerdote(2002)는 구직과정에서 동문연결망을 활용하는 것과 높은 연봉의 좋은 일자리를 획득하는 것 사이에 높은 양의 상관관계가 존재함을 확인한 바 있다. 한편, Simon and Warner(1992)는 인맥을 활용한 취업에서 임금 프리미엄이 존재하며, 이는 시간이 지남에 따라 하락한다고 보고하였다. 또한 이외에도, Granovetter(1975) 이후 비공식경로(Informal Networks)의 노동시장 효과에 대한 연구가 사회학적 관점에서 폭넓게 발전하여 왔다(Lin *et al.*[2001]; Glaeser *et al.*[2002]).

흔히 인적 네트워크를 활용한 구직을 '연줄' 혹은 '정실인사'라 하여 부정적으로 보는 견해가 지배적이다. 이러한 견해에 따르면, 인적 네트워크를 활용한 취업이 개인적으로는 유익할지 모르나, 사회 전반적으로는 고용기회의 형평성을 저해하고 인력자원의 효율적 배치를 위협한다고 본다. 앞서 지적한 바와 같이 김성훈(2005)은 이러한 맥락에서 청년층의 첫 취업에서 인적 네트워크를 활용한 구직이 공개채용에 비해 사회적 차원에서 비효율적이라고 주장한 바 있다. 반면, 인적 네트워크의 구인/구직 간 정보전달 기능에 초점을 맞춰 네트워크의 긍정적 측면을 강조하는 견해도 상당하다(Ioannides and Loury[2004]). 즉, 인적 네트워크는 각 개인의 취업 기회를 확장시킬 뿐만 아니라 사회 전반의 일자리 매치(Job Match) 효율성 역시 증대시킨다는 주장이다. 업체에는 채용후보자의 기술능력이나 직무적합도 등 서류 이면의 상세한 정보를 유통하는 주요한 통로가 인적 네트워크이며, 구직자에게도 네트워크는 취업정보를 확보하고 관심있는 회사에 대한 긴요한 내부사정을 사전에 확인할 수 있는 유용한 통로로 활용된다는 것이다.

으며, 아버지의 학력이 좋을 경우 구직에서 인적 네트워크를 보다 많이 활용하는 경향이 있음을 확인한 바 있다.

4 Simond and Warner(1992)도 인적 네트워크를 활용한 입사인 경우, 근속연수가 더 증가하는 경향이 있음을 입증한 바 있다.

본 연구는 이상의 엇갈린 견해에 대하여 부분적인 해답을 제시하고 있다. 즉, 인적 네트워크의 '연줄' 효과와 '연결' 효과가 동시에 한국사회 내에 상존한다고 볼 때, 과연 노동시장에서 어느 효과가 보다 지배적인지 확인해 보는 것이다. 분석에는 국내 임금근로자의 이직 관련 자료를 활용한다. 첫 취업의 경우 그 비교대상이 마땅하지 않아 인맥을 활용한 '네트워크 구직'의 순효과를 규명하기가 기술적으로 쉽지 않다. 반면, 이직의 경우에는 이직 전과 이직 후를 상호 비교함으로써 '네트워크 구직'의 직접적인 효과를 규명해 볼 수 있다. 동시에 본 논문은 이상의 분석을 바탕으로 국내 노동시장의 임금근로자 개개인이 '소유한' 구직 네트워크의 가치를 추정하여 제시한다.

분석에는 한국노동패널(KLIPS)의 5차부터 10차까지의 자료를 활용하였다. 6개연도 자료를 모두 하나로 취합하여 인적 네트워크 활용에 관한 방대한 규모의 표본을 구성하였으며, 이를 바탕으로 신뢰도 높은 분석 결과를 제시하고자 노력하였다. 덧붙여 노동패널이 담보하고 있는 다면적인 정보, 즉 기업의 규모, 비정규직 여부, 일자리의 매치(Match) 적합성, 각종 만족도 변화 등을 종합적으로 이용하여 기존의 연구들이 다루지 못했던 다각적 측면에서의 인적 네트워크 효과를 분석하였다. 무엇보다 본 연구에서 활용한 Propensity Score Matching(PSM) 방법론은 사후가정형 접근법(Counterfactual Framework)에 기반한 경제학의 진일보된 분석기법으로서, 선택편의(Selection Bias)의 문제를 충분히 해소할 수 없었던 국내 및 국외 네트워크 연구들의 한계를 상당 부분 극복하고 있다.

핵심적인 분석 결과는 다음과 같다. 우선 일자리 이동은 인적 네트워크의 활용 여부를 떠나 그 자발적 이직자의 효용(일자리에 대한 주관적 만족도)을 평균적으로 증대시킨다는 점을 확인하였다. 또한 네트워크를 주로 활용한 이직(네트워크형 이직)과 비네트워크를 주로 활용한 이직(비네트워크형 이직)을 구분하여 보았을 때, '네트워크형 이직'이 일자리 매치에서의 교육 및 기술 수준 적합도를 현저하게 향상시킨다는 점을 확인한 반면, '비네트워크형 이직'은 자발적 이직자의 개인효용 증대를 가져오더라도, 교육 및 기술 수준 적합도를 현저하게 개선시키지는 못한다는 점을 확인하였다. 구체적으로 살펴보면, 직장만족도와 직무만족도를 비롯한 개인의 만족도 개선 측면

에서는, 네트워크형 이직과 비네트워크형 이직 모두 각 만족도를 (100점 만점에서) 2~3점가량 개선시키는 것으로 확인되었다. 반면, 교육 및 기술 수준의 적합도 개선 측면에서는 비네트워크 이직의 긍정적 효과는 포착되지 않았고, 네트워크 이직만이 교육수준의 적합도와 기술수준의 적합도를 각기 (100점 만점에서) 2.13점과 2.52점만큼 개선시키는 것으로 확인되었다. 즉, 인적 네트워크가 구인과 구직 사이의 효과적인 정보전달 기능을 수행함으로써, 국내 노동시장의 일자리 매치 적합성을 개선하는 데 현저히 기여하고 있음이 증명된 것이다.

이러한 현상은 네트워크형 이직이 이직자의 임금상승효과로 직결되는 반면, 비네트워크형 이직에서는 임금상승효과를 확인할 수 없었다는 점에서 재확인된다. 네트워크 이직을 통한 임금상승효과는 월 4.074만원(2010년 기준)에 이르는 것으로 확인된 반면, 비네트워크 이직 전반의 임금상승효과는 포착되지 않았다. 이를 활용하여 임금근로자 개인의 구직 네트워크의 가치를 추정해 보면, 구직 네트워크의 생애 금전적 가치는 1,872.0만원으로 집계되었으며, 여기에 주관적 만족도에 대한 보상 측면까지 고려하면, 만족도 1점의 현금가치를 n만원으로 환산할 때, 대략 (1872.0+758.2n)만원에 이르는 것으로 집계되었다.

결론적으로, 본 연구는 근로자의 자발적 이직이 일자리에 대한 주관적 만족도를 높임으로써 근로자 개인의 효용을 개선할 수 있으며, 네트워크형 이직, 즉 네트워크를 주로 활용하는 이직은 이직자와 노동시장 수요자 사이의 매치 적합성을 향상시킴으로써 노동시장의 효율성을 개선할 수 있음을 보여주고 있다. 이러한 연구 결과는 인적 네트워크를 활용한 구직활동이 한국사회 전반에서 '정실인사(Nepotism)'라는 부정적인 기능을 주로 담당하기보다는 '연결(Networking)'을 통한 구인/구직 간 정보전달이라는 긍정적 역할을 주로 감당하고 있음을 강하게 뒷받침한다.

본 논문은 다음과 같이 구성되어 있다. 제2장은 분석자료에 대해, 제3장은 분석변수에 대해 설명한다. 제4장은 국내 노동시장에서의 일자리 이동의 영향요인을 분석해 본다. 제5장은 분석에 활용한 방법론 즉, Propensity Score Matching에 대해 설명하고, 제6장에서는 구체적으로 이직에서의 Propensity

Score를 추정한다. 제7장에서는 이를 기반한 주요한 분석 결과를 요약하며, 제8장에서는 임금근로자 개인의 구직 네트워크의 가치를 추정해 본다. 마지막으로 제9장은 결언부분으로서 본 연구의 정책적 시사점을 제시한다.

2. 분석자료

본 연구의 분석자료는 노동패널의 5차(2002년도 조사)부터 10차(2007년도 조사)까지의 자료 중 개인자료와 직업력자료를 활용하여 구성하였다. 분석에 활용한 최종샘플은 다음의 과정을 거쳐 완성되었다. 우선 각 차수의 개인자료에 직업력자료의 정보를 추가한다. 직업력자료는 각 개인의 현재 일자리가 생애 몇 번째 일자리인가(Job Sequence)에 대한 정보를 제공해 주고 있다. 각 차수의 개인자료에 포함된 개인식별번호(pid)를 활용하여 각 개인의 한 해 전, 즉 한 차수 이전의 일자리 정보를 매칭하였다. 예를 들어 6차 개인자료에 포함된 각 개인에 대해 그 한 해 전인 5차에서의 일자리 정보를 첨부하였다. 단, 이전 차수에 일자리가 없었던 이들은 이전 차수의 일자리 정보를 '무직'으로 표시하였다. 이를 6-5차 자료라 명하자. 이렇게 형성된 6-5차, 7-6차, 8-7차, 9-8차, 10-9차 자료를 합쳐서 통합샘플(Pooled Dataset)을 구성하였다. 여기에 직업력자료가 제공하는 자발적, 비자발적 퇴사를 비롯한 퇴직 관련 정보를 첨부하였다. 이 정보는 이전 차수의 일자리를 그만둔 경우 그 퇴직사유를 파악하도록 돕는다. 통합샘플의 구성도는 [그림 1]에 요약되어 있다.

이 통합샘플을 활용하여, 국내 노동시장에서의 개괄적인 일자리 이동 현황을 파악해 볼 수 있다. 〈표 1〉은 이전 차수에서 임금일자리 소유자였던 이들과 비임금일자리(즉, 자영업자/고용주 혹은 무급 가족종사자) 소유자였던 이들의 현 차수에서의 일자리 내역을 정리하고 있다. 이전 차수에서 임금일자리 소유자였던 이들의 경우, 단 75.36%만이 이전 차수의 일자리를 그대로 유지하고 있는 것으로 나타났다. 네 명 중 한 명의 임금근로자가 한 해 사이에 일자리를 옮기거나 그만둔 것이다. 국내 노동시장에서 일자리 이동이 광범위하게 이루어지고 있음을 확인할 수 있다. 상당수인 10.72%가 한 해 뒤

[그림 1] 통합샘플(Pooled Dataset)의 구성도

〈표 1〉 일자리 소유자들의 연간 일자리 이동 현황

이전 차수 임금일자리 소유자의 일자리 이동			이전 차수 비임금일자리 소유자의 일자리 이동		
이전 차수 임금일자리 유지	14,343	75.36%	이전 차수 비임금일자리 유지	8,258	86.13 %
새로운 임금일자리 진입	2,046	10.75%	새로운 비임금일자리 진입	255	2.66%
비임금일자리 진입	603	3.17%	임금일자리 진입	417	4.35%
현 차수 일자리 없음.	2,041	10.72%	현 차수 일자리 없음.	658	6.86%
합 계	19,033	100%	합 계	9,588	100%

자료: 노동패널 5차부터 10차.

같은 시기에 무직상태인 것으로 나타났고, 비슷한 규모인 10.75%는 새로운 임금일자리로 이동한 것으로 나타났다. 비임금근로자로 전환한 경우도 3.17%에 달한다. 반면, 이전 차수에서 비임금일자리를 소유한 이들의 경우, 대부분인 86.13%가 당시 일자리를 현 차수에서 그대로 유지하고 있는 것으

로 나타났으며, 단 7.01%만이 새로운 비임금일자리를 시작하거나 임금일자리로 진입한 것으로 파악되었다.

이어서 분석에 활용할 최종샘플을 구성하기 위하여 주어진 통합샘플에서 현 차수의 일자리가 없는 개인은 제외시켰으며, 비임금일자리 소유자인 자영업자 및 무급 가족종사자도 제외시켰다. 최종적으로 현 차수에서 임금일자리 소유자로 파악된 이들은 6차부터 10차까지 총 21,199명으로 확인되었는데, 이들 중 이전 차수의 임금일자리를 그대로 유지하고 있는 근로자가 15,004명이며, 새로운 임금근로 일자리에 진입한 경우가 6,196명으로 파악되었다. 이들의 각 차수별 구성은 다음과 같다.

현 차수(조사연도)	임금근로자 수	백분율
6차(2003년)	4,211	19.86
7차(2004년)	4,257	20.08
8차(2005년)	4,085	19.27
9차(2006년)	4,300	20.28
10차(2007년)	4,346	20.5
합 계	21,199	100

여기서 이전 일자리에 대한 상세한 정보를 파악할 수 없거나 이전 차수에서 무직이었던 4,393명을 우선 제하고, 이전 차수에서 비임금일자리 소유자였던 417명도 제하였다. 나머지 16,389명은 이전 차수와 현 차수 모두에서 임금근로자라고 답한 이들이다. 이는 〈표 1〉에서 이전 차수의 임금일자리 소유자 중 현 차수에서도 임금일자리 소유자로 파악된 16,389명과 동일한 수치이다. 우선 분석자료의 신뢰도를 높이기 위하여 72명의 특수한 경우를 가려내어 최종샘플에서 제하였다.[5] 그리고 이직의 순효과만을 파악할 수 있도록 비자발적 이직자라고 밝힌 417명을 제하였다. 다음으로 나이가 70세

5 구체적으로, 지난 한 해 동안 2번 이상 일자리를 옮긴 근로자 55명과 현재의 임금근로 일자리를 이전 차수에서는 자신의 주된 일자리가 아니었다고 답한 15명을 제하였다. 그리고 일자리 일련번호(Job Sequence)가 누락된 2명을 추가로 제하였다.

이상인 임금근로자 114명을 제하였다.[6] 마지막으로, 이전 차수의 임금정보가 누락된 81명을 제하였다. 이로써 15,705명의 최종샘플이 확보되었으며, 이들의 각 차수별 구성은 아래와 같다. 본 최종샘플은 이전 차수와 현 차수 모두에서 임금근로자라고 밝힌 이들 중 중요 변수가 누락되었거나, 비자발적 이직을 비롯한 특수한 경우들을 제외하고 그 나머지 임금근로자들의 전체 집합이라 할 수 있다.

차수별	최종샘플	백분율
5~6차	2,927	18.64
6~7차	3,110	19.80
7~8차	3,100	19.74
8~9차	3,186	20.29
9~10차	3,382	21.53
합 계	15,705	100

3. 분석 변수

본 장에서는 각 분석 변수에 관한 체계적 설명을 제시하고자 한다. 분석에 활용된 변수들에 대한 기초통계량은 〈표 2〉와 〈표 3〉에 요약되어 있다.

가. 개인 및 일자리 특성변수

개인에 대한 기초변수로는 성별, 나이, 교육수준,[7] 혼인 여부를 포함하였다. 이전 차수, 즉 지난 조사시점에서의 일자리에 대한 기본정보로서 정규직 여부, 첫(혹은 두 번째) 일자리 여부, 임금수준(로그), 기업 규모를 포함하였다. '첫(혹은 두 번째) 일자리 여부'는 당시 일자리가 생애 첫 번째 혹은 두

6 이들 대부분(97%)은 한 해 사이에 일자리 이동이 없었던 것으로 나타나, 근로자의 이직 특성을 보편적으로 대변하기 힘든 특이치(Outliers)로 처리하였다.

7 '교육수준'에 대한 등급은 다음의 순서대로 1부터 8을 부여하였다: 무학, 초등학교, 중학교, 고등학교, 2년제 대학, 4년제 대학, 대학원 석사, 대학원 박사.

번째 일자리에 해당하는가를 표시한다. '임금수준(로그)'은 임금상승률을 감안하여 2008년도 기준으로 환산된 월평균 임금액에 로그를 취한 값이다.[8] 2008년 기준의 실질임금으로 환산하자면 임금상승률이 아닌 물가상승률을 이용하여야 할 것이나, 본 분석의 목적이 실질임금의 변화를 정확히 추정하는 데 있지 아니하고 전체 통합샘플에서의 임금수준의 증가 여부에 있으므로, 2008년 기준 임금수준으로 일원화(Equalizing)하는 차원에서 임금상승률을 대신 활용하였다. 단, 일부 응답자들이 월평균임금이 아닌 연봉을 기입한 것으로 판단되어, 8명의 이전 차수 월평균임금을 무응답 처리하고, 17명의 현 차수 월평균임금 역시 무응답 처리하였다.[9] '종업원 규모(로그)'는 근무하는 직장의 종업원 수에 로그를 취한 값이다. 단, 응답자가 정확한 종업원 수가 아닌 1부터 10까지 종업원 규모의 등급만을 밝힌 경우, 해당 등급이 아우르는 범위의 중간값을 차용하였다. 예를 들어, 3등급(종업원 10~29명) 직장인 경우 종업원 수를 19.5명이라 표시하였다.[10]

다음으로 '일자리(혹은 일)를 계속 유지하길 희망하는가'에 대한 응답으로 '직장유지의향'과 '직무유지의향'을 포함하였다. 노동패널은 5단위로 '전혀 그렇지 않다(1)'부터 '아주 그렇다(5)'까지를 표기하는데, 본 분석에서는 이를 백단위로 전환하여 '전혀 그렇지 않다'를 0점, '아주 그렇다'를 100점으로 표하였다.[11] '업무만족도'는 다음 네 가지 질의에 대한 5단위 응답을 역시 백단위로 전환한 후 산술평균한 값이다: 업무에 만족하나, 업무에 열정적인가, 업무를 즐겁게 하나, 업무에 보람을 느끼나. 그리고 다음 일곱 가지 영역에

---

8 임금상승률의 계산에는 노동부의 '고용형태별 근로실태조사(구 임금구조기본통계조사)'에 수록된 상용근로자 5인 이상 사업체의 6월 기준 월평균임금을 활용하였다. 이로부터 추정한 연간 임금상승률은 다음과 같다: 2002~03년(8.36%), 2003~04년(6.75%), 2004~05년(7.23%), 2005~06년(6.15%), 2006~07년(4.08%), 2007~08년(5.65%).

9 2002년 기준으로 환산된 월평균임금에서 8명의 이전 차수 임금이 현 차수 임금보다 500만원 이상 높게 나타났고, 17명의 현 차수 임금 역시 이전 차수 임금보다 500만원 이상 높게 나타났다. 한 해 사이에 월급여가 500만원(2008년 기준으로 723.8만원) 이상 변동하는 경우는 드물므로, 이들이 월급여 대신 연봉을 기입한 것으로 판단된다.

10 각 등급을 대체한 종업원 수는 다음과 같다: 1등급(2.5명), 2등급(7명), 3등급(19.5명), 4등급(39.5명), 5등급(59.5명), 6등급(84.5명), 7등급(199.5명), 8등급(399.5명), 9등급(745.5명). 마지막 종업원 1,000명 이상을 표시하는 10등급의 경우, 종업원 수를 1500명이라 표하였다.

11 5단위 점수 a를 백단위 점수 b로 전환하기 위하여 다음의 산술식을 활용한다: $b=25(a-1)$.

대한 만족도 조사를 추가하였다: 임금에 대한 만족도, 취업의 안정성에 대한 만족도, 근로환경에 대한 만족도, 의사소통 및 인간관계에 대한 만족도, 개인의 발전가능성에 대한 만족도, 인사고과의 공정성에 대한 만족도, 복지후생에 대한 만족도. 본 분석에서는 이들 만족도에 대한 5단위 응답을 100점 만점으로 전환하여 사용하였는데, '매우 만족'을 100점으로, '만족'을 75점, '보통'을 50점으로, '불만족'을 25점, '매우 불만족'을 0점으로 처리하였다. 〈표 2〉에서 보듯이 임금만족도와 복지후생만족도가 일반적으로 50점을 크게 하회하는 반면, 업무, 직업안정성, 인간관계에 대한 만족도는 일반적으로 50점을 크게 상회하는 것을 확인할 수 있다.

이전 차수 일자리를 직종별, 업종별로 구분하여 더미변수로 처리하였다. 직종별로는 전문관리직(노동패널 대분류 0 '의회의원, 고위 임직원 및 관리자', 1 '전문가'), 사무기술직(대분류 2 '기술공 및 준전문가', 3 '사무 종사자', 소분류 950 '군인'), 서비스판매직(대분류 4 '서비스 종사자', 5 '판매 종사자'), 농어민(대분류 6 '농업 및 어업숙련 종사자'), 생산기능직(대분류 7 '기능원', 8 '장치 및 기계조작 종사자', 9 '단순노무자')로 구분하였다. 업종별로는 농어업 종사(대분류 A '농업 및 임업', B '어업'), 광공업 종사(대분류 C '광업', D '제조업'), 건설업 종사(대분류 F), 도소매 숙박업 종사(대분류 G '도매 및 소매업', H '숙박 및 음식점업'), 서비스 관련업 종사(대분류 E '전기, 가스, 수도사업' 외 각종 서비스 관련 업종)으로 구분하였다.

〈표 2〉 개인 및 일자리 특성변수별 기초통계량

변수명		관측 수	평균값	표준편차	최솟값	최댓값
개인 특성변수	성별(여성=1)	15,705	0.37	0.48	0	1
	나이	15,705	40.05	10.81	18	69
	교육수준	15,703	4.51	1.35	1	8
	혼인 여부 (미혼=1)	15,705	0.27	0.45	0	1

〈표 2〉의 계속

변수명		관측 수	평균값	표준 편차	최솟값	최댓값
일자리 특성변수 (이전 차수 기준)	정규직 여부 (정규직=1)	15,659	0.76	0.43	0	1
	첫(혹은 두 번째) 일자리 여부	15,705	0.48	0.50	0	1
	임금수준 (단위: 만원, 로그)	15,694	5.14	0.59	1.47	7.29
	종업원 규모 (단위: 명, 로그)	12,912	4.00	2.31	0	10.97
만족도 관련 변수 (이전 차수 기준)	직장유지의향	15,658	65.16	18.71	0	100
	직무유지의향	15,645	64.09	19.22	0	100
	업무만족도	15,653	59.36	16.44	0	100
	임금만족도	15,656	43.94	19.27	0	100
	취업 안정성 만족도	15,645	55.40	19.38	0	100
	근무환경만족도	15,653	54.46	18.48	0	100
	인간관계만족도	15,631	57.12	16.29	0	100
	자기발전만족도	15,649	50.88	18.39	0	100
	인사공정만족도	15,460	49.75	16.02	0	100
	복지후생만족도	15,552	45.69	19.58	0	100
직종더미 (이전 차수 기준)	전문관리직 여부	15,702	0.13	0.33	0	1
	사무기술직 여부	15,702	0.33	0.47	0	1
	서비스판매직 여부	15,702	0.13	0.34	0	1
	농어민 여부	15,702	0.01	0.08	0	1
	생산기능직 여부	15,702	0.41	0.49	0	1
업종더미 (이전 차수 기준)	농어업 종사 여부	15,703	0.01	0.08	0	1
	광공업 종사 여부	15,703	0.26	0.44	0	1
	건설업 종사 여부	15,703	0.11	0.31	0	1
	도소매 숙박업 종사 여부	15,703	0.16	0.37	0	1
	서비스 관련업 종사 여부	15,703	0.46	0.50	0	1

나. 이직 및 성과지표 관련 변수

최종샘플 15,705명 중 지난 조사시점 이후 일자리를 이동한 임금근로자는 전체의 약 10%에 해당하는 1,560명이다. 각 샘플에 대한 이직 여부를 더미

변수로 처리하였다. 이직의 성과를 측정하기 위하여, 다음의 일곱 가지 평가지표를 마련하였다: 개인의 주관적 만족도와 관련된 종합적 지표 세 가지(직장만족도, 직무만족도, 일자리만족도), 일자리 배치의 효율성과 관련된 종합적 지표 세 가지(기술적합도, 교육적합도, 교육기술복합지수) 그리고 임금수준. 이들에 대한 기초통계량은 〈표 3〉에 요약되어 있다.

직장만족도는 다음 5가지 평가지표(5단위)의 평균값을 100점 단위로 환산한 것이다: 다닐 만한 직장인가, 들어온 게 기쁜가, 친구에게 추천하고 싶은가, 다른 이에게 자랑할 수 있는가, 계속 다니고 싶은가(즉, 앞서의 '직장유지의향'). 직무만족도는 앞서 제시한 '업무만족도' 관련 네 가지 지표와 '직무유지의향'을 합친 다섯 가지 평가지표를 산술평균하여 100점 단위로 환산한 것이다. 일자리만족도는 '일자리에 대해 전반적으로 얼마나 만족하는가'라는 질의에 대한 5단위 응답을 100점 단위로 환산한 것이다. 이들 세 가지 만족도와 관련된 지표들의 연간 변화를 (현 차수 만족도 – 전 차수 만족도)로 측정하여 만족도 변화지표를 추가로 생성하였다.

기술적합도는 '현재 하는 일의 수준은 나의 기술(기능)과 비교하여 어느 정도인가'라는 질의에 대한 답변으로부터 구성하였다. 응답자는 '매우 낮다', '낮은 편이다', '맞다', '높은 편이다', '매우 높다' 중 응답하도록 되어 있다.[12] 대략 80% 안팎의 응답자가 다섯 응답 중 '맞다'에 답하였다. 여기서 '높은 편이다'와 '매우 높다'에 대한 응답은 전체 응답자의 1% 내외이다. 하는 일의 수준이 매우 높거나 높은 편이다라는 것은 하는 일이 도전적이며 자기 능력을 충분히 발휘할 기회가 많다는 것을 의미하므로 적합도가 낮다고만 평할 수는 없다. 따라서 100점 단위로 환산할 때, '매우 낮다'에 0점, '낮은 편이다'에 50점, '맞다'와 그 이상의 답변에 100점을 부여하였다.[13] 교육적합도는 '현재 하는 일의 수준은 나의 교육수준과 비교하여 어느 정도인가'라는 질문에 대한 답변으로부터 구성하였으며, 같은 방식으로 '매우 낮다'에 0점, '낮

---

12 응답자별 분포: '매우 낮다(1.22%)', '낮은 편이다(17.27%)', '맞다(80.39%)', '높은 편이다(1.06%)', '매우 높다(0.06%)'.

13 '높은 편이다'와 '매우 높다'가 차지하는 비중이 매우 낮아, 이들을 적합도가 '낮은 편이다'와 '매우 낮다'와 함께 '나의 기술(기능)과 맞지 않다'로 통으로 취급하여도 분석 결과에는 의미있는 차이가 나타나지 않는다.

〈표 3〉 이직 및 성과지표별 기초통계량

변수명	관측 수	평균값	표준편차	최솟값	최댓값
이직 여부(이직=1)	15,705	0.099	0.30	0	1
전 차수 직장만족도	15,636	56.59	16.98	0	100
현 차수 직장만족도	15,585	56.79	16.98	0	100
직장만족도 변화	15,531	0.19	16.36	−90	80
전 차수 직무만족도	15,653	60.52	15.99	0	100
현 차수 직무만족도	15,600	60.56	16.15	0	100
직무만족도 변화	15,563	0.03	16.41	−75	85
전 차수 일자리만족도	15,596	53.90	16.18	0	100
현 차수 일자리만족도	15,562	54.54	16.46	0	100
일자리만족도 변화	15,468	0.65	17.22	−100	75
전 차수 기술적합도	15,613	90.14	21.38	0	100
현 차수 기술적합도	15,590	90.58	21.46	0	100
기술적합도 변화	15,509	0.44	23.87	−100	100
전 차수 교육적합도	15,656	89.69	21.69	0	100
현 차수 교육적합도	15,620	90.08	21.86	0	100
교육적합도 변화	15,582	0.40	24.13	−100	100
전 차수 교육기술복합지수	15,612	89.91	21.06	0	100
현 차수 교육기술복합지수	15,590	90.34	21.19	0	100
교육기술복합지수 변화	15,508	0.43	23.18	−100	100
전 차수 임금수준(단위: 만원)	15,697	202.47	120.55	0	1,469.75
현 차수 임금수준(단위: 만원)	15,658	205.89	124.06	6.25	1,469.75
임금수준 변화(단위: 만원)	15,650	3.44	56.19	−719.31	565.72

은 편이다'에 50점, '맞다'와 그 이상의 답변에 100점을 부여하였다. 여기서 교육수준은 서류상에 기재되므로, 서류상에 기재가 어려운 기술수준과는 취업과정에서 다르게 취급된다. 특히 인적 네트워크는 교육수준보다 기술수준의 정보전달에 보다 유용한 채널로 작동할 가능성이 높다. 따라서 이직의 종합적인 배치효율성 개선효과를 측정하기 위해서는 두 지표를 아우를 수

있는 독립적인 지표가 필요하다. 도입된 '교육기술복합지수'는 기술적합도와 교육적합도의 산술평균으로서 일자리 배치효율성에 대한 종합적 평가지표로 작성되었다. 이들 세 가지 배치효율성 관련 지표들의 연간 변화를 (현 차수 배치효율성 – 전 차수 배치효율성)으로 측정하여 배치효율성의 변화분을 추가로 추출하였다.

마지막으로, 월평균임금(단위: 만원)의 절대치를 2008년 기준으로 환산하여 '전 차수 임금수준'과 '현 차수 임금수준'을 구성하였다. 앞서 '임금수준(로그)' 변수의 생성에 활용한 임금상승률을 그대로 차용하였다. '임금수준 변화'는 (현 차수 임금수준 – 이전 차수 임금수준)으로 측정하였다. 표에서 보는 바와 같이, 전 차수 임금수준은 평균 202만 4,700원으로, 현 차수 임금수준은 평균 205만 8,900원으로 집계되었고, 평균 임금수준의 연간 상승분은 3만 4,400원으로 나타났다.

4. 일자리 이동의 영향요인

본 장에서는 일자리 이동에 영향을 미치는 주요 요인들에 대해 평가해 보도록 한다. 이직확률 추정을 위하여 로짓회귀분석(Logistic Regression)을 수행하였으며, 여덟 가지 회귀분석모형에 대해 그 결과를 〈표 4〉에 요약하였다. 각 모형은 이전 차수와 현 차수 사이의 이직 여부를 종속변수로 한다. 모형 1은 개인 특성변수들과 일자리 특성변수들을 설명변수로 하였으며, 모형 2는 여기에 교육적합도를 추가하였다. 모형 3은 여기에 일과 일자리에 대한 만족도를 측정하는 여덟 개 변수를 추가하였다. 모형 4에는 직종더미를, 모형 5에는 업종더미를, 모형 6에는 연차더미를 차례로 추가하였다. 모형 7은 모형 6에서 종업원 규모를 제하고 추정한 결과이다. 종업원 규모에 응답하지 않은 샘플 수가 전체 최종샘플의 17.8%에 달하므로, 설명변수에서 종업원 규모를 뺀 모형 7은 샘플 수를 극대화한 추정 결과를 제시한다. 모형 8은 모형 6의 설명변수 중 교육적합도를 기술적합도로 대체한 추정 결과이다. 교육적합도와 기술적합도의 상관계수가 0.913에 달하므로, 하나의 모형에 두 변수를 모두 포함시키기보다 별도의 모형을 만들어 상호비교하는 방

법을 택한 것이다. 이들 모형들의 하단에 '평균치 이직확률'을 표기하였다. '평균치 이직확률'은 추정에 활용된 변수들의 평균치에서 계산한 이직확률을 나타낸다. 즉, 샘플 내의 대표적 임금근로자(Representative Paid Worker)의 이직 가능성을 대변하는 수치이다. 주어진 모형들이 추정한 '평균치 이직확률'은 대략 8% 안팎(7.6~9.02%)이다. 각 추정계수 우편에는 한계효과를 함께 표시하였는데, 이는 설명변수가 한 단위 상승할 때(더미변수의 경우 0에서 1로 바뀔 때) '평균치 이직확률'의 변동분을 나타낸다. '평균치 이직확률'과 한계효과 모두 100을 곱하여 백분율로 표기하였다.

분석 결과에 따르면, 네 가지 개인의 특성변수(나이, 성별, 교육수준, 혼인 여부) 중에서는 나이와 성별만이 통계적으로 유의한 영향요인으로 확인되었다. 여성의 경우, 남성에 비해 이직확률이 대략 1.1%p가량 낮은 것으로 나타났다. 연령이 높을수록 이직확률이 낮아지는데, 나이가 한 살 증가할수록 대략 0.4%p가량 이직확률이 하락하였다.

일자리 관련 특성변수 중에서 정규직 여부, 첫(혹은 두 번째) 일자리 여부, 임금수준, 종업원 규모 모두 통계적으로 유의한 영향요인으로 파악되었다. 정규직일 경우 비정규직에 비해 이직확률이 2%p가량 하락하였다. 생애 첫 번째(혹은 두 번째) 일자리인 경우 4.4%p가량 이직확률이 하락하였다. 그리고, 임금수준이 높을수록 이직확률이 떨어지는 것으로 나타났다. 임금이 10% 상승할 때, 이직확률은 0.45%p만큼 하락한다. 종업원 규모 역시 이직확률과 부의 관계를 가지는 것으로 나타났다. 종업원 규모가 10%가량 큰 기업에서 근무하면, 이직확률은 0.07%p가량 하락한다. 이는 종업원 규모가 큰 기업일수록 내부 노동시장을 활용한 직무재배치가 용이하기 때문인 것으로 파악된다.

또한 교육적합도 혹은 기술적합도가 높을수록 이직확률이 하락하는 것으로 나타났다. 교육 혹은 기술 적합도가 10점 상승할 때, 0.25%p가량 하락한다. 이는 현재 하는 일이 나의 교육(혹은 기술) 수준보다 낮다고 답한 경우(적합도 50점), 수준이 맞다고 답한 경우(적합도 100점)보다 1.25%p만큼 이직확률이 증가하는 것을 의미한다. 따라서 노동자의 기술 혹은 교육 수준에 적합한 직무와 그에 합당한 대우가 이직확률을 떨어뜨리는 데 효과적임을

알 수 있다.

일자리만족도와 관련한 여덟 가지 변수 중에서 임금에 대한 만족도, 직장 내 인간관계에 대한 만족도, 인사고과의 공정성에 대한 만족도는 이직에 유의미한 영향을 미치지 못하는 것으로 나타났다. 특히 이 중 임금에 대한 만족도가 이직 여부에 결정적 역할을 하지 않는다는 점은 흥미로운 발견이며, 이는 여러 해외 연구 결과들과도 맥을 같이 한다.[14] 반면, 취업 안정성에 대한 만족도와 근무환경 및 복지후생에 대한 만족도 그리고 업무에 대한 만족도는 이직확률과 통계적으로 유의한 부(−)의 관계가 있음이 확인되었다. 취업 안정성에 대한 만족도, 근무환경의 만족도 그리고 업무만족도의 경우, 100점 만점에 10점 향상 시 0.4%p가량 이직확률을 떨어트리는 것으로 나타났으며, 이는 이들 만족도에 대한 응답이 불만족(25점)에서 보통(50점)으로 개선된 경우, 1%p만큼 이직확률이 감소하는 것을 의미한다. 개인만족도 관련 변수 중 이직확률에 가장 영향력이 큰 변수는 복지후생 변수로서, 이에 대한 만족도는 10점 향상 시 이직확률을 0.55%p가량 떨어트리는 것으로 나타났다. 복지후생만족도에 대한 응답이 불만족(25점)에서 보통(50점)으로 개선된다면, 대략 1.38%p만큼의 이직률 하락을 기대할 수 있는 것이다.[15]

직종에 따른 이직확률의 차이에서는 전문관리직 종사자나 서비스판매직 종사자가 생산기능직 종사자에 비해 대략 3%p만큼 이직확률이 높다는 것을 확인하였다. 반면, 농어민의 경우 생산기능직 종사자에 비해 6%p만큼 이직확률이 낮았다. 업종에 따른 이직확률의 차이에서는 업종 간의 큰 차이를 발견하기 어려웠다. 다만, 농어업 관련 기업에 종사할 경우 광공업 관련 기업에 종사하는 경우보다 이직확률이 상당히(대략 15%p만큼) 높아짐을 확인할 수 있었다. 한편, 노동패널은 군부지역을 제외하고 도시지역만을 대상으로 한 조사이기 때문에, 농어민 혹은 농어업 관련 산업의 종사자에 대한 자

---

14 예를 들어, Gottschalk and Maloney(1985)는 Michigan PSID(Panel Study of Income Dynamics)를 이용하여, 이직 후 새로운 직장이 더 만족스럽다고 응답한 사람들 가운데 그중 41%는 실질임금의 삭감을 감내한 것으로 밝힌 바 있다.

15 덧붙여, 개인의 발전가능성에 대한 만족도는 이직확률과는 정(+)의 관계를 보이고 있다. 이는 근로자가 인적자본을 높일 수 있는 일을 하고 있을 때, 이러한 자기발전을 활용하여 보다 대우가 좋은 직장으로 이동하는 경향이 있음을 암시한다. 자기발전에 대한 만족도 10점 상승이 0.45%p만큼의 이직확률 증가와 연관된 것으로 확인되었다.

료는 매우 미흡한 수준이다.[16] 따라서 농어민이나 농어업 종사자에 관한 이상의 결론은 신뢰도가 다소 떨어짐을 유념할 필요가 있다.

〈표 4A〉 일자리 이동 영향요인 분석(I)

다항로짓회귀분석	모형 1		모형 2		모형 3		모형 4	
종속변수: 이직 여부	추정계수 (표준오차)	한계 효과	추정계수 (표준오차)	한계 효과	추정계수 (표준오차)	한계 효과	추정계수 (표준오차)	한계 효과
성별(여성=1)*	−0.1627** (0.0665)	−1.313	−0.1272* (0.0672)	−1.030	−0.0669 (0.0701)	−0.536	−0.1378* (0.0753)	−1.081
나이	−0.0512*** (0.0041)	−0.420	−0.0513*** (0.0041)	−0.421	−0.0510*** (0.0042)	−0.412	−0.0507*** (0.0042)	−0.404
교육수준	0.0263 (0.029)	0.216	0.0135 (0.0294)	0.111	0.0350 (0.0306)	0.283	0.0264 (0.0342)	0.210
혼인 여부(미혼=1)*	0.0531 (0.0746)	0.440	0.0601 (0.0748)	0.498	0.0563 (0.0757)	0.459	0.0643 (0.0762)	0.518
정규직 여부(정규직=1)*	−0.3042*** (0.0713)	−2.688	−0.2777*** (0.0718)	−2.438	−0.2213*** (0.0743)	−1.887	−0.1853** (0.0751)	−1.544
첫(혹은 두 번째) 일자리 여부*	−0.5513*** (0.0647)	−4.453	−0.5462*** (0.0649)	−4.412	−0.5313*** (0.0656)	−4.227	−0.5429*** (0.0659)	−4.258
임금수준 (단위: 만원, 로그)	−0.5933*** (0.0709)	−4.868	−0.5360*** (0.0727)	−4.398	−0.5253*** (0.0769)	−4.242	−0.5393*** (0.0782)	−4.294
종업원 규모 (단위: 명, 로그)	−0.1019*** (0.0145)	−0.836	−0.1010*** (0.0145)	−0.829	−0.0838*** (0.0149)	−0.677	−0.0691*** (0.0149)	−0.550
전 차수 교육적합도			−0.0045*** (0.0012)	−0.037	−0.0031** (0.0014)	−0.025	−0.0030** (0.0014)	−0.024
업무만족도					−0.0031 (0.0025)	−0.025	−0.0036 (0.0025)	−0.029
취업 안정성 만족도					−0.0041* (0.0021)	−0.033	−0.0044** (0.0021)	−0.035
근무환경만족도					−0.0049** (0.0021)	−0.039	−0.0050** (0.0022)	−0.040

16 최종샘플에서 농어민이 차지하는 비중은 1% 미만이고 샘플 수로는 101명에 그친다. 농어업 관련 기업의 종사자가 차지하는 비중 역시 1% 미만에 종사자 수 111명에 그친다.

〈표 4A〉의 계속

다항로짓회귀분석 종속변수: 이직 여부	모형 1		모형 2		모형 3		모형 4	
	추정계수 (표준오차)	한계 효과	추정계수 (표준오차)	한계 효과	추정계수 (표준오차)	한계 효과	추정계수 (표준오차)	한계 효과
인간관계만족도					−0.0016 (0.0024)	−0.013	−0.0015 (0.0024)	−0.012
자기발전만족도					0.0055** (0.0023)	0.045	0.0050** (0.0023)	0.040
인사공정만족도					0.0006 (0.0027)	0.005	0.0011 (0.0027)	0.009
복지후생만족도					−0.0069*** (0.0021)	−0.055	−0.0070*** (0.0021)	−0.055
(기준: 생산기능직)								
전문관리직 여부*							0.3710*** (0.1169)	3.328
사무기술직 여부*							−0.1145 (0.0887)	−0.898
서비스판매직 여부*							0.4280*** (0.0885)	3.890
농어민 여부*							−0.3201 (0.4768)	−2.238
연차 더미 포함	No		No		No		No	
평균치 이직확률×100 (각 변수의 평균치 기준)		9.02		9.02		8.86		8.72
관측 수	12869		12829		12655		12652	

주: 1) *는 유의수준 10%, **는 유의수준 5%, ***는 유의수준 1%를 의미함.
2) '한계효과'는 추정된 한계효과(marginal effects)를 백분율로 표시함.
3) 더미변수의 한계효과는 변수값이 0에서 1로 변할 때 이직확률의 변화분을 나타냄(변수명의 * 표시가 더미변수).

〈표 4B〉 일자리 이동 영향요인 분석(II)

다항로짓회귀분석	모형 5		모형 6		모형 7		모형 8	
종속변수: 이직 여부	추정계수 (표준오차)	한계효과	추정계수 (표준오차)	한계효과	추정계수 (표준오차)	한계효과	추정계수 (표준오차)	한계효과
성별(여성=1)*	−0.1528** (0.0759)	−1.194	−0.1482* (0.0760)	−1.154	−0.1872*** (0.0713)	−1.289	−0.1477* (0.0761)	−1.151
나이	−0.0505*** (0.0042)	−0.401	−0.0505*** (0.0042)	−0.400	−0.0521*** (0.0040)	−0.366	−0.0504*** (0.0042)	−0.399
교육수준	0.0309 (0.0345)	0.245	0.0327 (0.0347)	0.258	0.0113 (0.0324)	0.080	0.0346 (0.0345)	0.274
혼인 여부(미혼=1)*	0.0659 (0.0764)	0.529	0.0635 (0.0766)	0.507	0.1045 (0.0721)	0.749	0.0684 (0.0767)	0.548
정규직 여부(정규직=1)*	−0.2033*** (0.0770)	−1.696	−0.2075*** (0.0776)	−1.727	−0.1213* (0.0735)	−0.875	−0.2093*** (0.0777)	−1.744
첫(혹은 두 번째) 일자리 여부*	−0.5421*** (0.0660)	−4.240	−0.5445*** (0.0661)	−4.241	−0.6294*** (0.0623)	−4.407	−0.5495*** (0.0662)	−4.284
임금수준 (단위: 만원, 로그)	−0.5309*** (0.0788)	−4.215	−0.5277*** (0.0790)	−4.172	−0.6554*** (0.0702)	−4.602	−0.5288*** (0.0791)	−4.186
종업원 규모 (단위: 명, 로그)	−0.0695*** (0.0151)	−0.552	−0.0690*** (0.0152)	−0.546			−0.0685*** (0.0152)	−0.542
전 차수 교육적합도	−0.0028** (0.0014)	−0.022	−0.0029** (0.0014)	−0.023	−0.0027** (0.0013)	−0.019		
전 차수 기술적합도							−0.0030** (0.0014)	−0.024
업무만족도	−0.0038 (0.0025)	−0.030	−0.0043* (0.0025)	−0.034	−0.0054** (0.0023)	−0.038	−0.0045* (0.0025)	−0.036
임금만족도	0.0029 (0.0020)	0.023	0.0026 (0.0020)	0.020	0.0027 (0.0019)	0.019	0.0026 (0.0020)	0.020
취업 안정성 만족도	−0.0048** (0.0021)	−0.038	−0.0045** (0.0021)	−0.035	−0.0051*** (0.0020)	−0.036	−0.0044** (0.0021)	−0.035
근무환경만족도	−0.0052** (0.0022)	−0.041	−0.0054** (0.0022)	−0.042	−0.0053*** (0.0020)	−0.037	−0.0053** (0.0022)	−0.042
인간관계만족도	−0.0014 (0.0024)	−0.011	−0.0015 (0.0024)	−0.012	−0.0014 (0.0023)	−0.010	−0.0013 (0.0024)	−0.011
자기발전만족도	0.0054** (0.0023)	0.043	0.0057** (0.0023)	0.045	0.0061*** (0.0022)	0.043	0.0057** (0.0023)	0.045

〈표 4B〉의 계속

다항로짓회귀분석 종속변수: 이직 여부	모형 5		모형 6		모형 7		모형 8	
	추정계수 (표준오차)	한계효과	추정계수 (표준오차)	한계효과	추정계수 (표준오차)	한계효과	추정계수 (표준오차)	한계효과
인사공정만족도	0.0010 (0.0027)	0.008	0.0011 (0.0027)	0.009	−0.0006 (0.0025)	−0.004	0.0014 (0.0027)	0.011
복지후생만족도	−0.0069*** (0.0021)	−0.055	−0.0069*** (0.0021)	−0.054	−0.0060*** (0.0020)	−0.042	−0.0068*** (0.0021)	−0.053
(기준: 생산기능직)								
전문관리직 여부*	0.3574*** (0.1203)	3.183	0.3594*** (0.1204)	3.190	0.3478*** (0.1160)	2.728	0.3514*** (0.1204)	3.114
사무기술직 여부*	−0.1409 (0.0916)	−1.098	−0.1365 (0.0917)	−1.060	−0.1322 (0.0878)	−0.911	−0.1374 (0.0917)	−1.068
서비스판매직 여부*	0.3146*** (0.1080)	2.752	0.3136*** (0.1081)	2.732	0.2369** (0.1012)	1.793	0.3037*** (0.1084)	2.640
농어민 여부*	−1.3598** (0.6827)	−6.349	−1.3198* (0.6821)	−6.224	−1.2188* (0.6557)	−5.262	−1.3254* (0.6828)	−6.246
(기준: 광공업 종사)								
농어업 종사 여부*	1.2277** (0.5423)	15.765	1.2064** (0.5429)	15.324	0.8109 (0.5129)	7.981	1.2026** (0.5431)	15.270
건설업 종사 여부*	−0.1858 (0.1239)	−1.386	−0.1819 (0.1240)	−1.353	−0.1896* (0.1146)	−1.251	−0.1797 (0.1240)	−1.339
도소매 숙박업 종사 여부*	0.1413 (0.1027)	1.165	0.1417 (0.1028)	1.163	0.2878*** (0.0976)	2.200	0.1393 (0.1029)	1.144
서비스 관련업 종사 여부*	0.0006 (0.0808)	0.005	0.0016 (0.0808)	0.013	−0.0420 (0.0778)	−0.295	−0.0024 (0.0809)	−0.019
연차 더미 포함	No		Yes		Yes		Yes	
평균치 이직확률×100 (각 변수의 평균치 기준)		8.69		8.65		7.60		8.67
관측 수	12651		12651		15344		12614	

주: 1) *는 유의수준 10%, **는 유의수준 5%, ***는 유의수준 1%를 의미함.
2) '한계효과'는 추정된 한계효과(marginal effects)를 백분율로 표시함.
3) 더미변수의 한계효과는 변수값이 0에서 1로 변할 때 이직확률의 변화분을 나타냄(변수명의 * 표시가 더미변수).

5. 분석 방법

본 장에서는 일자리 이동의 효과성 분석에 사용할 방법론으로서 Heckman, Ichimura, and Todd(1997)가 제안한 Propensity Score Difference-in-Differences (DID) Matching(PSM)에 대해 설명하고자 한다. 이에 앞서 우선 이 방법론의 근간이 되는 Averge Treatment Effect for the Treated(ATT)(Rubin[1974])와 Propensity Score Matching(PSM)(Rosenbaum and Rubin [1983]) 일반에 대해 소개하기로 한다.

가. Average Treatment Effect for the Treated

결과에 영향을 미치는 Treatment Variable로서 더미변수 D를 가정하자. Treatment의 부여 여부에 따라서 Treated Group(혹은 실험군)과 Untreated Group(혹은 대조군)으로 구분할 수 있다: D=1 (Treated Group)과 D=0 (Untreated Group). 이때 잠재적 결과치(Pontential Outcomes) Y가 Treatement 여부에 따라 각기 (Y_1, Y_0)일 때, Average Treatment Effect(ATE)는 다음과 같다: ATE: $\Delta_T = E(Y_1) - E(Y_0)$. 그러나 이러한 전통적인 계산방식은 Treatment가 무작위(Randomization)라는 가정하에서만 편중되지 않은 예측치(Unbiased Estimates)를 제공할 수 있다. 순수한 무작위 실험이 아니라면, 분석의 대상인 데이터에서 Treatment 여부가 무작위적인 경우는 드물다.[17]

데이터로부터 우리가 관측할 수 있는 결과치는 Treated된 경우의 Y_1과 Untreated된 경우의 Y_0이다. 선택편의(Selection Bias)의 문제가 발생할 때,

---

17 즉, 특정한 요인들이 Treatment 참여 여부에 직간접적인 영향을 미치는 것이다. 예를 들어, 특정약물의 효과를 알고 싶다고 하자. 약물이 투여된 사람과 그렇지 않은 사람의 건강상태를 파악하면 된다고 생각할 수 있다. 그러나 약물이 투여되지 않은 사람은 대개 건강한 사람들이기 때문에 이들의 건강상태를 약물이 투여된 사람과 직접 비교한다면, 약물을 투여한 사람이 여전히 건강상태가 나쁜 것으로만 나올 것이고, 약물투여의 효과가 없다라고 결론짓게 될 것이다. 비교대상은 건강한 사람이 아니라, 약물이 투여된 집단만큼의 건강이 양호하지 않은 집단이어야 한다. 이렇게 건강하지 않는 사람과 비교할 때, 약물 투여의 순수한 효과를 검증할 수 있다. 이러한 무작위의 여부로부터 발생하는 문제를 선택편의(Selection Bias)라고 한다.

Treatment의 효과를 제대로 알고자 한다면 우리가 비교해야 하는 대상은 Treated된 경우의 Treatment가 적용되지 않았을 때의 결과, 즉 ($Y_0 \mid D$=1)이다. 이러한 가상의 결과를 Counterfactual이라고 한다. (역시 Untreated된 경우의 Treatment가 적용되었을 때 결과, 즉 ($Y_1 \mid D$=0) 역시 Counterfactual이다.) 다음의 표가 이를 간략히 정리하고 있다.

Group	Y_1	Y_0
Treated (D=1)	관측 가능	Counterfactual
Untreated (D=0)	Counterfactual	관측 가능

선택편의(Selection Bias)의 문제하에서 Treatment의 효과를 측정하기 위하여, 전체 집단에 대한 Treatment Effect가 아닌 Treated Group에 대한 Treatment Effect에 한정하여야 한다. 이렇게 한정된 집단, 즉 Treated Group에 대한 효과성 측정을 Average Treatment Effect for the Treated (ATT)라고 한다.

$$ATT: \quad \Delta_{TT} = E(Y_1 - Y_0 | D=1) \\ = E(Y_1 | D=1) - E(Y_0 | D=1) \tag{1}$$

여기서 $E(Y_0 | D=1)$는 Counterfactual에 대한 기대치이므로, 자료로부터의 직접적인 추정은 불가능하다. Treatment Selection이 관측 가능한 변수들의 특정한 집합 Z에 의존한다고 가정해 보자. Dawid(1979)의 표현법에 따르면, 다음과 같은 관계가 성립한다: $Y_0 \perp\!\!\!\perp D \mid Z$. 즉, Z를 통제하였을 때, Untreated Group의 Y값의 분포와 Treated Group이 만약 Treatment를 받지 아니하였을 때의 Y값의 분포(즉, Counterfactual의 분포)는 서로 동일하다는 것이다. 이는 기대치에 관한 다음과 같은 관계를 내포한다.

$$Y_0 \perp\!\!\!\perp D \mid Z \;\Rightarrow\; E(Y_0 | Z, D=0) = E(Y_0 | Z, D=1) \tag{2}$$

즉, counterfactual인 $E(Y_0 | Z, D=1)$을 관측치인 $E(Y_0 | Z, D=0)$이 대체할 수 있는 것이다. 식 (2)의 관계를 조건부 독립가정(Conditional Independence

Assumption: CIA)이라고 한다. Rubin(1974)은 조건부 독립가정(CIA)의 조건이 충족할 경우, ATT를 다음과 같이 측정할 수 있다고 제안한 바 있다.

$$\begin{aligned} ATT: \quad \Delta_{TT} &= E_Z[E(Y_1|Z,D=1)-E(Y_0|Z,D=1)|D=1] \\ &= E_Z[E(Y_1|Z,D=1)-E(Y_0|Z,D=0)|D=1] \\ &= E(Y_1|D=1)-E_{Z|D=1}E(Y_0|D=0,Z) \end{aligned} \tag{3}$$

즉, 직관적으로 설명한다면, D=1인 집단에 속한 특성 Z인 개체에 대하여 동일 특성을 지닌 개체를 $D=0$인 그룹에서 찾아 그 둘의 Y값을 비교하면 되는 것이다. $D=1$ 집단 내의 모든 개체에 대하여 동일한 계산을 한 뒤, 이를 합산하면 ATT를 구하게 된다.

그러나 이 방법 역시 일정 정도의 한계를 지닌다. 만약 Z가 이산변수(Discrete Variable)가 아닌 연속변수(Continuous Variable)라면, $D=0$ 집단에서 동일한 Z를 가진 개체를 찾을 수 없으므로 이상의 측정법을 적용할 수 없다. 또한 특정 변수들이 집합인 Z에 포함된 변수들이 많은 경우, 동일한 특성의 개체를 $D=0$ 집단으로부터 찾는 것이 어려울 수 있다. 이러한 한계를 극복하고자 도입된 것이 바로 Propensity Score Matching 방식이다.

나. Propensity Score Matching Estimator

Propensity Score(PS)를 Z 특성을 지닌 개체가 Treated될 확률로 정의하고 $P(Z)$로 표시하도록 하자.

$$\textit{Propensity Score}: \; P(Z) \equiv \Pr(D=1|Z) = E(D|Z) \tag{4}$$

Rosenbaum and Rubin(1983)은 $0<P(Z)<1$이 모든 Z에 대해 만족할 경우, 다음의 관계가 성립한다는 것을 증명하였다.

$$Y_0 \perp\!\!\!\perp D \,|\, Z \;\Rightarrow\; Y_0 \perp\!\!\!\perp D \,|\, P(Z) \tag{5}$$

이 관계식은 $E(Y_0|P(Z),D=0)=E(Y_0|P(Z),D=1)$을 내포하므로, 변수집합의 Z의 차원수(Dimensionability)가 클 경우에도 다음과 같이 다일

변수 $P(Z)$를 활용하여 ATT를 구할 수 있다.

$$
\begin{aligned}
ATT:\quad \Delta_{TT} &= E_{P(Z)}\left[E(Y_1|P(Z),D=1)-E(Y_0|P(Z),D=1)|D=1\right] \\
&= E_{P(Z)}\left[E(Y_1|P(Z),D=1)-E(Y_0|P(Z),D=0)|D=1\right] \\
&= E(Y_1|D=1)-E_{P(Z)|D=1}E(Y_0|D=0,P(Z)) \qquad (6)
\end{aligned}
$$

샘플 수의 유한성으로 인해 실제로 위 식의 두 번째 항을 추정하는 것은 간단치 않은 작업이다. 또한 ATT의 추정은 Common Support 영역, 즉 Treated Group의 $P(Z)$의 분포와 Untreated Group의 $P(Z)$의 분포가 겹치는 Z의 영역에 한정하여야 한다. Common Support를 벗어나는 영역에 대해서는 비교가능한 Counterfactual를 찾기 힘들기 때문이다. 이를 반영하여 주어진 샘플 내에서 ATT를 추정할 수 있는 다양한 Propensity Score Matching(PSM) Estimator가 제안되었는데, 이는 다음과 같이 요약될 수 있다.(Todd[2006])

$$
\begin{aligned}
&\widehat{\Delta_{TT}} = \frac{1}{n_1}\sum_{i\in I_1\cap S_p}\left[Y_{1i}-\hat{E}(Y_{0i}|D=1,P(Z_i))\right], \qquad (7)\\
&\hat{E}(Y_{0i}|D=1,\ P(Z_i)) = \sum_{j\in I_0} W(i,j)\,Y_{0j}
\end{aligned}
$$

여기서 I_1는 Treated Group 구성원을, I_0는 Untreated Group의 구성원을 나타낸다. S_p는 Common Support 영역 내의 개체들의 집합을 나타낸다. n_1은 Treated Group의 구성원 중 Common Support 영역에 속하는 개체들의 총수이다. $W(i,j)$는 가중치를 나타내는 것으로, 두 Propensity Score의 거리인 $|P(Z_i)-P(Z_j)|$을 이용하여 결정된다. 가중치 적용방식에 따라 다양한 측정방식이 제시될 수 있다. 이에 대해서는 추후에 추가적으로 논의하도록 한다.

다. Difference-in-Differences Matching Estimator

여기서 한 단계 발전된 방식의 PSM이 Heckman, Ichimura, and Todd (1997)에 의해 제시된 Difference-in-Differences(DID) Matching Estimator

이다. 앞서 ATT의 추정에서 관측 가능한 특정 변수들의 집합 Z가 주어졌을 때, 결과치 Y_0가 Treatment에 독립적(즉, $Y_0 \perp\!\!\!\perp D \mid Z$이 성립)이라고 가정한 바 있다. 그러나 Z에 포함되어야 할 많은 변수 중 관측이 되지 않는 경우가 있을 수 있다. 이러한 경우 $E(Y_0|Z, D=0) = E(Y_0|Z, D=1)$ 관계가 더 이상 성립하지 않아, 앞서의 ATT 추정법은 정당성을 상실한다. 하지만 Longitudal Data가 주어진 경우, 즉 Treatment 이전과 이후의 결과치(Y)가 주어진 경우, 분석대상을 Y 대신에 'Y의 변화분'으로 변경함으로써 이러한 문제를 상당 부분 해소할 수 있다. Treatment 이전과 이후 두 개의 시간대를 t와 t'이라 한다면, 분석대상을 (Y_0, Y_1)이 아닌 $(Y_{0t} - Y_{0t'}, Y_{1t} - Y_{1t'})$으로 둘 수 있는 것이다. 이때 ATT를 추정하기 위해서는 $Y_{0t} - Y_{0t'} \perp\!\!\!\perp D \mid Z$의 가정이면 충분하게 된다. 이는 앞서보다 훨씬 완화된 가정이므로, 충족하기가 보다 용이해진다. 특히 관측되지 않는 시간 불변(time-invariant)의 일부 변수가 Treatment Selection에 연관된 경우에도, 이 변수가 Y_{0t}와 $Y_{0t'}$에는 직접적인 영향을 미치더라도 $Y_{0t} - Y_{0t'}$에 미치는 영향이 없다면(즉, 독립적이라면) 문제가 되지 않는 것이다.[18] 따라서 Longitudal Data가 주어진 경우에 DID Matching Estimator는 매우 효과적인 도구로 활용될 수 있다. 이때 DID Matching Estimator는 다음과 같은 방식으로 요약될 수 있을 것이다.

$$\widehat{\Delta_{DID}} = \frac{1}{n_1} \sum_{i \in I_i \cap S_p} [Y_{1ti} - Y_{1t'i} - \hat{E}(Y_{0ti} - Y_{0t'i}|D=1, P(Z_i))], \qquad (8)$$
$$\hat{E}(Y_{0ti} - Y_{0t'i}|D=1, P(Z_i)) = \sum_{j \in I_0} W(i,j)(Y_{0tj} - Y_{0t'j})$$

본 연구에서는 앞서 소개한 DID Matching Estimator를 이용함으로써, 시간불변(time-invariant)의 관측되지 아니하는 변수들을 사전에 통제하고 이를 통해 보다 신뢰할 만한 분석 결과를 제시하고자 하였다.

---

18 이 외에도 주어진 수치들이 데이터가 수집된 지역에 따라 Level이 다를 경우, Difference 변수를 활용함으로써 이러한 Level 차이에서 기인한 편의(bias)를 해소할 수 있다.

라. Treatment Effect 측정방식

$|P(Z_i)-P(Z_j)|$의 가중치를 결정하는 $W(i,j)$를 어떻게 설정하느냐에 따라 다양한 PSM Estimator가 존재한다. 본 연구의 분석에서는 가장 활발히 이용되는 측정방식들로서, Nearest Neighbor Matching, Radius Matching, Kernel Matching 이 세 가지를 활용하기로 한다.[19]

1) Nearest Neighbor Matching

이 방식은 대조군인 Untreated Group에 속한 개체 중에서 Propensity Score가 실험군(Treated Group) 개체의 Score와 가장 근접한 개체를 선택하는 방식이다. 즉, $|P(Z_i)-P(Z_j)|$를 최소화시키는 j^*에 대해서는 $W(i,j^*)=1$이고, 나머지 j에 대해서는 $W(i,j)=0$이 성립한다. 이때 Score가 근접한 개체를 하나가 아닌 복수로 선정함으로써, 하나를 선정할 때보다 더욱 안정된 추정치를 얻을 수 있다. 다만, 매칭되는 개체 수가 너무 많을 경우 $|P(Z_i)-P(Z_j)|$가 크게 되어 편의(bias)가 증가할 수 있으므로 신중할 필요가 있다. n개의 근접한 개체를 선택하는 경우 이들 개체 j^{**}에 대해서는 $W(i,j^{**})=1/n$이 성립하고, 나머지 j에 대해서는 $W(i,j)=0$이 성립한다.

한편 Nearest Neighbor Matching의 경우, 가장 근접한 개체를 선택하였으나 $|P(Z_i)-P(Z_j)|$가 너무 커서 Counterfactual로서 부적합한 매칭이 이루어질 가능성이 있다. 이를 보완하기 위하여 Cochran and Rubin(1973)은 적절한 Caliper를 선정하여, 매칭에 있어서 $|P(Z_i)-P(Z_j)|$를 일정 한도로 제한할 것을 제안한 바 있다. 본 분석에서는 n을 5개로 선정함으로써 편의

---

19 이 외에도 주로 활용되는 측정방식으로 Stratification Matching, Mahalanobis Matching 등이 있으나, 이들을 활용한 결과가 본 연구의 분석 결과와 크게 다르지 않다. Dehejia and Wahba(2002)는 Treated Group과 Untreated Group 간의 Propensity Score 분포가 상당 부분 서로 겹친다면, 측정방식에 따른 분석 결과의 차이가 크지 않다는 점을 강조한 바 있다. 이는 실험군 한 개체에 대해 매칭 가능한 충분한 수의 대조군 개체들이 존재하기 때문이다. 즉, 측정방식의 차이에 따라 매칭이 되는 대조군들의 특성이 크게 달라지지 않는 것이다. 본 연구에서 추정한 Propensity Score 분포는 Treated Group, Untreated Group 두 집단 사이에 겹치는 부분이 매우 크다. 이는 [그림 2]를 통해 쉽게 확인된다.

(bias)를 줄이면서도 안정된 추정치를 얻고자 하였으며, Caliper는 적절히 작은 0.005로 설정하여 부적합한 매칭을 최소화하고자 하였다.[20]

2) Radius Matching

이 방식은 일정 반경을 Caliper로 설정하고, Untreated Group에서 $|P(Z_i)-P(Z_j)|$가 Caliper 이내인 모든 개체 j를 Treated Group의 개체 i에 매칭하는 방법이다. 개체 i에 대하여 Untreated Group으로부터 매칭된 개체의 수가 n_i라면 이들에 대해서는 $W(i,j)=1/n_i$이 성립하고, 매칭이 안된 나머지 개체들에 대해서는 $W(i,j)=0$이 성립한다. 이 추정방식은 앞서 Nearest Neighbor Matching에 비해 Propensity Score가 근접한 대조군 내의 보다 많은 개체를 분석에 활용할 수 있다는 장점이 있다. 보다 많은 대조군 내 개체를 활용할수록 Treatment Effects 측정의 정확성(Precision)은 상승하게 된다.

한편, 매칭이 가능한 대조군 개체의 수가 충분히 많다면 Caliper는 작을수록 좋다. Caliper가 클수록 부적합한 매칭에 따른 Treatment Effects의 편중(Bias)이 커질 수 있기 때문이다. 본 분석에서는 샘플의 수가 충분히 크기 때문에 Caliper를 0.002로 설정하여 매우 근접한 개체들에 대해서만 매칭이 이루어지도록 설정하였다.[21]

3) Kernel Matching

이 방식은 Treated Group 내의 각 개체에 대한 매칭을 Untreated Group 내의 모든 개체를 대상으로 진행하는 방식으로, $|P(Z_i)-P(Z_j)|$에 따라 가중치를 부여한다. $|P(Z_i)-P(Z_j)|$가 작을수록 가중치가 커진다. 이때 사용되는 가중치는 다음과 같이 표시될 수 있다.

---

20 여기서 Caliper 설정은 실험군 개체와 매칭되는 대조군 개체 사이의 PS 거리, 즉 $|P(Z_i)-P(Z_j)|$를 적절한 수준으로 제한하고자 함이다. 대부분의 실험군 개체의 경우 Caliper가 설정한 Boundary에 크게 제한을 받지 않으므로, 적절히 작은 Caliper의 설정이면 편의(Bias)를 개선하기에 충분하다. 본 분석에서 설정한 0.005 이외에 0.002이나 0.01을 사용하여 보았으나, 역시 결과의 차이가 크지 않음을 확인하였다.

21 민감성 테스트(Sensitivity Check)를 통해 Caliper 0.001이나 0.003에서도 연구 결과의 차이가 크지 않음을 확인하였다.

$$W(i,j) = \frac{G(\frac{P_j - P_i}{a_n})}{\sum_{k \in I_0} G(\frac{P_k - P_i}{a_n})} \tag{9}$$

여기서 G는 선택된 Kernel function을, a_n은 Bandwidth Parameter를 표시한다. 이 방식은 Heckman, Ichimura, and Todd(1998)에 의해 도입되었는데, 주어진 모든 개체를 추정에 활용하므로 정보의 손실을 최소화할 수 있다는 장점이 있다. 또한 앞서의 두 추정방식과는 달리 인위적인 Caliper의 설정이 불필요하다는 장점도 있다. Kernel의 선택에는 Gaussian Function (Normal Distribution), Biweight Function, Epanechnikov Function 등 다양한 방식이 가능하나 본 분석에는 Normal Distribution을 채택하였다. Bandwidth Parameter로는 0.01을 선택하여 $|P(Z_i) - P(Z_j)|$가 근접한 이들에게 충분한 가중치가 주어지도록 하였다.[22]

6. Propensity Score의 추정

주어진 자료에서 Treatment는 이직에 해당한다. 이직에 대한 Propensity Score(PS)를 추정하기 위해서는 이직에 영향을 미치는 주요 변수의 집합(Z)을 사용하여야 한다. 이들 변수는 다음 조건을 만족하여야 한다: $Y_{0t} - Y_{0t'} \perp\!\!\!\perp D \mid Z$. 즉, 이직에 영향을 미치는 주요 변수들을 통제한 후에는, 이직을 하지 않은 이들의 결과치(Y_0)에 관한 변화분($Y_{0t} - Y_{0t'} | D = 0$)의 분포가 이직을 한 이들이 만약 이직을 하지 않았을 때 예상되는 결과치(Y_0)에 관한 변화분($Y_{0t} - Y_{0t'} | D = 1$)의 분포와 동일해야 하는 것이다. 따라서 Propensity Score의 추정에 활용할 변수들은 앞서 제4장의 일자리 이동의 영향요인에 대한 분석을 통해 선별할 수 있다. 특히 주어진 노동패널의 자료에서는 "현재의 직장을 계속 다니고 싶은가(직장유지의향)"와 "현재 맡고 있는 일을 계속하고 싶은가(직무유지의향)"라는 이직의사와 관련된 매

22 Bandwidth Parameter가 0.005, 0.02인 경우도 확인해 보았으나, 결과에는 큰 차이가 발견되지 않았다.

〈표 5〉 Propensity Score의 추정방정식

추정함수: Logistic Regression(이직=1, 비이직=0)		
Z	추정계수	표준오차
직장유지의향	−0.002	0.004
직무유지의향	−0.015***	0.004
성별(여성=1)	−0.104	0.071
나이	−0.138***	0.023
나이^2	0.001***	0.000
교육수준	0.169***	0.050
혼인 여부(미혼=1)	−0.056	0.082
정규직 여부(정규직=1)	0.342	0.248
첫(혹은 두 번째) 일자리 여부	−0.599***	0.068
임금수준(단위: 만원, 로그)	0.076	0.601
임금수준(단위: 만원, 로그)^2	−0.052	0.063
종업원 규모(단위: 명, 로그)	−0.084***	0.015
전 차수 교육적합도	0.000	0.001
임금만족도	0.003	0.002
근무환경만족도	−0.004*	0.002
일자리만족도	−0.003	0.003
서비스판매직 여부	0.459***	0.077
농어업 종사 여부	0.324	0.378
정규직 여부 × 교육수준	−0.131**	0.056
직장유지의향 × 직무유지의향	0.000	0.000
상수항	3.558**	1.584
관측 수	12754	
Log Likelihood	−4010.98	

주: *는 유의수준 10%, **는 유의수준 5%, ***는 유의수준 1%를 의미함.

우 긴요한 변수들이 포함되어 있는데, 이들을 주요 변수의 집합(Z)에 포함시킴으로써 이상의 조건이 보다 용이하게 충족될 수 있음을 기대할 수 있다.

Propensity Score의 추정에는 Logistic Regression을 활용하였다. 추정에 활용된 주요 변수들의 집합(Z)과 각 변수에 대한 추정계수는 〈표 5〉에 요약되어 있다. 앞서 제4장에서 일자리 이동의 주요한 결정변수로 파악된 변수

들이 대부분 PS 추정방정식에 포함되었다. 만족도와 관련한 변수 중 업무만족도, 취업 안정성 만족도, 자기발전만족도, 복지후생만족도 이상 네 변수는 일자리 영향요인으로 통계적으로 유의하게 파악되었으나, PS 방정식에 추가된 일자리만족도, 직장유지의향, 직무유지의향 등과의 통계적 상관관계가 매우 높아 PS 추정방정식에 따로 포함시키지 않았다.[23]

또한 PS의 올바른 추정을 위해서는 Balancing Property를 충족시킬 필요가 있다. Rosenbaum and Rubin(1983)에 따르면, PS에 관련하여 다음의 관계가 성립하여야 한다.

$$Z \perp\!\!\!\perp D \mid P(Z) \;\Rightarrow\; E(Z \mid D=0, P(Z)) = E(Z \mid D=1, P(Z)) \qquad (10)$$

즉, PS를 통제한 뒤에는 변수집합 Z와 Treatment 여부 D가 상호 독립적이라는 것이다. 이는 PS가 동일한 개체들에 대해 Z의 평균값을 구한다면, Treatment를 받은 집단과 그렇지 않은 집단 사이에 차이가 없어야 한다는 점을 내포한다. 이를 Balancing Property라 한다. 이를 검증하기 위한 방법으로 P(Z)를 여러 구간(Blocks)으로 나눈 뒤 각 구간에 대한 Mean Difference Statistical T-test를 시행할 수 있다. 일부 구간에 대해 T-test가 만족하지 않는 경우에는 구간을 더욱 세분하여 진행하고, 여전히 만족이 되지 않는 경우에는 문제가 되는 일부 변수들의 Interaction Terms들과 Higher Order Terms들을 PS 추정방정식에 추가하여 앞서의 과정을 되풀이 한다(Dehejia and Wahba[1999]). 〈표 5〉의 추정방정식에 포함된 Interaction Terms과 Higher Order Terms들은 이상의 과정을 반복함으로써 추가된 항들이다. 〈표 6〉은 Balancing Property 검증을 위해 설정된 구간들을 요약하고 있다.[24]

---

23 예를 들어, 일자리만족도와 이들 네 변수와의 상관계수(Correlation Coefficient)는 각각 업무만족도(0.6536), 취업 안정성 만족도(0.6014), 자기발전만족도(0.6279), 복지후생만족도(0.5514)에 이른다. 이들을 포함시키더라도 전반적인 결과에는 큰 차이가 없다.

24 최종적인 PS 추정방정식을 도출하기까지 Balancing Property 검증을 위한 다음의 테스트가 진행되었음을 밝혀 둔다. 〈표 5〉의 추정방정식에서 도출한 PS를 기준으로 〈표 6〉과 같이 10개의 Block을 구분한 뒤 Mean-Difference Statistical T-test를 수행하였다. Block 설정은 PS의 Common Support 영역인 [0.0149, 0.6]에 대하여 이루어졌다. 추정방정식에 도입된 독립변수 항이 총 20개이고 Block의 수는 10개이므로 총 200개의 Mean-Difference T-test가 시행되었다. 〈부표 2〉에서 확인할 수 있듯이, 5% Significance

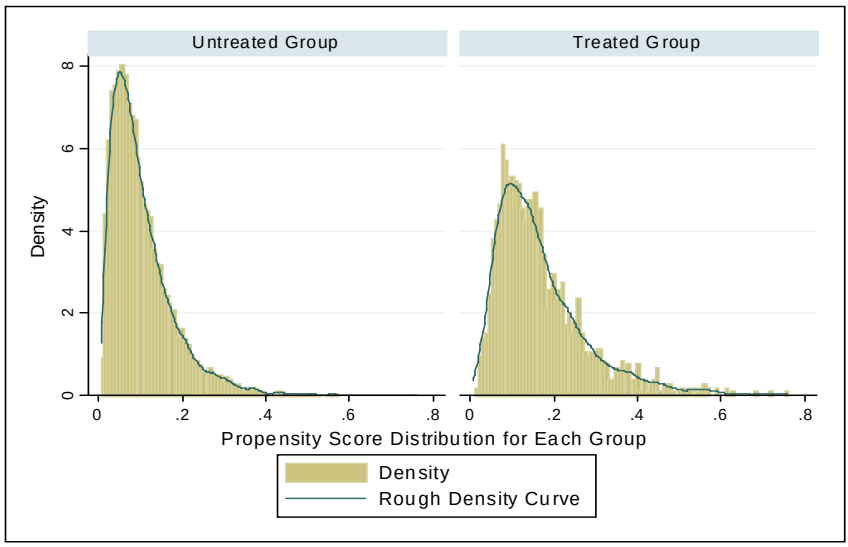
〈표 6〉 Balancing Property 검증을 위한 구간 설정

구간 번호	Propensity Score 범위	D=0	D=1	합계
1	0.0149 ~ 0.025	655	10	665
2	0.025 ~ 0.05	2,128	59	2,187
3	0.05 ~ 0.075	2,146	152	2,298
4	0.075 ~ 0.01	1,744	200	1,944
5	0.1 ~ 0.125	1,300	171	1,471
6	0.125 ~ 0.15	949	162	1,111
7	0.15 ~ 0.2	1,138	238	1,376
8	0.2 ~ 0.3	845	242	1,087
9	0.3 ~ 0.4	230	95	325
10	0.4 ~ 0.6	57	56	113
	합 계	11,192	1,385	12,577

이렇게 확정된 PS 추정방정식을 이용하여 각 개체별로 PS를 구할 수 있는데, [그림 2]가 각 집단별 PS 분포도를 요약하고 있다. Treated Group의 경우 PS의 분포가 Untreated Group에 비해 상대적으로 우측으로 치우쳐 있음을 쉽게 확인할 수 있다. 그리고 PS 분포에서 Common Support 영역이 [0.0149, 0.6]에 이른다는 것을 확인할 수 있다. 이는 PS가 0.6보다 큰 경우에는 Treatment에 참여한 실험군 개체에 대해 그에 상응하는 Counterfactual을 대조군으로부터 찾을 수 없음을 의미한다. 따라서 PS를 활용한 Treatment의 효과 측정은 이 Common Support 영역에 들어오는 실험군 개체들에 한정하여 이루어질 수밖에 없다.

Level에서 대부분의 Block들이 T-test를 통과하였다. 통과에 실패한 테스트는 단 두 개로, Block 1의 '정규직 여부'에 관한 테스트와 Block 8의 '성별'에 관한 테스트이다. 따라서 Block Test의 통과율이 99%에 이르러, 앞서의 PS 추정방정식이 Balancing Property를 대체로 만족하고 있다고 결론내릴 수 있다.

[그림 2] 각 집단별 Propensity Score 분포도



주: Common Support 영역인 [0.0149, 0.6]에 포함된 개체 수는 Untreated Group의 경우 11,192명, Treated Group의 경우에는 1,385명임.

7. 분석 결과

이제 앞서 구해진 PS를 활용하여 이직의 효과 및 이직 시 인적 네트워크 활용의 효과성을 분석할 준비가 마련되었다. 본 분석에서는 직장만족도, 기술적합도, 임금수준 등 앞서 제3장의 나.에서 소개한 7가지의 성과지표를 대상으로 분석을 진행한다. 우선 PS가 추정된 12,754개체에 대하여 PS를 고려하지 않은 단순비교를 진행하고 그 결과를 살펴보도록 하자. 〈표 7〉이 이직자 집단과 비이직자 집단의 성과지표 변화를 단순비교한 결과이다. 표에서 확인할 수 있듯이, 이직자의 경우 모든 지표들에 대하여 성과지표의 뚜렷한 증가가 목격되었다. 비이직자의 경우에는 임금수준이 2.782만원 증가한 것을 제외하고 눈에 띄는 성과지표의 개선이 나타나지 않았다.[25] 성과지

25 주어진 임금수준은 연간 임금상승률을 감안한 수치이기 때문에, 비이직자의 임금에는 큰 변화가 없어야 정상이다. 현재 나타난 임금상승분은 임금상승률을 추정하는 데 사용된 '임금구조기본통계조사'의 표본과 본 노동패널 표본과의 구성의 차이에 의해 발생한 것으로 보인다.

표 개선에서 집단 간의 차이가 존재하는지를 검증하기 위하여 Mean-Difference Statistical T-test를 진행하고 그 결과를 표에 수록하였다. 모든 지표에 대하여 이직자 집단이 비이직자 집단에 비해 높은 증가세를 보이는 것이 통계적으로 유의하게 확인된다. 예를 들어, 이직자 집단의 월평균 임금 수준은 9.088만원 상승한 것으로 나타나, 비이직자 집단에 비해 6.307만원 만큼 큰 폭의 임금향상을 보였다. 하지만 우리는 이상의 결과를 이직의 효과라고 단정 지을 수 없다. 왜냐하면, 이직의 효과는 이직자 집단에 속한 개체들의 성과 변화와 이들의 Counterfactual, 즉 이들이 이직을 하지 않고 현 직장을 유지하였을 때의 성과 변화를 직접 비교해야 제대로 파악될 수 있기 때문이다. 이후 제시하는 Propensity Score Matching에 의한 이직효과 추정은 이러한 Counterfactual의 탐색에 기반한 분석 결과이다.

〈표 7〉 주요 성과지표의 연간 변화 단순비교

성과지표의 연간 변화	비교대상		이직자 평균	비이직자 평균	격차 (표준오차)
직장만족도 변화	이직자 수	1,379	3.724	-0.334	4.058***
	비이직자 수	11,274			(0.466)
직무만족도 변화	이직자 수	1,386	2.962	-0.428	3.389***
	비이직자 수	11,285			(0.466)
일자리만족도 변화	이직자 수	1,384	2.944	0.282	2.662***
	비이직자 수	11,261			(0.489)
기술적합도 변화	이직자 수	1,383	2.350	-0.058	2.408***
	비이직자 수	11,245			(0.684)
교육적합도 변화	이직자 수	1,389	2.556	-0.142	2.697***
	비이직자 수	11,300			(0.689)
교육기술복합지수 변화	이직자 수	1,383	2.422	-0.091	2.513***
	비이직자 수	11,245			(0.664)
임금수준 변화	이직자 수	1,384	9.088	2.782	6.307***
	비이직자 수	11,340			(1.614)

주: 1) 성과지표의 변화에 관한 집단 간 차이를 확인하기 위하여 Mean-Difference Statistical T-test를 수행함.
2) *는 유의수준 10%, **는 유의수준 5%, ***는 유의수준 1%를 의미함.

본격적인 분석에 앞서, 인적 네트워크를 이직경로로 활용한 경우와 그렇지 않은 경우로 이직의 성격을 구분지어 보도록 하자. 이를 위해 노동패널 6차부터 10차까지의 전체 경력직 취업자들을 대상으로 한 〈부표 1〉의 '경력직 취업자들의 일자리 진입방식별 구직방법의 분포'를 참조하도록 하자. 노동패널에서 제공하는 일자리 진입방식은 '공개채용', '스카우트', '소개나 추천', '직접 찾아가서', '기타' 이렇게 다섯 가지로 구분된다. 이 중 '공개채용' 형태의 일자리 진입에서는 '인터넷'이나 '매체광고'를 활용한 구직이 전체 사례의 84.86%에 이른다. '직접 찾아가서' 형태의 일자리 진입 역시 '인터넷'이나 '매체광고' 그리고 '직접 탐문' 방식의 구직이 사례의 81.13%에 이른다. 반면, '소개나 추천' 형태의 일자리 진입에서는 '친구나 친지'를 통하거나 '취업희망 직장의 지인' 혹은 '업무상 알게 된 지인'을 통하는 경우가 전체의 81.23%에 이른다. 즉, 각 일자리 진입방식 간에 매우 뚜렷한 구직형태의 차이를 확인할 수 있다. 〈부표 1〉의 성공한 구직방법 2, 3, 8, 10, 11을 인적 네트워크를 활용한 구직으로, 1, 4, 5, 6, 7, 9를 그렇지 않은 구직으로 분류하고, 각 일자리 진입방식에 대한 인적 네트워크 활용도를 추산해 보면 다음 〈표 8〉과 같이 요약된다.

〈표 8〉 일자리 진입방식별 이직의 성격 분류

	공개채용	스카우트	소개나 추천	직접 찾아가서	기타
인적 네트워크 활용 구직	21	10	730	68	2
	(6.9)	(62.5)	(84.59)	(11.66)	(5.56)
인적 네트워크 비활용 구직	278	4	118	502	27
	(91.45)	(25.0)	(13.67)	(86.1)	(75.0)
알 수 없음.	5	2	15	13	7
	(1.64)	(12.5)	(1.74)	(2.23)	(19.44)
총 사례 수(1,802명 중)	304	16	863	583	36
	(100)	(100)	(100)	(100)	(100)
이직 성격 분류	비네트워크 경로	–	네트워크 경로	비네트워크 경로	–

주: ( ) 안은 각 일자리 진입방식에 대한 이직 성격의 비중을 백분율로 표시함.
자료: 〈부표 1〉를 재구성한 것임.

‘공개채용’과 ‘직접 찾아가서’ 형태의 일자리 진입에서 인적 네트워크를 활용하지 않은 구직이 각기 91.45%와 86.1%에 이른다. 반면, ‘소개나 추천’에서는 인적 네트워크를 활용한 구직이 84.59%에 이른다. 이를 바탕으로 본 분석에서는 ‘공개채용’과 ‘직접 찾아가서’를 ‘비네트워크 경로 이직’으로 ‘소개나 추천’을 ‘네트워크 경로 이직’으로 구분한다. 이 분류에 따르면 15,705명의 최종샘플에서 이직자로 파악된 1,560명 중 1,438명의 대체적인 구직경로 구분이 가능하다. 이 중 999명이 네트워크 경로 이직자로, 439명이 비네트워크 경로 이직자로 분류된다. 또한 앞서 PS가 추정된 12,754명 중에는 1,391명이 이직자인데, 그 중 891명은 네트워크 경로 이직자로, 387명은 비네트워크 경로 이직자로 분류된다.

가. 이직을 통한 개인만족도의 변화

아래 세 개의 도표 〈표 9〉, 〈표 10〉, 〈표 11〉은 이직을 통하여 개인의 만족도가 개선되는지의 여부를 PSM을 통하여 검증한 것이다. 각각의 만족도 지수(직장만족도, 직무만족도, 일자리만족도)에 대하여 세 가지 방식의 PSM 추정치(Five Nearest Neighbors, Radius Matching, Kernel Matching)를 제시하고 있다.

앞서 〈표 7〉의 단순비교에서는 이직자와 비이직자의 연간 만족도변화가 100점 만점에서 4.058점(직장만족도), 3.389점(직무만족도), 2.662점(일자리만족도)만큼 차이가 나는 것으로 집계되었다. 그러나 PSM 방식으로 재추정된 이직의 만족도 개선효과는 각각 약 2.50점(직장), 2.16점(직무), 1.55점(일자리)으로 나타났다.[26] 종합하면, 단순비교 방식(표 7)은 PSM 활용방식(표 9, 표 10, 표 11)에 비해 이직의 만족도 개선효과를 약 1~1.5점만큼 과대추정하고 있음을 확인할 수 있다. 이러한 현상이 나타난 이유는 실제 이직한 이들이 그렇지 않은 이들에 비해 기존 직장에서의 만족도가 상대적으로 낮았다는 데 있다. 예를 들어 주어진 최종샘플에서 이직자들의 기존 직장에서의 직장만족도는 평균 50.71점을 보이는 반면, 같은 시기 비이직자들의

26 이는 분석에 사용된 세 가지 방식의 PSM 추정치들을 산술평균하여 정리한 수치들임.

〈표 9〉 이직을 통한 직장만족도 변화

매칭방식	비교집단 (샘플 수)	실험군 변화(A)	매칭된 대조군 변화(B)	이직효과 (A-B) (표준오차)	T-stat.
전체 이직효과					
Five Nearest Neighbors	실험군(1,371)	3.662	1.201	2.460***	4.03
	대조군(11,274)			(0.610)	
Radius Matching	실험군(1,362)	3.543	1.009	2.534***	4.36
	대조군(11,274)			(0.581)	
Kernel Matching(Normal)	실험군(1,372)	3.659	1.165	2.494***	4.34
	대조군(11,274)			(0.564)	
전체 이직효과 평균		3.62	1.13	2.50	
네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(881)	3.309	1.169	2.140***	2.93
	대조군(11,274)			(0.730)	
Radius Matching	실험군(879)	3.231	0.939	2.292***	3.31
	대조군(11,274)			(0.693)	
Kernel Matching(Normal)	실험군(881)	3.309	1.146	2.162***	3.15
	대조군(11,274)			(0.686)	
네트워크 이직효과 평균		3.28	1.08	2.20	
비네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(380)	4.224	1.525	2.699**	2.24
	대조군(11,274)			(1.206)	
Radius Matching	실험군(373)	3.981	1.438	2.543**	2.17
	대조군(11,274)			(1.171)	
Kernel Matching(Normal)	실험군(381)	4.213	1.565	2.647**	2.30
	대조군(11,274)			(1.149)	
비네트워크 이직효과 평균		4.14	1.51	2.63	

주: 1) Five Nearest Neighbors Matching에서는 Caliper를 0.005로, Radius Matching에서는 이를 0.002로 설정함. 또한 Kernel Matching에서는 Kernel로 정규분포를 사용하고 Bandwidth는 0.01로 설정함.
2) *는 유의수준 10%, **는 유의수준 5%, ***는 유의수준 1%를 의미함.

〈표 10〉 이직을 통한 직무만족도의 변화

매칭방식	비교집단 (샘플 수)	실험군 변화(A)	매칭된 대조군 변화(B)	이직효과 (A-B) (표준오차)	T-stat.
전체 이직효과					
Five Nearest Neighbors	실험군(1,377)	2.850	0.701	2.149***	3.63
	대조군(11,285)			(0.592)	
Radius Matching	실험군(1,368)	2.767	0.626	2.140***	3.81
	대조군(11,285)			(0.562)	
Kernel Matching(Normal)	실험군(1,378)	2.852	0.648	2.204***	3.98
	대조군(11,285)			(0.554)	
전체 이직효과 평균		2.82	0.66	2.16	
네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(884)	2.302	0.808	1.494**	2.11
	대조군(11,285)			(0.707)	
Radius Matching	실험군(882)	2.256	0.658	1.598**	2.38
	대조군(11,285)			(0.670)	
Kernel Matching(Normal)	실험군(884)	2.302	0.654	1.648**	2.49
	대조군(11,285)			(0.661)	
네트워크 이직효과 평균		2.29	0.71	1.58	
비네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(381)	3.648	0.577	3.072***	2.69
	대조군(11,285)			(1.142)	
Radius Matching	실험군(374)	3.463	0.774	2.688**	2.45
	대조군(11,285)			(1.098)	
Kernel Matching(Normal)	실험군(382)	3.652	0.888	2.764**	2.57
	대조군(11,285)			(1.077)	
비네트워크 이직효과 평균		3.59	0.75	2.84	

주: 1) Five Nearest Neighbors Matching에서는 Caliper를 0.005로, Radius Matching에서는 이를 0.002로 설정함. 또한 Kernel Matching에서는 Kernel로 정규분포를 사용하고 Bandwidth는 0.01로 설정함.
2) *는 유의수준 10%, **는 유의수준 5%, ***는 유의수준 1%를 의미함.

〈표 11〉 이직을 통한 일자리만족도의 변화

매칭방식	비교집단 (샘플 수)	실험군 변화(A)	매칭된 대조군 변화(B)	이직효과 (A-B) (표준오차)	T-stat.
전체 이직효과					
Five Nearest Neighbors	실험군(1,375)	2.909	1.571	1.338**	2.17
	대조군(11,261)			(0.617)	
Radius Matching	실험군(1,366)	2.818	1.276	1.543***	2.62
	대조군(11,261)			(0.588)	
Kernel Matching(Normal)	실험군(1,376)	2.907	1.147	1.760***	3.03
	대조군(11,261)			(0.581)	
전체 이직효과 평균		2.88	1.33	1.55	
네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(882)	2.523	1.626	0.897	1.21
	대조군(11,261)			(0.742)	
Radius Matching	실험군(880)	2.472	1.246	1.225*	1.73
	대조군(11,261)			(0.707)	
Kernel Matching(Normal)	실험군(882)	2.523	1.139	1.383**	1.98
	대조군(11,261)			(1.697)	
네트워크 이직효과 평균		2.51	1.34	1.17	
비네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(381)	3.609	1.499	2.110*	1.76
	대조군(11,261)			(1.196)	
Radius Matching	실험군(374)	3.409	1.530	1.879	1.63
	대조군(11,261)			(1.151)	
Kernel Matching(Normal)	실험군(382)	3.599	1.365	2.235**	1.97
	대조군(11,261)			(1.133)	
비네트워크 이직효과 평균		3.54	1.46	2.07	

주: 1) Five Nearest Neighbors Matching에서는 Caliper를 0.005로, Radius Matching에서는 이 를 0.002로 설정함. 또한 Kernel Matching에서는 Kernel로 정규분포를 사용하고 Bandwidth는 0.01로 설정함.
2) *는 유의수준 10%, **는 유의수준 5%, ***는 유의수준 1%를 의미함.

평균 직장만족도는 이보다 무려 7점 가까이 높은 57.24점으로 나타났다. 따라서 단순비교 방식에서는 이직을 통한 만족도 개선효과가 다소 과장되어 추산되기 마련이다.

이들 이직한 이들이 만약 기존 직장에 그대로 남아 있었다면, (이들의 만족도가 상대적으로 낮은 수준이므로) 다른 이들에 비해 보다 높은 수준의 만족도 개선을 한 해 사이에 경험하였을 것이다. 실제로 전체 비이직자들의 연간 만족도의 변화가 각기 -0.334점(직장), -0.428(직무), 0.282점(일자리)에 그치는 데 반해, 실험군(이직자 집단)의 Counterfactual, 즉 PS를 사용하여 실험군 개체에 매칭된 (비이직자 집단 내) 대조군 개체들의 만족도 변화는 각기 1.13점(직장), 0.66점(직무), 1.33점(일자리)에 이르렀다(각 표의 '매칭된 대조군 변화(B)' 항목 참조). 실험군 Counterfactual에서의 만족도 개선폭이 여타 비이직자들의 연간 만족도 개선폭보다 대략 1점 이상 높게 나타나는 것이다. 이상의 선택편의(Selection Bias) 문제가 적절히 통제될 때, 이직의 순효과가 바르게 추정될 수 있다. 앞서 적시한 PSM 방식으로 추정된 이직의 만족도 개선효과는 이러한 선택편의 문제를 Counterfactual Framework으로 극복한 추정 결과라 할 수 있다.

그럼 네트워크 경로 이직과 비네트워크 경로 이직 사이에 뚜렷한 차이가 존재하는지 살펴보도록 하자. 표에서 확인할 수 있듯이 두 경우 모두, 이직의 만족도 개선효과가 통계적으로 유의한 수준에서 명확히 확인된다. 네트워크 경로의 이직에서는 만족도 개선의 효과가 각기 2.20점(직장), 1.58점(직무), 1.17점(일자리)으로 확인되었고, 비네트워크 경로의 이직에서는 각기 2.63점(직장), 2.84점(직무), 2.07점(일자리)으로 확인되었다. 흥미로운 부분은 비네트워크 경로의 이직에서 이직을 통한 만족도 개선의 효과가 소폭 높게 나타난 점이다. 이는 비네트워크 이직 사례들이 상당수의 '공개채용' 입사자를 포함하기 때문에 나타난 현상으로 보인다. '공개채용'은 주로 종업원 300인 이상의 규모가 큰 기업에서 집중적으로 활용되고 있다.[27] 이들 큰

27 이 부분에 대한 구체적인 설명은 한국개발연구원 정책연구시리즈 '인적 네트워크(개인의 사회적 자본)의 노동시장 효과 분석(김영철[2010])'을 참조하기 바란다.

기업에 '공개채용'으로 입사한 이들은 그 전 직장에 비해 주관적인 만족도가 크게 향상되었을 것이다. 이러한 '공개채용' 사례들이 비네트워크 이직의 만족도 개선효과를 다소 증폭시키는 역할을 하였을 것으로 추정된다. 결국 이직을 통한 주관적 만족도 개선 측면을 살펴볼 때, 이직은 '네트워크형 이직'과 '비네트워크형 이직' 모두에서 개인의 주관적 만족도를 (100점 만점에서) 2~3점가량 개선시키는 효과가 있는 것으로 결론지을 수 있다.

나. 이직을 통한 배치효율성의 변화

다음은 이직을 통한 일자리 재배치의 효율성 문제에 대해 살펴보도록 하자. 직장의 이동이라는 것은 개인에게 있어서는 근로환경의 변화라 할 수 있지만, 기업의 입장에서는 노동인력의 교환에 해당한다. 따라서 이직을 통한 노동인력의 재배치가 과연 사회 전반의 경제적 순익을 창출하고 있는지를 따져 볼 필요가 있다.

앞서 〈표 7〉에서 기술수준, 교육수준, 교육기술복합지수 이 세 가지 적합도에 관해 이직자 및 비이직자 집단 내의 연간 변화를 정리한 바 있다. 여기서 비이직자의 경우 각 지수에서 연간 적합도가 소폭 하락한 것으로 나타났고, 이직자의 경우 적합도가 크게 상승한 것으로 나타났다. 비이직자는 기술수준의 적합도에서 0.058점이, 교육수준의 적합도에서 0.142점이 그리고 교육기술수준의 복합지수에서는 0.091점이 하락한 데 반해, 이직자들은 각기 2.350점(기술), 2.556점(교육), 2.422점(복합지수)의 적합도 상승이 발견되었다. 비이직자들의 적합도 하락은 기술이나 경제환경의 변화와 밀접한 관련이 있다. 경쟁력 있는 기술 및 이에 관한 사회적 수요가 시간에 따라 변화하므로, 현 직장에서의 자신의 기술 혹은 교육수준은 (평균적으로 보아) 이전보다 적합성이 다소 떨어지게 마련이다. 반면, 이직자들의 적합도 상승이 과연 이직의 순효과인지에 대해서는 여전히 의문의 여지가 크다. 이직을 결행한 이들은 이전 직장에서의 직무 관련 적합도가 평균적으로 크게 떨어지는 이들이다. 예를 들어 최종샘플에서 이직을 하지 않은 이들의 한 해 전 기

술적합도는 평균 90.66점인 데 반해, 이직을 결행한 이들의 한 해 전 (이전 직장에서의) 기술적합도는 평균 85.47점에 머무는 것으로 나타났다. 이들은 애초에 워낙 적합도가 떨어지기 때문에, 굳이 이직을 택하지 않더라도 직무 재배치나 직장 내 부서이동 등을 통하여 1년 사이에 상당한 정도의 적합도 개선을 이루었을 것으로 예상된다.

따라서 이직을 통한 배치효율성의 개선효과, 즉 전반적인 근로자의 직무 관련 적합도 상승효과를 명확히 규명하기 위해서는 이직한 이들이 이직을 하지 아니하였을 때에 예상되는 적합도의 개선을 우선 추정해 볼 필요가 있다. 이것은 앞서 설명하였듯이 Counterfactual의 추정을 통해서만이 가능하다. 〈표 12〉, 〈표 13〉, 〈표 14〉는 PSM을 이용하여 비이직자들의 정보로부터 이직자들의 Counterfactual을 추정한 뒤 이를 보고하고 있다. 세 방식(Five Nearest Neighbors, Radius Matching, Kernel Matching)의 추정치를 산술평균하면, 기술적합도에서는 0.88점, 교육적합도에서는 0.57점, 교육기술복합지수에서는 0.75점의 상승이 확인되었다(각 표의 '매칭된 대조군 변화(B)' 항목을 참조). 이를 실험군, 즉 실제 이직자들의 적합도 상승(각 표의 '실험군 변화(A)' 항목)과 비교함으로써 이직의 순효과를 추정할 수 있는데, 분석 결과에 따르면 각기 1.31점(기술적합도), 1.83점(교육적합도), 1.40점(교육기술복합지수)에 이르는 것으로 나타났다.

그럼 이직을 통한 배치효율성 개선 측면에서 인적 네트워크의 역할을 살펴보도록 하자. 네트워크 경로 이직과 비네트워크 경로 이직으로 나누어 이직효과를 각기 추정해 보면, 둘 사이에 의외의 뚜렷한 차이가 존재함을 확인할 수 있다. 네트워크 경로의 이직인 경우 이직을 통한 적합도 개선효과가 통계적으로 유의한 수준에서 매우 높게 나타난다. 추정된 순효과가 각기 2.13점(기술적합도), 2.52점(교육적합도), 2.26점(교육기술복합지수)에 이른다. 반면, 비네트워크 경로의 이직인 경우 이러한 이직의 순효과가 모두 사라져 버렸다. 즉, 기술적합도, 교육적합도, 교육기술복합지수 모두에서 이직효과가 양과 음을 반복하였으며, 그 통계적 유의성도 전혀 확보되지 않는다. 말하자면, 비네트워크 경로를 통한 이직에서는 일자리 재배치를 통한 사회 전반의 경제적 이득을 기대할 수 없는 것이다. 앞서 이직 전반의 배치효율

성 개선효과를 확인한 바 있는데, 이 효과의 대부분은 비네트워크 경로 이직보다는 네트워크 경로 이직을 통하여 창출된 것임을 짐작할 수 있다.

특히 기술적합도를 보면, 이직자들의 적합도 개선은 네트워크와 비네트워크 이직 사이에 뚜렷한 차이를 보이는데, 네트워크 이직자들의 적합도 개선은 평균 2.92점인 데 반해, 비네트워크 이직자들의 적합도 개선은 평균 0.48점에 그친다. 인적 네트워크를 활용하지 않고 이직을 하였을 경우, 이직을 하였음에도 불구하고 기술적합도의 개선은 평균적으로 거의 기대되지 않는 것이다. 이는 앞서 주관적 만족도의 개선효과와 비교하여 매우 상반된 결과에 해당한다. 이직을 통한 주관적 만족도의 개선에서는 네트워크와 비네트워크 이직 모두 그 효과가 분명하였으며, 특히 비네트워크 이직자들의 주관적 만족도 개선폭은 3점 내지 4점대에 이르렀다. 따라서 이직이 전반적으로 개인의 주관적 만족도를 개선하는 효과가 있으나, 배치효율성의 개선 측면에서는 오직 인적 네트워크에 의존한 이직만이 재배치의 분명한 경제적 효과를 평균적으로 창출하고 있다고 결론지을 수 있다.

이러한 네트워크와 비네트워크 이직 사이의 뚜렷한 이직효과의 차이는 네트워크가 지닌 정보전달 기능에 기인한 것으로 판단된다. 구직자에게는 어떠한 일자리가 구직자의 기술능력 혹은 교육수준에 비추어 적합한지에 대한 정보를 제공하고, 구인자에게는 구인자가 필요로 하는 적합한 기술의 소유자가 누구인지에 대한 정보를 제공하는 것이다. 이러한 정보제공은 평소에 구인자와 구직자 모두를 아우르는 중간 매개로서의 인적 네트워크가 있었기에 가능한 것이다. 반면, 비네트워크에서는 이러한 효과를 기대하기 힘들다. 비네트워크형 채용에서는 주어진 서류와 단시간의 인터뷰 혹은 직무능력 테스트만을 가지고 적합한 인력을 선발하여야 한다. '공개채용'의 경우 많은 지원자들의 경쟁을 거치므로, 상대적으로 보다 적합한 후보자를 선별할 수 있을 것이다. 그러나 '직접 찾아가서' 형태의 입사에서는 이러한 경쟁의 과정 역시 생략되므로 높은 적합도를 지닌 후보의 채용은 더욱 기대하기 힘들다. 정리하자면, 인적 네트워크는 국내 노동시장에서 일자리와 일자리 후보 사이의 활발한 정보전달 기능을 수행함으로써 노동시장의 효율적 작동을 돕고 있는 것이다.

〈표 12〉 이직을 통한 기술적합도의 변화

매칭방식	비교집단 (샘플 수)	실험군 변화(A)	매칭된 대조군 변화(B)	이직효과 (A-B) (표준오차)	T-stat.
전체 이직효과					
Five Nearest Neighbors	실험군(1,374)	2.220	1.095	1.124	1.21
	대조군(11,245)			(0.929)	
Radius Matching	실험군(1,365)	2.088	0.735	1.353	1.55
	대조군(11,245)			(0.874)	
Kernel Matching(Normal)	실험군(1,375)	2.255	0.795	1.460*	1.68
	대조군(11,245)			(0.869)	
전체 이직효과 평균		2.19	0.88	1.31	
네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(881)	2.951	0.919	2.032*	1.81
	대조군(11,245)			(1.125)	
Radius Matching	실험군(879)	2.844	0.746	2.098**	1.98
	대조군(11,245)			(1.057)	
Kernel Matching(Normal)	실험군(881)	2.951	0.702	2.250**	2.14
	대조군(11,245)			(1.049)	
네트워크 이직효과 평균		2.92	0.79	2.13	
비네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(381)	0.525	2.297	-1.772	-0.96
	대조군(11,245)			(1.840)	
Radius Matching	실험군(374)	0.267	0.868	-0.600	-0.34
	대조군(11,245)			(1.753)	
Kernel Matching(Normal)	실험군(382)	0.654	1.297	-0.642	-0.37
	대조군(11,245)			(1.746)	
비네트워크 이직효과 평균		0.48	1.49	-1.00	

주: 1) Five Nearest Neighbors Matching에서는 Caliper를 0.005로, Radius Matching에서는 이를 0.002로 설정함. 또한 Kernel Matching에서는 Kernel로 정규분포를 사용하고 Bandwidth는 0.01로 설정함.
2) *는 유의수준 10%, **는 유의수준 5%, ***는 유의수준 1%를 의미함.

〈표 13〉 이직을 통한 교육적합도의 변화

매칭방식	비교집단 (샘플 수)	실험군 변화(A)	매칭된 대조군 변화(B)	이직효과 (A-B) (표준오차)	T-stat.
전체 이직효과					
Five Nearest Neighbors	실험군(1,380)	2.428	0.630	1.797*	1.93
	대조군(11,300)			(0.931)	
Radius Matching	실험군(1,371)	2.298	0.496	1.802**	2.07
	대조군(11,300)			(0.872)	
Kernel Matching(Normal)	실험군(1,381)	2.462	0.586	1.876**	2.16
	대조군(11,300)			(0.869)	
전체 이직효과 평균		2.40	0.57	1.83	
네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(886)	3.047	0.342	2.705**	2.45
	대조군(11,300)			(1.106)	
Radius Matching	실험군(884)	2.885	0.528	2.357**	2.27
	대조군(11,300)			(1.037)	
Kernel Matching(Normal)	실험군(886)	3.047	0.551	2.496**	2.43
	대조군(11,300)			(1.029)	
네트워크 이직효과 평균		2.99	0.47	2.52	
비네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(382)	1.702	2.007	-0.305	-0.16
	대조군(11,300)			(1.891)	
Radius Matching	실험군(375)	1.600	0.559	1.041	0.58
	대조군(11,300)			(1.788)	
Kernel Matching(Normal)	실험군(383)	1.828	0.910	0.917	0.51
	대조군(11,300)			(1.793)	
비네트워크 이직효과 평균		1.71	1.16	0.55	

주: 1) Five Nearest Neighbors Matching에서는 Caliper를 0.005로, Radius Matching에서는 이를 0.002로 설정함. 또한 Kernel Matching에서는 Kernel로 정규분포를 사용하고 Bandwidth는 0.01로 설정함.
2) *는 유의수준 10%, **는 유의수준 5%, ***는 유의수준 1%를 의미함.

〈표 14〉 이직을 통한 교육기술복합지수의 변화

매칭방식	비교집단 (샘플 수)	실험군 변화(A)	매칭된 대조군 변화(B)	이직효과 (A-B) (표준오차)	T-stat.
전체 이직효과					
Five Nearest Neighbors	실험군(1,374)	2.293	0.893	1.399	1.55
	대조군(11,245)			(0.904)	
Radius Matching	실험군(1,365)	2.161	0.641	1.520*	1.79
	대조군(11,245)			(0.850)	
Kernel Matching(Normal)	실험군(1,375)	2.327	0.711	1.616*	1.91
	대조군(11,245)			(0.847)	
전체 이직효과 평균		2.26	0.75	1.40	
네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(881)	2.951	0.643	2.308**	2.12
	대조군(11,245)			(1.087)	
Radius Matching	실험군(879)	2.816	0.662	2.154**	2.11
	대조군(11,245)			(1.021)	
Kernel Matching(Normal)	실험군(881)	2.951	0.645	2.306**	2.28
	대조군(11,245)			(1.014)	
네트워크 이직효과 평균		2.91	0.65	2.26	
비네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(381)	1.115	2.233	-1.118	-0.62
	대조군(11,245)			(1.816)	
Radius Matching	실험군(374)	0.936	0.749	0.187	0.11
	대조군(11,245)			(1.727)	
Kernel Matching(Normal)	실험군(382)	1.243	1.131	0.112	0.07
	대조군(11,245)			(1.726)	
비네트워크 이직효과 평균		1.10	1.37	-0.27	

주: 1) Five Nearest Neighbors Matching에서는 Caliper를 0.005로, Radius Matching에서는 이를 0.002로 설정함. 또한 Kernel Matching에서는 Kernel로 정규분포를 사용하고 Bandwidth는 0.01로 설정함.
2) *는 유의수준 10%, **는 유의수준 5%, ***는 유의수준 1%를 의미함.

끝으로, 이러한 네트워크 이직의 배치효율성이 모든 이직 사례에 일괄적으로 적용되는 것이 아님을 주지할 필요가 있다. 인적 네트워크가 구인과 구직 사이의 '연결(Networking)' 기능을 수행할 때 이상의 긍정적인 효과를 기대할 수 있을 것이나, 이 둘 사이의 '연줄(Nepotism)'로서 기능할 때는 오히려 역효과를 초래할 수 있다. 즉, 인적 네트워크를 통하여 적합하지 않은 지원자를 연줄로 채용시키는 경우, 해당 일자리에 대한 매치 적합성은 네트워크 이직으로 인해 오히려 감퇴할 수 있다. 우리는 이상의 분석을 통하여 국내 노동시장에서 네트워크 이직의 전반적인 교육 및 기술 수준 적합도 개선효과를 확인한 바 있다. 이는 국내 노동시장의 고용 프로세스에서 '연줄'의 부정적 효과보다는 구인/구직 간 '연결'이라는 네트워크의 긍정적 효과가 보다 강하게 작동하고 있음을 시사한다.

다. 이직을 통한 임금수준의 변화

마지막으로 이직을 통한 임금수준의 변화가 실재하는지의 여부를 검토해 보도록 하자. 네트워크 이직과 비네트워크 이직을 나누어 볼 때, 앞서 우리는 네트워크 이직이 일자리 매치 적합도를 현저히 개선한다고 밝힌 바 있다. 임금이 근로자의 생산성 기여분을 그대로 반영한다고 한다면, 네트워크 이직에 따른 매치 적합도의 개선은 근로자의 임금상승으로 이어져야 할 것이다.

앞서 〈표 7〉의 단순비교에서 이직자들의 연간 임금상승분이 평균 9.088만원, 비이직자들의 연간 임금상승분은 2.782만원으로 집계된 바 있다. 둘 사이의 격차가 6.307만원에 이른다. 한 해 사이에 이직한 이들의 연간 임금상승폭이 직장을 그대로 유지한 이들의 연간 임금상승폭 보다 현저히 높은 수준인 것이다. 하지만 이러한 단순비교는 선택편의(Selectoin Bias) 문제를 역시 고려하지 않고 있으므로, 이직의 직접적인 임금상승효과라 볼 수는 없다. 즉, 실제로 이직을 결행한 이들의 이직 전 임금수준은 같은 시기 직장을 그대로 유지한 이들에 비해 상대적으로 낮은 수준일 가능성이 높다. 이들이 전 직장을 그대로 유지하였다면, 다른 이들에 비해 현저히 높은 수준의 임금상승을 경험하였을 것이다. 실제 이직한 이들이 만약 이직을 하지 않고

전 직장을 그대로 유지하였을 때 예상되는 임금상승분, 즉 이직자 임금상승분의 Counterfactual을 PSM 방식을 활용하여 추정한 수치가 〈표 15〉의 '대조군 변화(B)'에 요약되어 있다. 이에 따르면 실제 이직자들이 이직을 하지 않았을 때 기대할 수 있는 임금상승분은 대략 5만원 정도에 이르는 것으로 나타난다. 따라서 이직에 따른 임금상승의 순효과는 앞서 제시한 6.307만원이 아닌 이보다 상당히 축소된 3.86만원이다. 또한 이러한 이직의 임금상승효과는 통계적으로도 유의한 것으로 확인되었다.

반면, 네트워크 경로 이직자와 비네트워크 경로 이직자의 임금상승분을 비교해 보면 둘 사이에 상당한 격차가 존재함을 쉽게 확인할 수 있다. 네트워크 이직자들의 이직을 통한 임금상승효과는 통계적으로 유의한 수준에서 대략 3.84만원으로 추정되는 반면, 비네트워크 이직자들의 임금효과는 -0.77만원이고 이는 통계적으로도 유의하지 않다. 즉, 네트워크를 활용하여 이직하였을 때 뚜렷한 임금상승이 기대되는 반면, 인적네트워크를 활용하지 않고 이직하였을 때는 이 효과를 확신할 수 없을 뿐더러 직장을 그대로 유지하는 것에 비해 오히려 더 하락할 가능성도 있는 것이다. 따라서 앞서 확인된 이직을 통한 전반적인 임금상승의 효과는 대체적으로 네트워크 이직을 통해 창출된 효과라고 결론지을 수 있다.

이직은 새로운 일자리에 자신의 기술 및 직무 능력을 적응시키는 과정이다. 따라서 임금상승효과가 이직 초기에 항상 담보되지는 않을 것이다. 반면, 인적 네트워크를 활용하였을 때 자신에게 보다 적합한 일자리에 배치됨으로써, 즉 자신의 능력과 잠재력을 보다 잘 발휘할 수 있는 직무에 재배치됨으로써 이상의 추가적인 임금상승을 기대할 수 있는 것이다. 이는 앞서 이직을 통한 배치효율성 검증에서 확인되었던 네트워크 이직의 기술수준(혹은 교육수준) 적합도 상승효과와 일맥상통하는 결과이다. 인적 네트워크를 활용한 이직은 임금근로자를 보다 적합한 일자리에 재배치하는 데 일조하고, 이것이 생산성에의 긍정적 기여를 창출함으로써 이직자들의 추가적인 임금상승으로 이어지는 것으로 해석할 수 있다.

〈표 15〉 이직을 통한 임금수준의 변화

매칭방식	비교집단 (샘플 수)	실험군 변화(A)	매칭된 대조군 변화(B)	이직효과 (A-B) (표준오차)	T-stat.
전체 이직효과					
Five Nearest Neighbors	실험군(1,375)	8.887	5.274	3.613*	1.84
	대조군(11,340)			(1.962)	
Radius Matching	실험군(1,366)	8.842	4.813	4.029**	2.08
	대조군(11,340)			(1.936)	
Kernel Matching(Normal)	실험군(1,376)	8.861	4.916	3.945**	2.06
	대조군(11,340)			(1.880)	
전체 이직효과 평균		8.86	5.00	3.86	
네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(882)	8.943	5.519	3.423	1.50
	대조군(11,340)			(2.285)	
Radius Matching	실험군(880)	8.827	4.855	3.972*	1.78
	대조군(11,340)			(2.231)	
Kernel Matching(Normal)	실험군(882)	8.943	4.819	4.124*	1.86
	대조군(11,340)			(2.217)	
네트워크 이직효과 평균		8.90	5.06	3.84	
비네트워크 경로 이직효과					
Five Nearest Neighbors	실험군(381)	4.772	5.672	-0.900	-0.24
	대조군(11,340)			(3.685)	
Radius Matching	실험군(374)	4.805	5.201	-0.396	-0.11
	대조군(11,340)			(3.661)	
Kernel Matching(Normal)	실험군(382)	4.691	5.716	-1.025	-0.28
	대조군(11,340)			(3.601)	
비네트워크 이직효과 평균		4.76	5.53	-0.77	

주: 1) Five Nearest Neighbors Matching에서는 Caliper를 0.005로, Radius Matching에서는 이를 0.002로 설정함. 또한 Kernel Matching에서는 Kernel로 정규분포를 사용하고 Bandwidth는 0.01로 설정함.
2) *는 유의수준 10%, **는 유의수준 5%, ***는 유의수준 1%를 의미함.

물론 이러한 해석은 평균적인 추세를 반영한 것임에 유념할 필요가 있다. 네트워크 이직의 사례 중에는 앞서 말한 생산적인 '연결' 효과가 아닌 비생산적인 '연줄' 효과 혹은 정실인사(Nepotism)가 작동한 경우들도 상당할 것이다. 이 경우 생산성에의 기여가 충분하지 않음에도 불구하고, 기술이나 능력에 비해 임금을 후하게 설정할 가능성이 높다. 이러한 '연줄'형 이직을 통한 임금상승 역시 네트워크 이직의 임금상승효과라 볼 수는 있겠으나, 이것이 일자리 배치효율성의 개선을 반영한다고 볼 수는 없는 것이다. 따라서 앞서 추정한 네트워크 이직의 임금상승효과 3.84만원이 전적으로 일자리 매치 적합도 개선효과에서 기인한다고 단정 지을 순 없다. 또한 비네트워크 이직 역시 평균적으로 임금상승의 효과가 포착되지 않은 것일 뿐, 비네트워크 이직의 표본 중에도 실제로 임금이 크게 상승한 사례들이 상당히 존재할 것이다.

8. 분석의 확장: 구직 네트워크의 가치 추정

본 장에서는 이상의 분석을 확장하여 한국사회에서 임금근로자 개인이 '소유한' 구직 네트워크의 가치를 추정해 보도록 한다. 앞서 네트워크 이직을 통한 임금상승효과를 3.840만원으로 추정하였다. 이는 2008년 기준 금액이다. 연간 물가상승률을 감안하면[28] 2010년 현재가로 4.074만원에 해당한다. 평소에 구직 네트워크를 적절히 관리하여, 이직에서 이를 활용한다면 한 번의 이직으로 4만원 안팎의 추가적인 임금상승을 기대할 수 있는 것이다. 연봉으로는 48.9만원가량의 임금이 이직 이후 매년 추가적으로 지급되는 것으로 해석될 수 있다.[29] 한편, 이직이라는 것은 근로자의 전 생애를 걸쳐 발생하는 사건이다. 임금근로자를 중심으로 한 현재의 최종샘플(15,705명)에서 한해 사이에 일자리를 이동한 비율은 9.93%에 이른다. 직종 및 업종에

28 여기에 연평균 물가상승률 3%를 적용하였다. 실제 임금상승률도 2009년의 임금이 금융위기 여파로 거의 동결이었음을 고려할 때 2년간 대략 6%에 해당한다.

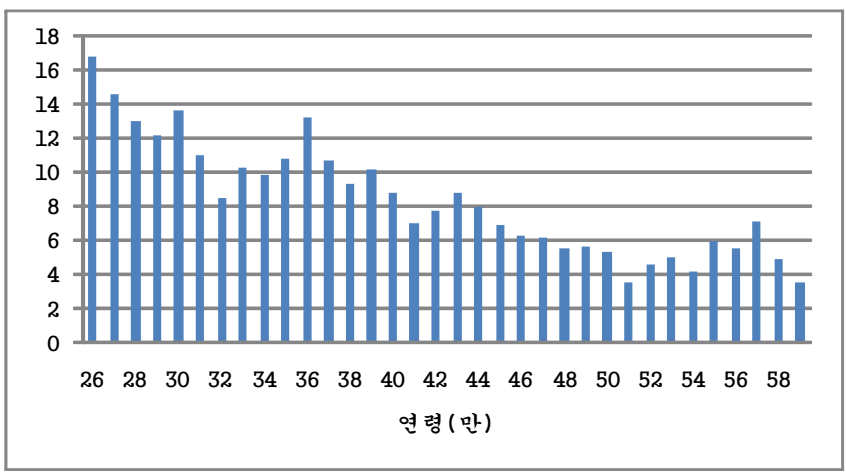
29 여기서는 네트워크 이직의 임금프리미엄(연봉 48.9만원 상승)이 이직 후 매년 지속된다고 가정하고 있다. 실제로 프리미엄이 상당 기간 지속되는지, 아니면 이직 후 빠르게 축소되는지에 관한 국내 실증분석은 향후 과제로 남겨져 있다.

따라 혹은 재직 회사의 규모에 따라 이직률에는 상당한 차이가 있겠으나, 전체 임금근로자를 대상으로 하였을 때 대략 10년에 한 번 정도의 이직이 예상되는 것이다. 임금근로자의 전 생애를 걸쳐 살펴보면 이직은 주로 직장 생활 후기보다는 전기에 집중되어 있다. [그림 3]이 최종샘플을 바탕으로 작성된 임금근로자의 각 연령별 이직률 추이이다. 생애 이직률은 20대 중후반에 가장 높고, 30대 초반에 주춤하다가 30대 중후반에 다시 상승하고 40대 이후에 하강하는 추세임을 확인할 수 있다.

이를 활용하면, 임금근로자 한 사람이 평생에 걸쳐 기대할 수 있는 이직의 임금상승효과를 추정해 볼 수 있다. 첫 취업의 평균연령이 26.5세임을 고려하여, 대표적인 임금근로자(A Representative Worker)가 26세부터 60세까지 노동시장에 참여한다고 가정해 보자. 인적 네트워크를 활용한 이직만이 평균적인 임금상승효과를 가져온다는 점을 고려할 때, 구직 네트워크의 생애 금전적 가치(V_M)는 다음과 같이 요약된다.[30]

[그림 3] 연령별 이직률(26세부터 59세까지)

(단위: %)



자료: 노동패널 5차~10차.

30 구직 네트워크의 현재 가치를 추산하기 위해서는 시간할인률을 적용할 필요가 있으나, 여기서는 이를 생략하였다. 시간할인률이 적용된 추정치는 현재 계산된 값보다 다소 하락할 것이다.

$$V_M = \sum_{t=26}^{59} (60-t) \times E[T_t] \times J_N \times \Delta W \times 12 \quad (11)$$

여기서 $E[T_t]$는 연령 t에서의 예상 이직률(Job Transfer Rate)을 나타낸다. J_N은 이직 시 인적 네트워크에 대한 의존도 수준이다. ΔW는 네트워크 이직에 따른 월평균 임금상승의 효과이다. 여기에 [그림 3]에 요약된 이직률의 생애 추이를 $E[T_t]$에 대입하자. 여기서 경력직 이직자의 인적 네트워크 의존도가 60% 중반(±5% 이내)으로 추산된 점을 고려하여, J_N에 64%를 대입하도록 하자.[31] 그리고 ΔW에 앞서 추정한 네트워크 이직의 임금상승효과 4.074만원(2010년 기준)을 대입하여 계산하면, 구직 네트워크의 생애 금전적 가치(V_M)는 1,872.0만원으로 집계된다.

물론 이 수치는 이직을 통한 금전적 이득만을 반영하고 있을 뿐, 주관적 만족도의 개선효과는 반영하고 있지 않다. 앞서 우리는 일자리 이동을 통해 창출되는 개인의 만족도 변화를 직장만족도, 직무만족도, 일자리만족도 이 세 가지 측면에서 고려해 보았다. 네트워크 이직과 비네트워크 이직 모두 만족도의 뚜렷한 개선효과를 보여 주었다. 그러나 국내 노동시장에서 이직의 약 60% 이상이 인적 네트워크에 의존하고 있음을 고려할 때, 임금근로자 한 개인이 구직 네트워크를 일체 '구비'하지 않는다면, 그의 이직률은 $E[T_t]$에서 60% 이상 추락할 것이다. 이를 고려하여 구직 네트워크의 생애 만족도 개선효과(V_S)를 다음과 같이 요약할 수 있다.

$$V_S = \sum_{t=26}^{59} (60-t) \times E[T_t] \times J_N \times \Delta S \times 12 \quad (12)$$

여기서 ΔS는 네트워크 이직을 통한 주관적 만족도의 개선폭을 나타낸다. 앞서 네트워크 이직이 창출하는 주관적 만족도의 개선효과가 100만점에서 2.20점(직장만족도), 1.58점(직무만족도), 1.17점(일자리만족도) 정도임을 확인하였다. 이 세 수치의 평균치가 네트워크 이직의 만족도 개선효과를 적절히 대변하고 있다고 한다면, ΔS의 대략적인 추정치는 1.65점이 된다. 이를

31 이에 대한 보다 구체적인 설명은 한국개발연구원 정책연구시리즈로 출간된 '인적 네트워크(개인의 사회적 자본)의 노동시장 효과 분석(김영철[2010])' 보고서를 참조하기 바란다.

대입하면 구직 네트워크의 만족도 개선효과는 대략 758.2점으로 추산된다. 만족도 1점을 금전적으로 환산하여 현금 n만원에 해당한다고 표시하면, 구직 네트워크의 임금근로자 1인당 생애가치(V_{Total})는 임금상승효과(V_M)와 만족도 개선효과(V_S)의 합으로서 다음과 같이 요약된다.[32]

$$V_{Total} \equiv V_M + n V_S \quad (=1872.0+758.2n) \tag{13}$$

추정치인 (1872.0+758.2n)만원은 한국사회의 임금근로자 각 개인이 구직 네트워크의 유지 및 관리를 위하여 기꺼이 지불할 용의가 있는 비용을 나타낸다. 만족도 1점이 1만원의 효용이 있다면, 즉 n=1이라면, 이는 12.24개월치 월급(대략 일년치 연봉)에 해당한다.[33]

9. 결언 및 시사점

이제까지 우리는 국내 고용시장에서의 인적 네트워크 활용의 효과성을 다각적인 측면에서 살펴보았다. 인적 네트워크를 활용한 이직의 직장생활만족도 개선효과는 100점 만점에 약 1.65점에 달하는 것으로 확인되었으며,[34] 직무적합도 개선효과는 100점 만점에 약 2.30점에 이르는 것으로 나타났다.[35] 또한 인적 네트워크를 활용한 이직은 임금상승을 동반하는데, 그 규모는 월평균 임금으로 4.074만원(2010년 기준)인 것으로 확인되었다. 반면, 인적 네트워크를 활용하지 않은 이직에서도 직장생활만족도의 개선효과가 일부 포착되었으나, 일자리 적합도에 대한 개선이나 임금상승효과는 확인되지 않았

---

32 구직 네트워크의 가치 (1872.0+758.2n)만원이 함의하는 바를 명확히 규정하기는 쉽지 않다. 특히 개인마다 일자리에서 얻는 주관적 만족도를 현금가치로 환산하는 방식이 다를 것이다. 예를 들어 어떤 이들에게는 금전적 이득만이 중요하고, 주관적 만족도는 경시될 수 있다. 이들에게 n은 '0'에 가까운 것이다. 반면, 또 다른 이들에게는 일자리에서 얻는 주관적 만족도가 임금소득보다 몇 배 이상 중요할 수 있다. 이들에게 n은 1보다 큰 양수가 될 것이다.

33 2630.2만원을 전 차수 임금수준(202.47만원)의 2010년도 기준 가치인 214.8만원으로 나누면 12.24개월이 나온다.

34 직장만족도 개선효과 2.20점, 직무만족도 개선효과 1.58점, 일자리만족도 개선효과 1.17점의 산술평균값 적용 시.

35 기술적합도 개선효과 2.13점, 교육적합도 개선효과 2.52점, 교육기술복합지수 개선효과 2.26점의 산술평균값 적용 시.

다. 즉, 구인자와 구직자를 연결시켜주는 인적 네트워크의 효율적인 정보전달 기능이 확인된 것이다. 이는 인적 네트워크를 활용한 구직활동이 한국사회 전반에서 '연줄' 혹은 '정실인사(Nepotism)'이라는 부정적인 역할을 감당하기 보다는 '연결(Networking)'을 통한 노동시장의 효율성 증대에 기여하고 있음을 입증해 주고 있다.

동시에 본 분석은 첫 취업이 아닌 경력직 취업 즉 이직활동에 한정된 분석임을 유념할 필요가 있다. 경력직 취업의 경우, 인적 네트워크가 전달할 수 있는 정보의 질이 첫 취업에 비해 월등히 우수하다. 경력직 구직자의 특수한 기술이나 업무능력, 즉 직무 관련 특수자본(Job-Specific Human Capital)은 직장경험을 통하여 발달되고 축적되는데, 이러한 인적자본은 추상적이며 서류를 통하여 증빙하기 어려운 문제를 안고 있다. 따라서 이를 교환하는 매개(Intermediaries)로서 인적 네트워크가 적극 활용되는 것이다. 첫 취업의 경우에는, 인적 네트워크의 기능이 이보다 제한적이므로 서류와 인터뷰를 통한 비네트워크 채용이 보다 효율적일 수 있다. 이에 대한 보다 엄밀한 분석은 추후 연구과제로 남겨 둔다.

한편 현재 60% 안팎에 달하고 있는 국내 노동시장의 인적네트워크 의존도는 전 세계적으로도 상당히 높은 수준에 해당한다.[36] 특별히 발달한 경조사 문화, 다양한 동호회와 활발한 동창회 활동, SNS 열풍, 업계 관계자와의 잦은 사적 만남까지 한국사회 각 개인은 다양한 방식으로 구직 네트워크의 유지 및 관리를 위해 노력하고 있으며, 이를 위해 기꺼이 '비용'을 지불하고 있다. 인적 네트워크를 활용한 구직이 개개인의 편익(Benefits) 측면에서 이직 성공률을 높인다든지, 이직 후 일자리 매치의 적합성을 개선한다든지 하는 뚜렷한 긍정적 효과를 창출함에도 불구하고, 한국사회 전반의 구직 네트워크 의존도 및 네트워크 관리를 위한 지출(Expenditures)은 과도한 수준인 것으로 판단된다.[37]

---

36 이에 대한 보다 구체적인 설명은 한국개발연구원 정책연구시리즈로 출간된 '인적 네트워크(개인의 사회적 자본)의 노동시장 효과 분석(김영철[2010])' 보고서를 참조하기 바란다.

37 전국의 가구원 2인 이상 가구를 대상으로 한 통계청 조사(2008년)에 따르면, 가구당 월평균 경조사비는 4만 4,709원으로 연간 52만 4,500원에 이른다. 이는 사회 전체적으로는 연간 약 8조원에 이르는 막대한 규모이다.

이는 무엇보다 개개인의 구직 네트워크를 대체할 만한 고용의 사회적 인프라가 충분히 성숙하지 아니한 데 기인하다고 볼 수 있다.[38] 예를 들어, 주요 선진국에서 공공고용서비스(Public Employment Service)가 구직에 기여하는 비중이 10%에 달하는 데 반해, 우리나라는 겨우 1%에 안팎에 그치고 있다. 대중교통 인프라가 충분히 갖춰지지 않았을 때, 각 가정이 자동차를 구비하고 다같이 교통체증에 시달려야 하는 것과 같은 이치이다. 고용의 사회적 인프라를 확충해 나가는 일은 일자리 매치를 통한 고용률의 증대뿐만 아니라 노동시장의 사회적 효율성을 개선하는 차원에서 우리사회의 시급한 과제 중 하나라 하겠다.

38 이에 관해서는 KDI 정책포럼으로 출간된 '구직에서의 인적 네트워크의 의존도 추정(김영철[2011])'을 참조하기 바란다.

참고문헌

김동헌・김상호, 「직업탐색과 자발적 이직」, 2001 경제학 공동학술대회 발표문, 2010.

김성훈, 「사회연결망과 공식경로를 통한 첫 취업의 개인적 결과와 사회적 결과」, 『한국사회학』, 제39집 제1호, 2005.

김용학, 『사회연결망 이론』, 박영사, 2003.

류석춘 외, 『한국의 사회자본: 역사와 현실』, 백산출판사, 2008.

이병훈, 「구직활동의 영향요인에 관한 탐색적 연구」, 『노동경제논집』, 제25권 제1호, 2002, pp.1~21.

Blau, David and Philip Robins, "Job Search Outcomes for the Employed and Unemployed," *Journal of Political Economy* 98(3), 1992, pp.637~655.

Dehejia, R. and S. Wahba, "Propensity Score-Matching Methods for Nonexperimental Causal Studies," *The Review of Economics and Statistics* 84, 2002, pp.151~161.

Glaeser, E., D. Laibson, and B. Sacerdote, "An Economic Approach to Social Capital," *The Economic Journal* 112, 2002.

Gottschalk, P. and T. Maloney, "Involuntary Termination, Unemployment, and Job Matching: A Test of Job Search Theory," *Journal of Labor Economics* 3, 1985, pp.109~123.

Granovetter, Mark S., *Getting A Job: A Study of Contracts and Careers*, Chicago: University of Chicago Press, 1975.

Heckman, J., H. Ichimura, and P. Todd, "Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Program," *Review of Economic Studies* 64, 1997, pp.605~654.

_____, "Matching as an Econometric Evaluation Estimator," *Review of Economic Studies* 65, 1998, pp.261~294.

Ioannides, Yannis and Linda Loury, "Job Information Networks, Neighborhood

Effects, and Inequality," *Journal of Economic Literature 92, 2004.*

Lin, Nan, Karen Cook, and Ronald Burt (eds.), *Social Capital: Theory and Research*, Aldine Transaction, 2001.

Marmaros, David and Bruce Sacerdote, "Peer and Social Networks in Job Search," *European Economic Review* 46, 2002, pp.870~879.

Rosenbaum, P. and D. Rubin, "The Central Role of the Propensity Score on Observational Studies for Causal Effects," *Biometrika* 70, 1983, pp.41~55.

Rubin, D., "Estimating Causal Effects of Treatments in Randomized and Non-randomized Studies," *Journal of Educational Psychology* 66, 1974, pp.688~701.

Simon, Curtis and John Warner, "Matchmaker, Matchmaker: The Effect of Old-Boy Networks on Job Match Quality, Earnings, and Tenure," *Journal of Labor Economics* 10(3), 1992, pp.306~330.

Todd, Petra, "Matching Estimators," unpublished manuscript, 2006.

부록

〈부표 1〉 경력직 취업자(1802명)의 일자리 진입방식별 구직방법의 분포

성공한 구직방법	일자리 진입방식					합계
	공개 채용	스카우트	소개나 추천	직접 찾아가서	기타	
1. 학교나 학원	12 (3.95)	0 (0)	26 (3.01)	4 (0.69)	0 (0)	42 (2.33)
2. 교수나 교사	2 (0.66)	0 (0)	8 (0.93)	0 (0)	0 (0)	10 (0.55)
3. 친구나 친지	5 (1.64)	2 (12.5)	509 (58.98)	28 (4.8)	2 (5.56)	546 (30.3)
4. 공공 안내소	3 (0.99)	0 (0)	7 (0.81)	9 (1.54)	4 (11.11)	23 (1.28)
5. 사설 안내소	3 (0.99)	0 (0)	29 (3.36)	16 (2.74)	1 (2.78)	49 (2.72)
6. 매체광고	53 (17.43)	1 (6.25)	21 (2.43)	209 (35.85)	13 (36.11)	297 (16.48)
7. 직접 탐문	2 (0.66)	0 (0)	13 (1.51)	85 (14.58)	0 ((0)	100 (5.55)
8. 가족	1 (0.33)	1 (6.25)	21 (2.43)	2 (0.34)	0 (0)	25 (1.39)
9. 인터넷	205 (67.43)	3 (18.75)	22 (2.55)	179 (30.7)	9 (25)	418 (23.2)
10. 희망직장 지인	7 (2.3)	3 (18.75)	90 (10.43)	20 (3.43)	0 (0)	120 (6.66)
11. 업무상 지인	6 (1.97)	4 (25)	102 (11.82)	18 (3.09)	0 (0)	130 (7.21)
12. 기타	5 (1.64)	2 (12.5)	15 (1.74)	13 (2.23)	7 (19.44)	42 (2.33)
합 계	304 (100)	16 (100)	863 (100)	583 (100)	36 (100)	1,802 (100)

주: 1) 노동패널 6차부터 10차까지의 신규 일자리 진입자 중 경력직 취업자를 대상으로 함.
2) ( ) 안은 각 일자리 진입방식에 대한 성공한 구직방법의 백분율임.

〈부표 2-A〉 Propensity Score 각 구간(Block)에 대한 Mean-Difference T-test 결과(I)

구간 번호	직장 유지 의향	직무 유지 의향	성별	나이	나이^2	교육 수준	혼인 여부	정규직 여부	첫(혹은 두 번째) 일자리	임금 (로그)
	격차	격차	격차	격차	격차	격차	격차	격차	격차	격차
1	1.64	1.16	0.48	-1.02	-149.13	-0.03	0.03	0.09*	0.00	0.07
	(4.55)	(3.95)	(0.11)	(2.07)	(194.54)	(0.44)	(0.05)	(0.04)	(0.09)	(0.13)
2	-2.54	0.50	0.03	0.07	-16.29	-0.22	-0.06	0.04	-0.02	0.01
	(2.03)	(1.91)	(0.06)	(1.23)	112.32	(0.20)	(0.04)	(0.04)	(0.06)	(0.07)
3	0.36	-0.76	0.02	-0.94	-70.67	-0.01	0.00	-0.04	0.08	0.01
	(1.31)	(1.29)	(0.04)	(0.88)	(78.70)	(0.12)	(0.03)	(0.03)	(0.04)	(0.04)
4	-0.79	-1.17	-0.01	0.71	64.28	0.00	-0.04	-0.02	0.01	-0.05
	(1.28)	(1.22)	(0.04)	(0.79)	(68.61)	(0.10)	(0.03)	(0.03)	(0.04)	(0.03)
5	0.26	1.44	-0.05	0.68	62.11	-0.12	0.04	0.00	-0.06	-0.01
	(1.42)	(1.44)	(0.04)	(0.77)	(62.01)	(0.10)	(0.04)	(0.03)	(0.04)	(0.04)
6	0.61	1.52	-0.08	-0.43	-36.55	0.06	0.02	0.02	-0.07	0.07
	(1.51)	(1.51)	(0.04)	(0.73)	(56.61)	(0.10)	(0.04)	(0.04)	(0.04)	(0.04)
7	0.10	-1.34	-0.02	0.43	27.26	0.03	-0.02	0.01	0.03	0.01
	(1.33)	(1.31)	(0.04)	(0.58)	(42.96)	(0.08)	(0.04)	(0.03)	(0.03)	(0.03)
8	0.45	1.73	0.08*	0.44	32.33	0.07	0.00	-0.01	-0.01	-0.03
	(1.46)	(1.43)	(0.04)	(0.52)	(36.15)	(0.07)	(0.04)	(0.03)	(0.03)	(0.03)
9	1.28	-0.10	0.00	0.61	30.33	-0.16	-0.03	0.06	-0.10	0.04
	(2.59)	(2.46)	(0.06)	(0.65)	(39.30)	(0.12)	(0.05)	(0.06)	0.06	(0.06)
10	5.00	1.14	0.13	-0.35	-16.26	0.04	0.00	0.07	0.01	-0.03
	(4.07)	(3.94)	(0.09)	(0.81)	(44.54)	(0.17)	(0.07)	(0.08)	(0.09)	(0.09)

주: 1) Untreated Group과 Treated Group의 각 항목에 대한 Mean Difference를 테스트함.
2) * 표시는 5% 유의도 수준에서 테스트를 통과하지 못한 항목을 표시함.
3) ( ) 안은 표준오차임.

〈부표 2-B〉 Propensity Score 각 구간(Block)에 대한 Mean-Difference T-test 결과(II)

구간 번호	임금 (로그)^2	종업원 규모	교육 적합도	임금 만족도	근무 환경 만족도	일자리 만족도	서비스 판매직 여부	농어업 종사 여부	정규직 × 교육 수준	직장 × 직무유 지의향
	격차	격차	격차	격차	격차	격차	격차	격차	격차	격차
1	0.52	0.54	2.02	6.56	-0.48	-1.01	0.02	0.01	0.03	259.54
	(1.47)	(0.53)	(3.79)	(5.64)	(4.80)	(4.21)	(0.05)	(0.03)	(0.47)	(606.38)
2	-0.06	0.43	0.46	0.47	-3.03	-1.82	0.02	0.00	-0.04	-98.27
	(0.73)	(0.27)	(1.97)	(2.47)	(2.20)	(1.88)	(0.02)	(0.01)	(0.26)	254.62
3	0.06	0.11	-1.51	-0.30	2.55	0.13	-0.02	0.00	-0.11	-2.46
	(0.41)	(0.17)	(1.58)	(1.56)	(1.42)	(1.17)	(0.02)	(0.00)	(0.18)	(157.76)
4	-0.52	0.00	-0.75	-1.11	-0.46	-0.05	-0.04	0.00	-0.11	-105.85
	(0.34)	(0.15)	(1.55)	(1.37)	(1.33)	(1.10)	(0.02)	(0.01)	(0.16)	(142.03)
5	-0.08	0.06	0.53	-0.47	-0.17	-0.36	0.03	0.00	-0.04	176.36
	(0.35)	(0.17)	(1.76)	(1.52)	(1.44)	(1.23)	(0.03)	(0.01)	(0.18)	(162.13)
6	0.63	-0.05	2.73	0.49	2.11	0.40	-0.06	0.01	0.15	146.59
	(0.35)	(0.17)	(2.01)	(1.50)	(1.45)	(1.24)	(0.03)	(0.01)	(0.19)	(162.25)
7	0.08	-0.18	-0.45	0.16	-0.31	0.05	0.05	0.00	0.10	-106.40
	(0.29)	(0.14)	(1.74)	(1.27)	(1.27)	(1.08)	(0.03)	(0.01)	(0.16)	(135.77)
8	-0.22	-0.14	0.28	-0.28	-1.63	0.86	0.00	0.00	-0.01	67.66
	(0.28)	(0.14)	(1.89)	(1.27)	(1.31)	(1.11)	(0.03)	(0.00)	(0.17)	(137.84)
9	0.37	-0.13	1.43	1.33	0.46	-0.70	0.01	-0.02	0.15	-11.16
	(0.47)	(0.21)	(3.71)	(2.04)	(2.27)	(1.87)	(0.06)	(0.02)	(0.29)	(217.79)
10	-0.28	0.21	0.77	1.61	-2.47	-1.13	-0.13	0.02	0.19	132.95
	(0.74)	(0.26)	(6.12)	(3.52)	(3.66)	(3.40)	(0.09)	(0.02)	(0.38)	(304.59)

주: 1) Untreated Group과 Treated Group의 각 항목에 대한 Mean Difference를 테스트함.
2) * 표시는 5% 유의도 수준에서 테스트를 통과하지 못한 항목을 표시함.
3) ( ) 안은 표준오차임.

CHAPTER 8

노인의료비 지출 분석*

정 완 교
(한림대학교 경영학부 교수)

〈초 록〉

본 논문은 건강보험과 의료급여 내 노인진료비의 추이를 분석하고, 국민노후보장패널을 사용하여 노인의 소득, 의료보험, 건강상태 등을 통제하고서 연령이 의료비 분포에 미치는 영향과, 출생 후 시기인 연령과 더불어 사망 전 생애 마지막 시기와 생애 마지막 시기의 연령이 의료비 지출에 미치는 영향을 분석한다. 분석 결과에 따르면, 우리나라 건강보험의 노인 진료비는 1999년 이후 지속적으로 증가하여 2009년에는 전체 진료비 가운데 31.58%를 차지하였으며, 의료급여의 노인 진료비도 2001년 이후 지속적으로 증가하여 2009년에는 전체 진료비 가운데 41.4%를 차지하였다. 노인 진료비의 증가를 성별로 나누어 살펴보면 여자 노인의 진료비가, 의료서비스의 종류별로 나누어 살펴보면 2000년 의약분업 이후 외래서비스와 의약품에 비해 입원서비스의 진료비가 크게 증가하였다. 한편, 우리나라 중・고령자 의료비의 지출 분포를 살펴보면 평균값이 중위값보다 큰, 오른쪽으로 치우친 분포를 보인다.

또한 Quantile Regression을 이용하여 연령이 의료비 지출의 분포에 미치

* 본 논문은 기 발간된 『고령화와 의료서비스 비용』(한국개발연구원, 2010)을 수정・보완한 것임. 이 논문은 2011년도 한림대학교 교비연구비(HRF-2011-204)에 의하여 연구되었음
(Chuncheon 200-702, Korea wankyo@hallym.ac.kr).

는 영향을 살펴보면 의료비 지출의 분포가 나이가 증가할수록 점점 퍼져나가는 결과를 보였다. 마지막으로, 연령과 더불어 사망 전 생애 마지막 시기가 의료비 지출에 미치는 영향을 분석한 결과, 생애 마지막 시기가 의료비 지출에 큰 영향을 미치며, 생애 마지막 시기의 의료비 지출에 미치는 영향이 생애 마지막 시기의 연령이 증가함에 따라 감소하였다. 이러한 결과는 노인가계의 소득, 노인의 건강상태, 의료보험제도, 의료기술 등의 변화와 더불어 사망 전 생애 마지막 시기와 생애 마지막 시기의 연령이 노인의료비 지출을 결정하는 중요한 요인임을 의미한다.

Abstract

Rising medical costs due to aging population have been a growing concern to both elderly households and the National Health Insurance (NHI). While previous research is preoccupied with forecasting medical costs under the assumption of constant or constantly rising age-medical cost profile, this paper analyzes the medical cost of the elderly taking account of "end-of-life" medical cost, the more important factor affecting their medical costs. Among the results, the medical cost for the elderly has increased significantly since 1999 to represent 31.58% of the total NHI cost in 2009. Simultaneously, the medical cost for the poor elderly under the Medical Aid Program increased to 41.4% of its total cost in 2009. Increased use of medical care, especially inpatient care, is shown to have contributed significantly to these results. Furthermore, the distribution of medical cost is skewed to the right for the elderly and spreads out as their age increases. In addition, the medical cost during the last year of life is significantly high but declines with age at death. These results mean that for the sake of better health policy on rising medical costs with aging population, both distribution of medical cost and "end-of-life" medical cost should be taken into consideration together with such factors as income, health status, and health insurance coverage.

1. 서 론

현재 우리나라에서는 빠른 속도로 인구 고령화가 진행되어 의료서비스의 비용이 증대되고 가계와 건강보험의 재정이 불안정해질 위험이 지속적으로 제기되고 있다. OECD 국가들 가운데 상대적으로 높았던 우리나라 1960년대의 출산율이 2005년에는 가장 낮은 수준으로 떨어지고 기대수명은 가장 크게 늘어났다. 이로 인해, 전체 인구 가운데 65세 이상 노인인구의 비율은 1960년의 2.9%에서 2009년에는 10.65%로 증가하였으며, 20~64세 인구 대비 65세 이상 인구의 비율로 측정되는 노인부양지수는 2009년부터 2050년까지 OECD 국가들 가운데 가장 크게 증가할 것으로 추정되고 있다(Jones[2010]).

한편, 고령으로 인한 질병의 빈도와 심도로 인해 노인의 의료서비스 소비와 지출은 다른 연령계층에 비해 상대적으로 매우 크다. 2008년의 경우 전체 인구 가운데 10.32%인 노인에 대한 진료비와 급여비가 전체 진료비의 30.79%를, 건강보험의 보험자인 국민건강보험공단이 부담하는 전체 급여비의 31.65%를 차지하였다. 따라서 의료서비스의 소비와 지출이 상대적으로 큰 노인인구의 빠른 속도의 증가는 건강보험의 재정에 심각한 위험이 될 수 있다.[1]

인구 고령화가 의료서비스의 비용과 건강보험의 재정에 미치는 영향에 대한 기존의 국내연구(김미숙 외[2003]; 최준욱 · 전병목[2004]; 정우진[2005])는 국가 간 고령인구의 비율과 일인당 의료비 간의 관계를 분석하거나, 사망률 추계에 따른 노인인구수의 변화와 연령별 의료비 지출이 일정하거나 일정하게 증가할 것이라는 가정하에 이루어졌다.[2]

그러나 의료서비스 비용 증가의 주요 설명요인은 고령화, 소득 증가, 의료보험 확대 등이라기보다는 의료기술의 발달임이 지적되었다(Newhouse

---

1 국민건강보험은 1997년부터 적자로 전환하여 2001년에는 적자규모가 2조 1,775억원에 달하였으나 국고지원금에 의해 2003년 이후 재정적자는 면하고 있다. 그러나 보험급여비는 보험료수입을 지속적으로 초과하고 있다.

2 예외적으로 정형선(2007)은 국가 간 자료를 이용하여 후에 논의될 사망 관련 비용의 지표로서 인구 천명당 사망자 수가 일인당 의료비에 미치는 영향을 분석하였다. 한편, 사망률 추계의 어려움에 대해서는, 특히 사망률 감소의 과소추정 위험에 대해서는 Fuchs (1984)와 정우진(2005)을 참조하기 바란다.

[1992]). 또한 의료서비스 비용에 대한 미시분석들은 *출생 후 시기(time from birth)인 연령보다는 사망 전 시기*(time until death)가 의료서비스 비용에 더 큰 영향을 끼치며, 사망 전 생애 마지막 시기가 의료서비스 비용에 미치는 영향은 생애 마지막 시기의 연령이 증가함에 따라 감소한다는 결과를 보여주었다(Norton[2000]; Lubitz and Riley[1993]). 특히, Cutler and Sheiner(2001)는 평균수명의 연장으로 인해 의료비 지출이 큰 생애 마지막 해에 있는 노인들이 감소하고 더 많은 노인들이 나이가 들어 사망함에 따라 생애 마지막 해의 의료비 지출이 감소함으로써 노인의 평균 의료비가 감소할 수 있음을 지적한다.

따라서 고령화와 의료서비스 비용 간의 관계를 분석함에 있어서 연령별 의료비 지출이 일정하거나 일정하게 증가할 것이라고 가정하는 것은 소득, 의료보험, 의료기술 등의 변화를 제대로 고려하지 못하는 문제가 있으며, 출생 이후의 시기인 연령 외에 생애 마지막 시기를 간과하는 문제가 있다. 또한 의료서비스 비용과 관련이 있는 일상생활에서의 장애, 주관적 건강인식 등으로 측정된 노인의 건강상태의 변화도 고려되어야 한다. 미국의 경우 신체장애 등으로 측정된 노인의 건강상태가 개선되고 있음을 보여주는 연구 결과들이 있다(Fuchs[1984]; Cutler and Sheiner[2001]; Costa[2000]).

본 연구는 제2장에서 건강보험과 의료급여 노인진료비의 추이를 분석하고, 제3장 가.에서 노인의 소득, 의료보험, 건강상태 등을 통제한 후 연령이 의료비 지출의 분포에 미치는 영향을 분석하고, 나.에서는 출생 후 시기인 연령과 더불어 사망 전 생애 마지막 시기와 생애 마지막 시기의 연령이 의료비 지출에 미치는 영향을 분석한다. 마지막으로 제4장에서는 주요 연구 결과를 정리한다.

2. 건강보험과 의료급여 노인진료비

가. 건강보험 노인진료비

우리나라의 노인인구수는 매우 빠르게 증가하고 있다.[3] 전체 인구 대비

65세 이상 노인인구의 비율은 1960년의 2.9%에서 지속적으로 증가하여 2009년에는 10.65%였다. 노인은 일반적으로 고령으로 인해 질병에 걸리거나 사망할 위험이 높기 때문에 의료비의 지출이 크다. 따라서 노인인구수의 지속적인 증가는 의료비 지출의 증가를 예측하게 한다.[4]

우리나라의 의료비 지출 가운데 건강보험이 적용되는 급여부문에 대한 총진료비는 1999년 13조 8,829억원에서 2009년 34조 8,749억원으로 2.51배 증가하였다.[5] 한편, 65세 이상 노인 진료비는 〈표 1〉에서 살펴보면 동일기간 동안에 2조 3,171억원에서 11조 138억원으로 4.75배 증가하였다. 따라서 건

〈표 1〉 건강보험 65세 이상 인구의 진료비

구분 / 연도	진료비(천원, 2005년=100)			
	전체	입원 (%)	외래 (%)	약국 (%)
1999	2,317,186,452	983,727,021 (42.5%)	1,305,667,417 (56.3%)	27,792,014 (1.2%)
2000	2,657,715,372	1,066,809,841 (40.1%)	1,371,685,668 (51.6%)	219,219,863 (8.2%)
2001	3,581,116,129	1,217,839,474 (34%)	1,383,650,229 (38.6%)	979,626,425 (27.4%)
2002	4,005,938,404	1,323,420,628 (33%)	1,533,102,374 (38.3%)	1,149,415,404 (28.7%)
2003	4,684,343,658	1,645,321,200 (35.1%)	1,691,303,292 (36.1%)	1,347,719,165 (28.8%)
2004	5,277,860,285	1,825,730,105 (34.6%)	1,851,087,505 (35.1%)	1,601,042,676 (30.3%)
2005	6,073,084,081	2,096,436,150 (34.5%)	2,094,708,652 (34.5%)	1,881,939,279 (31%)
2006	7,192,168,846	2,580,675,756 (35.9%)	2,397,105,783 (33.3%)	2,214,387,306 (30.8%)
2007	8,701,324,109	3,422,081,471 (39.3%)	2,728,316,680 (31.4%)	2,550,925,958 (29.3%)
2008	9,787,689,717	3,927,231,234 (40.1%)	3,032,836,075 (31%)	2,827,622,408 (28.9%)
2009	11,013,865,006	4,434,956,447 (40.3%)	3,427,306,013 (31.1%)	3,151,602,546 (28.6%)

자료: 보건복지부, 『건강보험통계연보』 각년도.

3 노인은 국가 내 혹은 국가 간 비교를 위해 출생 후 시기(time from birth)를 기준으로 65세 이상인 사람으로 정의된다. 그러나 이러한 출생 후 시기를 기준으로 한 노인의 정의는 사망률의 감소와 기대수명의 연장 등을 고려하지 못하는 문제가 있다. 새로운 노인의 정의로는 사망 전 시기(time until death)를 고려한 기대수명이 15년 이하인 사람 혹은 출생 후 시기와 사망 전 시기를 모두 고려한 65세 이상인 사람들 가운데 기대수명이 5년 이하인 사람 등이 있다(Sanderson and Scherbov[2008]; Fuchs[1984]).

4 Cropper(1977)는 연령이 높을수록 건강에 대한 투자 수익을 획득할 기간이 짧아지고 건강의 감가상각률이 높아 치료적 의료서비스의 수요는 증가하고 예방적 의료서비스의 수요는 감소함을 보였다. 우리나라 노인의 예방적 의료 서비스의 이용과 건강상태의 변화에 대해서는 정완교(2010)를 참조한다.

5 이후의 모든 진료비는 소비자물가지수를 이용하여 2005년의 값으로 실질화하였다.

강보험 전체진료비 가운데 노인진료비의 비율은 16.69%에서 31.58%로 증가하였다. 이러한 노인진료비의 증가를 남자 노인과 여자 노인의 진료비로 나누어 살펴보면 남자노인의 진료비가 9,873억원에서 4조 6,219억원으로 4.68배, 여자노인의 진료비가 1조 3,298억원에서 6조 3,919억원으로 4.81배 증가하였다.

한편, 건강보험 노인 진료비의 변화를 의료서비스의 종류에 따라서 상대적으로 비용이 높은 입원서비스와 상대적으로 비용이 낮은 외래서비스와 의약품으로 나누어 살펴볼 수 있다.[6] 〈표 1〉에 의하면 입원서비스 진료비는 1999년 9,837억원에서 2009년 4조 4,349억원으로 4.51배 증가하였으며, 외래서비스 진료비는 동일기간 동안에 1조 3,056억원에서 3조 4,273억원으로 2.62배, 의약품 진료비는 277억원에서 3조 1,516억원으로 113.4배 증가하였다. 이러한 결과로 노인진료비 가운데 입원서비스의 비율은 1999년 42.45%에서 2002년 33.04%로 감소하였다가 점차 증가하여 2009년에는 40.27%까지 증가하였으며, 외래서비스의 비율은 1999년 56.35%에서 2008년 30.99%까지 지속적으로 감소한 뒤 2009년에는 31.12%로 증가하였으며, 의약품의 비율은 1999년 1.20%에서 2000년 8.25%로 증가한 뒤 2001년 이후로는 27~30% 수준을 유지하고 있다.[7]

또한, 건강보험 노인 일인당 진료비는 1999년 81만원에서 2009년 228만원으로 증가하였으며, 전체 노인을 남자 노인과 여자 노인으로 나누어 살펴보면, 남자 노인 일인당 진료비가 89만원에서 229만원으로 여자 노인 일인당 진료비가 75만원에서 227만원으로 지속적으로 증가하였다.

---

6 또한 노인 진료비의 변화를 진료건수와 진료건수당 진료비로 나누어 살펴볼 수 있는데, 진료건수는 1999년부터『건강보험통계연보』내 관련 데이터가 제공된 2007년까지 약 5.9배 증가하였다. 반면에 진료건수당 진료비는 동일기간에 감소하였다. 그러나, 진료건수는 의료기관이 청구하는 청구건으로 파악되고 있어 동일 질환이 청구기간에 따라 여러 건으로 분리하여 청구될 수 있는 한계가 있다.

7 의약품 비율의 변화는 2000년 8월의 의약분업의 효과가 크게 반영된 결과로 보이나 향후 추가적인 분석이 요구된다. 우리나라 의약분업과 의약분업 이후 고가의약품의 사용 증대에 대해서는 Jones(2010)와 Kim and Ruger(2008)를 참조한다.

나. 의료급여 노인진료비

한편, 노인인구 가운데 상당수는 저소득 빈곤층으로 건강보험이 아닌 의료급여의 혜택을 받고 있다.[8] 2005년을 기준으로 65세 이상 노인의 45.1%가 전체 가구 중위소득의 50% 미만의 소득을 가지는 상대적 빈곤층이며(OECD [2009]), 국민기초생활보장 수급자 가운데 65세 이상 노인 수급자의 비율은 2008년 기준 26.5%이다(보건복지부[2009]). 따라서 건강보험 내의 노인진료비에 대한 분석과 더불어 의료급여 내의 노인진료비에 대한 분석이 필요하다.

먼저, 건강보험과 의료급여의 적용을 받는 노인 수의 변화를 비교하면 건강보험의 적용을 받는 65세 이상 노인은 2001년 3,216,228명에서 2009년 4,826,440 명으로 1.5배 증가하였으며, 의료급여 적용노인은 동일 기간 동안에 371,664명에서 459,943명으로 1.2배 증가하였다. 이에 따라 건강보험 적용인구 가운데 노인의 비율은 6.9%에서 9.9%로 증가하였으며, 의료급여 적용인구 가운데 노인의 비율은 24.7%에서 27.4%로 증가하였다. 또한 건강보험과 의료급여의 적용을 받는 노인 가운데 남자노인이 빠르게 증가하였다. 건강보험의 적용을 받는 노인 가운데 남자의 비율은 2001년의 39.3%(1,264,476명)에서 41.7%(2,012,419명)로 증가하였으며, 의료급여의 적용을 받는 노인 가운데 남자의 비율은 26.7%(99,419명)에서 27.6%(126,894명)으로 증가하였다.

이러한 의료급여의 적용을 받는 노인의 증가로 의료급여 노인진료비는 빠르게 증가하였다. 〈표 2〉에 의하면, 2001년의 의료급여 노인진료비는 7,811억원으로 전체 의료급여 진료비의 36.5%를 차지하였으나 2009년의 의료급여 노인진료비는 2.23배 증가한 1조 7,432억원으로 전체 의료급여 진료비의 41.4%를 차지하였다.[9] 의료급여 노인진료비의 증가를 남자 노인과 여자 노인으로 나누어 살펴보면, 남자 노인의 진료비가 2,369억원에서 5,142억원으

---

8 2001년 10월 의료보호법이 의료급여법으로 개정되었다. 의료급여의 수급자 자격 및 급여 내용 등에 대해서는 최성은(2008)을 참조한다.

9 건강보험의 진료비와 같이 의료급여 진료비도 소비자물가지수를 이용하여 2005년의 값으로 실질화하였다.

〈표 2〉 의료급여 65세 이상 인구의 진료비

구분 / 연도	진료비(천원, 2005년=100)			
	전체	입원 (%)	외래 (%)	약국 (%)
2001	781,156,817	314,487,812 (40.3%)	279,321,452 (35.8%)	187,347,551 (24%)
2002	829,119,275	334,568,642 (40.4%)	289,534,200 (34.9%)	205,016,433 (24.7%)
2003	890,825,644	382,676,439 (43%)	286,528,224 (32.2%)	221,620,980 (24.9%)
2004	1,021,699,493	442,813,397 (43.3%)	313,426,714 (30.7%)	265,459,382 (26%)
2005	1,242,688,287	541,975,882 (43.6%)	366,939,074 (29.5%)	333,773,332 (26.9%)
2006	1,492,654,106	655,414,590 (43.9%)	427,112,246 (28.6%)	410,127,270 (27.5%)
2007	1,581,012,871	712,925,653 (45.1%)	436,359,086 (27.6%)	431,728,132 (27.3%)
2008	1,671,934,237	790,706,716 (47.3%)	435,483,663 (26%)	445,743,860 (26.7%)
2009	1,743,206,500	844,626,006 (48.5%)	443,393,834 (25.4%)	455,186,659 (26.1%)

자료: 보건복지부, 『의료급여통계』 각년도.

로 2.17배 증가하였으며, 여자 노인의 진료비는 5,442억원에서 1조 2,289억원으로 2.26배 증가하였다.

한편, 의료서비스의 종류에 따라 의료급여 노인진료비의 변화를 〈표 2〉에서 살펴보면 입원서비스 진료비는 2001년 3,144억원에서 2009년 8,446억원으로 2.69배, 외래서비스 진료비는 2,793억원에서 4,433억원으로 1.59배, 의약품 진료비는 1,873억원에서 4,551억원으로 2.43배 증가하였다.[10] 이러한 결과는 건강보험 노인진료비의 경우 의약품 진료비가 가장 크게 증가한 결과와 다르다. 그러나 건강보험 노인 의약품 진료비의 변화는 2000년 8월 의약분업 이전의 1999년부터의 변화이고, 의료급여 노인 의약품 진료비의 변화는 의약분업 이후 2001년부터의 변화이다. 따라서 건강보험 노인 의약품 진료비의 증가는 의약분업의 효과가 크게 반영된 결과로 2001년 이후의 건강보험 노인진료비 변화를 의료서비스의 종류별로 살펴보면 의료급여의 경우와 같이 입원서비스 진료비가 가장 크게 증가하였다.[11]

10 이에 따라, 노인진료비 가운데 각 비율의 변화를 살펴보면, 의약품 비율은 2001년 24%에서 2006년 27.5%로 증가한 뒤 지속적으로 감소하여 2009년에는 26.1% 수준을 유지하고 있으며, 외래서비스 비율은 동일 기간 동안에 35.8%에서 지속적으로 감소하여 2009년에는 25.4% 수준이고, 입원서비스 비율은 40.3%에서 48.5%까지 지속적으로 증가하였다.

11 즉, 2001년 이후의 건강보험 노인진료비 변화를 살펴보면, 입원서비스 진료비는 2001년부터 2009년까지 3.64배, 의약품 진료비는 3.22배, 외래서비스 진료비는 2.48배 증가하였다. 또한 건강보험과 같이 의료급여 노인진료비의 증가를 진료건수와 진료건수당 진료비로 나누어 살펴보면 진료건수는 2001년 10,678,759건에서 2009년 32,983,775건으로

또한 의료급여 적용을 받는 노인인구수의 증가에도 불구하고 의료급여 노인 일인당 진료비는 2001년 210만원에서 2009년 379만원으로 증가하였다. 전체 노인을 남자 노인과 여자 노인으로 나누어 살펴보면, 2001년부터 2009년까지 남자 노인 일인당 진료비는 238만원에서 405만원으로, 여자 노인 일인당 진료비는 199만원에서 369만원으로 각각 지속적으로 증가하였다. 따라서 건강보험의 경우와 같이 여자 노인 일인당 진료비가 남자 노인 일인당 진료비 보다 빠르게 증가하였다.

3. 노인의료비 분석

가. 의료비 분포

의료서비스의 수요 및 지출은 인적자본이론에 기초한 건강(health capital)에 대한 투자로써 설명한다(Grossman[1972]). 의료서비스의 수요 자체는 효용을 증진시키지 못하지만 의료서비스의 수요가 건강을 증진시킴으로써 간접적으로 효용을 증진시키므로 의료서비스의 수요가 발생한다.

의료서비스의 수요에 영향을 미치는 여러 요소 가운데 연령은 고령에 따른 질병과 사망의 위험이 커짐에 따라 의료서비스 수요에 영향을 미친다. 그러나 의료서비스 이용과 지출에 대한 여러 미시분석들은 출생 후 시기인 연령(time from birth)보다는 사망 전 시기(time until death, 사망 전 생애 마지막 시기)가 의료서비스 수요의 중요한 설명 요인임을 보여주었다(Fuchs [1984]; Lubitz and Riley[1993]; Cutler and Sheiner[2001]; Norton [2000]).

우리나라 노인의료비 분석에 사용된 자료는 『국민노후보장패널』이다.[12] 『국민노후보장패널』의 패널 특성을 활용하여 2007년(1차 조사시점인 2005년으로부터 2년 뒤) 혹은 2009년(1차 조사시점인 2005년으로부터 4년 뒤)

3.09배 증가한 반면에 진료건수당 진료비는 73,151원에서 52,850원으로 감소하였다.

12 『국민노후보장패널』은 국민연금공단에서 중·고령층의 노후준비 및 노후생활을 지속적으로 파악하기 위하여 2005년 당시 전국의 만 50세 이상 가구원이 있는 약 5,000여 가구와 그 가구에 속하는 만 50세 이상 개인 8,600여명을 추출하여 2005년부터 격년으로 조사하는 코호트(cohort) 패널자료이다. 격년으로 수행되는 조사에서는 노인가구의 경제상황, 중·고령자의 고용 현황 및 퇴직, 건강, 가족관계, 노후소득보장 현황 등 노후생활 전반에 걸친 주제들을 포괄적으로 조사한다.

조사 때 사망한 중·고령자를 확인한 뒤 그들의 사망 전 2005년 의료비 지출의 특성이 다른 그룹의 의료비 지출과 어떻게 다른가를 살펴봄으로써 사망 전 시기가 의료서비스 수요에 미치는 영향을 분석하고자 한다.[13]

〈표 3〉는 분석에 사용된 주요 변수들의 요약통계를 보인다. 분석에 포함된 개인의 평균 나이는 63.6세이며, 여성의 비율은 59.2%이다. 학력의 경우 초등학교 졸업자가 34.7%로 제일 많으며, 그 다음으로 고등학교 졸업자가 19.9%, 중학교 졸업자가 17.8%, 대학교 이상 졸업자가 8.6% 순이다. 건강에 관련된 변수로서는 '의사로부터 진단을 받고 3개월 이상 지속되고 있거나 치료를 받고 있는 질환이 있다'라고 응답한 사람의 비율이 46%이며, 개인 스스로 평가한 건강상태가 '보통이다' '좋은 편이다' '매우 좋다'를 포함한 5개 항목 가운데 '매우 좋지 않다'와 '좋지 않은 편이다'로 평가한 사람의 비율이 48.9%이다.

전체 개인 가운데 가구주는 48.9%, 배우자 있는 개인은 75.8%, 은퇴한 사람은 26.4%, 자가소유자는 83.1%, 민간보험을 보유하고 있는 사람은 25.3%이다. 가구의 연간 총소득은 평균 2,200만원이며, 부부만 함께 살거나 자녀와 함께 살고 있는 가구가 많다. 또한 실증분석에 중요하게 사용될 2005년 『국민노후보장패널』 조사에서는 살아 있었으나 2007년(2년 뒤) 혹은 2009년(4년 뒤) 조사때 사망한 중·고령자의 비율은 각각 4.9%와 6.9%이다.

한편, 2004년 가구 월평균 의료비용은 110.9천원이며 중위값 60천원보다 크다.[14] 따라서 우리나라중·1고령자 의료비 지출의 분포는 평균값이 중위값보다 큰 오른쪽으로 치우친(skewed to the right) 분포를 보인다. 예를 들어, 가구 월평균 의료비용의 0.1분위수 값은 10천원, 0.25분위수 값은 30천원, 0.75분위수 값은 110천원, 0.90분위수 값은 200천원, 0.95분위수 값은 307천원이다. 0.9분위수의 값은 0.1분위수의 값의 20배에 달한다.[15] 노인은 사망 전에 심각한 의료비 지출과 그에 따른 경제적 파산의 위험에 노출되어 있

---

13 『국민노후보장패널』의 1, 2, 3차 조사시점은 2005년, 2007년, 2009년이며, 각각 전 해의 연간 소득과 지출에 대한 정보를 제공한다.

14 의료이용과 지출의 범위는 본인이 부담한 수술/입원비, 외래진료비, 약값, 보건의료 용품 및 기구, 건강보조식품 구입비이다. 전체 8,617명 가운데 146명인 1.69%의 사람들이 의료비지출이 전혀 없는 가구에 속한다.

15 분위수(quantiles)와 백분위수(percentiles)는 동의어다. 예를 들어, 0.9분위수는 90th백분위수이다.

다(Fuchs[1998a, 1998b]; Marshall, McGarry, and Skinner[2010]; Himmelstein *et al.*[2005]; Dranove and Millenson[2006]).[16] 따라서 연령에 따라 의료비 지출의 평균값뿐만 아니라 의료비 지출의 분포를 면밀히 살펴보아야 한다.

〈표 3〉 요약통계

		평균	표준편차	최솟값	최댓값
가구 월평균 의료비용(천원)		110.9	191.0	0	5830
연령		63.6	9.7	36	101
여성		0.592	0.491	0	1
학력	초등학교	0.347	0.476	0	1
	중학교	0.178	0.382	0	1
	고등학교	0.199	0.399	0	1
	대학교 이상	0.086	0.280	0	1
건강	질환	0.460	0.498	0	1
	좋지 않은 건강상태	0.489	0.500	0	1
가구주		0.489	0.500	0	1
배우자 있음		0.758	0.429	0	1
은퇴		0.264	0.441	0	1
자가소유		0.831	0.375	0	1
민간보험		0.253	0.434	0	1
가구 연간소득(백만원)		22.1	30.8	0	770.6
가구 소득정보 무응답		0.123	0.328	0	1
세대구성	독거가구	0.106	0.307	0	1
	부부가구	0.318	0.466	0	1
	부부 및 자녀 가구	0.272	0.445	0	1
2년 내 사망(노환+질병)		0.049	0.217	0	1
4년 내 사망(노환+질병)		0.069	0.254	0	1
가구원 수		2.919	1.352	1	9
노인가구원 수		0.799	0.795	0	4
노인가구 여부		0.569	0.495	0	1
서울		0.210	0.407	0	1
광역시		0.263	0.440	0	1
관측치 수		8,617			

자료: 국민연금공단, 『국민노후보장패널 1차』, 2005.

16 2001년의 1,771명의 개인파산 가운데 54.5%(Himmelstein *et al.*[2005]) 혹은 17%(Dranove and Millenson[2006])가 의료비 지출과 관련되어 있다.

〈표 4〉는 학력, 성별, 가구원 수, 건강상태, 민간보험, 소득, 주거형태 등의 의료비 지출에 영향을 미치는 요인들을 통제하고서 연령이 의료비 지출과 의료비 지출의 분포에 미치는 영향을 직접적으로 보여준다. 연령이 의료비 지출에 미치는 영향은 일반적인 OLS(Ordinary Least Squares)를 이용하고 연령이 의료비 지출의 분포에 미치는 영향은 Quantile Regression을 사용한다.[17]

〈표 4〉 연령과 의료비 지출

	OLS Estimates	Quantile Regression Estimates				
		0.1	0.25	0.5	0.75	0.9
연령	1.247*** (0.412)	0.081 (0.066)	0.289*** (0.096)	0.365** (0.153)	0.837*** (0.294)	2.184*** (0.627)
노인가구원 수	8.901 (5.522)	2.325*** (0.670)	4.248*** (1.252)	11.814*** (1.980)	17.578*** (3.548)	23.647*** (7.079)
가구원 수	7.645** (3.473)	2.884*** (0.463)	3.121*** (0.681)	5.039*** (1.181)	7.020*** (2.163)	16.934*** (5.821)
여성	7.764* (4.112)	−0.334 (1.052)	0.900 (1.442)	2.342 (2.290)	6.680 (4.270)	13.126 (10.900)
초등학교	23.920*** (6.504)	0.695 (0.994)	5.012*** (1.536)	9.511*** (2.494)	18.729*** (4.761)	26.588*** (9.341)
중학교	41.609*** (10.637)	1.187 (1.290)	4.054* (2.099)	12.313*** (3.284)	30.757*** (5.607)	48.290*** (14.540)
고등학교	35.653*** (8.648)	0.022 (1.174)	5.717*** (1.954)	15.774*** (3.237)	29.089*** (5.752)	48.379*** (11.981)
대학교 이상	56.634*** (11.072)	3.380 (2.070)	12.706*** (2.819)	25.912*** (4.427)	62.771*** (9.915)	75.244*** (20.834)

17 OLS의 경우 양의 오차 혹은 음의 오차에 상관없이 모든 오차의 제곱의 합을 줄이는 계수(β)를 추정하나, Quantile Regression은 음의 오차의 절대값에 $(1-q)$를 곱하고 양의 오차의 절대값에 q를 곱한 값들의 합을 줄이는 계수(β_q)를 linear programming에 의해 추정한다. 또한 OLS의 경우 $q(0<q<1)$ 분위수(quantile)에 상관없이 하나의 계수를 추정하나 Quantile Regression은 $q(0<q<1)$ 분위수별로 각각의 계수를 추정한다. 한편, Quantile Regression의 모든 표준오차는 400회의 재표본추출에 의한 bootstrap method에 의해 추정되었다. Quantile Regression에 대한 보다 자세한 내용은 Angrist and Pischke(2009), Cameron and Trivedi(2005, 2009)를 참조한다.

〈표 4〉의 계속

	OLS Estimates	Quantile Regression Estimates				
		0.1	0.25	0.5	0.75	0.9
질환	31.788*** (4.397)	7.452*** (0.804)	12.370*** (1.289)	20.797*** (2.271)	32.598*** (4.008)	43.863*** (8.262)
좋지 않은 건강상태	24.814*** (4.789)	2.247*** (0.700)	4.729*** (1.118)	11.297*** (2.050)	22.095*** (3.904)	33.680*** (8.767)
가구주	−2.133 (3.430)	−0.638 (1.101)	−2.020 (1.421)	−3.090 (2.411)	0.960 (4.509)	1.843 (11.999)
배우자 있음	24.952*** (9.678)	3.301** (1.539)	10.520*** (2.201)	15.033*** (3.897)	25.309*** (6.651)	52.528*** (17.411)
은퇴	−0.284 (5.155)	−2.521*** (0.813)	−0.392 (1.234)	−0.759 (1.878)	−3.831 (3.627)	3.821 (9.077)
자가소유	−3.950 (7.346)	2.526** (1.062)	0.167 (1.642)	−1.277 (2.428)	−6.974 (4.974)	−21.156 (13.990)
민간보험	4.417 (4.820)	0.641 (0.872)	2.974** (1.351)	2.128 (2.116)	6.560* (3.886)	9.194 (9.346)
가구연간소득(백 만원)	0.455*** (0.102)	0.068*** (0.023)	0.188*** (0.038)	0.319*** (0.050)	0.586*** (0.063)	0.728*** (0.212)
가구소득정보 무응답	16.414** (7.953)	1.317 (1.148)	2.715 (1.655)	6.502** (2.661)	22.461*** (6.567)	28.372** (12.849)
독거가구	−12.961 (10.878)	0.459 (1.597)	−0.689 (2.236)	−5.628* (3.416)	−13.796* (7.187)	−25.168 (18.318)
부부가구	8.473 (12.456)	3.788** (1.499)	1.442 (2.320)	3.796 (3.697)	9.582 (7.498)	16.134 (17.300)
부부 및 자녀 가구	−11.826 (8.733)	−2.615** (1.216)	−6.402*** (2.027)	−5.908* (3.127)	−6.529 (5.973)	−19.984 (14.930)
서울	−0.719 (7.884)	3.553*** (1.135)	4.554*** (1.346)	7.808*** (2.198)	6.569 (4.604)	−10.151 (10.217)
광역시	−22.865*** (5.805)	−1.840** (0.754)	−4.262*** (1.193)	−6.255*** (1.953)	−12.508*** (3.910)	−31.335*** (8.377)
상수	−76.495** (32.828)	−11.070** (5.001)	−21.036*** (7.010)	−21.713* (11.783)	−41.551** (20.841)	−95.059* (49.372)
관측치 수	8,617	8,617	8,617	8,617	8,617	8,617

주: 1) ( ) 안의 수치는 standard errors.
2) *** p〈0.01, ** p〈0.05, * p〈0.1.

먼저 OLS 결과를 살펴보면, 예상되었듯이 가구원 수, 성별, 학력, 건강상태, 배우자 존재, 소득, 주거지역 등을 통제하고서도 연령이 높을수록 의료비지출이 통계적으로 유의하게 크다. 한편, Quantile Regression의 결과를 보면, 분위수(quantiles)의 증가에 따라 연령의 계수가 증가한다.[18] 이러한 결과는 의료비 지출의 분포(distribution)가 연령이 증가할수록 점점 퍼져나가는 것을, 즉 이분산(heteroskedastic errors)의 존재를 의미한다(Angrist and Pischke[2009]).[19] OLS 결과 내 연령의 계수(1.247)는 Quantile Regression 결과 내 연령의 0.75분위수 계수(0.837)와 0.9분위수 계수(2.184) 사이의 크기이다.[20]

다른 주요 변수들의 결과를 살펴보면, 가구원 수가 늘어날수록, 여성이거나 고학력자일수록 의료비 지출이 높다. 또한 질환이 있거나 주관적으로 판단한 건강상태가 좋지 않을 경우에도 의료비 지출이 증가하며, 배우자와 함께 살거나 소득이 높을수록 의료비 지출이 통계적으로 유의하게 높다. 한편, OLS의 경우 노인가구원 수가 의료비 지출에 미치는 영향이 통계적으로 유의하지 않았던 반면에 Quantile Regression에서는 그 영향이 통계적으로 유의해진다. 반면에 여성이 의료비 지출에 미치는 영향은 OLS의 경우에만 통계적으로 유의하다.

---

18 Quantile Regression에서 Linear Conditional Quantile Function $Q_q(y|x) = x'\beta_q$에 대한 각 설명변수 (i)의 한계효과는 $\partial Q_q(y|x)/\partial x_i = \beta_{qi}$이다(Cameron and Trivedi[2009]). 한편, 0.1분위수와 0.5분위수의 계수 간 그리고 0.5분위수와 0.9분위수의 계수 간의 차이는 통계적으로 유의한 반면에, 0.25분위수와 0.5분위수의 계수 간 그리고 0.5분위수와 0.75분위수의 계수 간의 차이는 통계적으로 유의하지 않다.

19 Koenker and Bassett(1982)는 이분산(heteroskedastic errors)에 대한 테스트의 한 방법으로 Quantile regression을 개발하였다.

20 연령 대신에 연령의 2차항 혹은 3차항을 사용할 경우 연령의 통계적 유의성이 없어진다. 한편, 국민건강보험정책연구원의 『2009년 건강보험 고액환자 분석 보고서』에 의하면 건강보험 대상자 일만명당 진료비가 300만원이 넘는 고액환자 수는 연령별로 0~9세 114명, 10~19세 52명, 20~29세 92명, 30~39세 150명, 40~49세 285명, 50~59세 639명, 60~64세 1,134명, 65~69세 1,724명, 70~79세 2,433명, 그리고 80세 이상인 경우 2,590명으로 늘어난다. 또한 Cutler and Meara(1997)에 의하면, 미국 내 노인의료비의 증가는 고액환자의 의료비 지출의 증가에 기인하였다.

나. 사망 전 시기와 의료비 지출

연령과 더불어 사망 전 생애 마지막 시기가 의료비 수요에 미치는 영향을 분석하기 위한 모델은 종속변수인 의료비 지출의 특성을 고려하여 토빗(tobit)모형을 사용하였다.[21] 따라서 추정모형은 다음과 같다.

$$y^* = x\beta + u,\ \ u|x\ \sim Normal(0, \partial^2) = \max(0,\ y^*)$$

예를 들어, 의료비 지출 y는 잠재변수 y*가 0보다 크거나 같을 때 잠재변수와 같고 잠재변수 y*가 0보다 작을 경우에는 0이다.[22]

〈표 5〉에서 의료비 지출에 영향을 미치는 주요 변수들을 통제하고서 사망 전 시기가 의료비 지출에 미치는 영향을 살펴보면, 가구 내 노인가구원 수와 개인의 연령을 통제하고서도 2년 내 사망하는 사람이 있는 가구는 통계적으로 유의하게 그리고 경제적으로도 유의미하게 의료비 지출이 증가한다.

〈표 5〉 사망 전 시기(time until death)와 의료비 지출(Tobit model)

변수	(1)	(2)	(3)	(4)
노인가구원 수	15.987*** (5.830)	8.867 (6.202)	6.696 (6.732)	6.175 (6.850)
연령		1.035** (0.448)	0.936** (0.463)	0.937** (0.447)
2년 내 사망			74.606* (42.536)	
4년 내 사망				66.351** (32.754)
가구원 수	11.834** (4.922)	12.099** (4.906)	11.956** (4.940)	11.721** (4.945)
여성	4.130 (4.760)	9.506* (5.013)	9.468* (4.991)	9.858* (5.100)
초등학교	17.469** (8.221)	21.063** (8.698)	22.262** (8.707)	21.968** (8.745)

21 그러나 Angrist and Pischke(2009)는 일부 사람들의 경우 실제 의료비 지출이 없을 수 있어 개념이 모호한 의료비 지출의 잠재변수(latent variable)에 기초한 토빗모형의 문제점을 지적한다.

22 토빗모형에서 각 설명변수 (i)의 한계효과는 $\beta_i \Phi(x\beta/\sigma)$ 이다(Wooldridge[2006]).

〈표 5〉의 계속

변수	(1)	(2)	(3)	(4)
중학교	35.729*** (12.993)	40.581*** (13.017)	41.208*** (13.200)	40.971*** (13.106)
고등학교	27.319*** (9.378)	32.920*** (9.846)	33.173*** (9.857)	32.656*** (9.834)
대학교 이상	49.166*** (11.579)	54.022*** (11.952)	55.318*** (12.018)	55.072*** (12.022)
질환	33.062*** (5.525)	32.577*** (5.555)	32.002*** (5.363)	32.110*** (5.443)
좋지 않은 건강상태	26.387*** (5.584)	25.841*** (5.628)	25.103*** (5.399)	24.956*** (5.445)
가구주	−1.701 (5.309)	0.124 (5.190)	−0.094 (5.080)	0.262 (5.202)
배우자 있음	10.639 (12.043)	20.097 (12.957)	15.992 (13.000)	16.117 (12.735)
은퇴	2.266 (5.572)	1.931 (5.589)	2.671 (5.687)	3.194 (5.710)
자가소유	1.696 (10.150)	4.389 (10.208)	5.326 (10.256)	5.721 (10.262)
민간보험	6.417 (5.901)	8.658 (5.837)	7.393 (5.647)	8.007 (5.723)
가구연간소득(백만원)	0.419*** (0.107)	0.416*** (0.108)	0.415*** (0.108)	0.416*** (0.108)
민간보험	6.417 (5.901)	8.658 (5.837)	7.393 (5.647)	8.007 (5.723)
가구연간소득(백만원)	0.419*** (0.107)	0.416*** (0.108)	0.415*** (0.108)	0.416*** (0.108)
가구소득정보 무응답	17.573* (10.412)	17.736* (10.411)	17.005 (10.519)	17.357* (10.490)
독거가구	−10.130 (12.318)	−12.055 (12.370)	−7.441 (12.195)	−6.892 (11.709)
부부가구	23.913* (14.390)	19.993 (14.941)	25.016 (16.157)	24.877 (15.414)
부부 및 자녀 가구	−10.906 (9.381)	−13.129 (9.612)	−8.536 (9.112)	−7.602 (8.680)
서울	−1.307 (8.442)	−2.010 (8.426)	−0.615 (8.240)	0.252 (8.131)
광역시	−23.442*** (6.948)	−23.760*** (6.930)	−23.396*** (6.843)	−23.409*** (6.860)
상수	−11.668 (19.381)	−86.826** (34.818)	−83.193** (34.965)	−84.574** (34.836)
Log-pseudolikelihood	−79244211	−79239411	−79202820	−79199712
관측치 수	8,508	8,508	8,508	8,508

주: 1) ( ) 안의 수치는 standard errors.
2) *** p〈0.01, ** p〈0.05, * p〈0.1.

또한 2년 내 사망하는 사람을 포함한 4년 내 사망하는 사람이 있는 가구의 경우에도 의료비 지출이 통계적으로 유의하게 증가한다. 따라서 개인의 연령 혹은 가구 내 노인가구원 수도 가구의 의료비 지출에 영향을 미치지만 가구 내 사망하는 사람의 존재 유무가 의료비 지출에 큰 영향을 미침을 알 수 있다.[23]

다른 주요 변수들이 의료비 지출에 미치는 영향을 살펴보면 가구원 수가 늘어날수록, 여성일수록, 고력학자일수록 의료비 지출이 높다. 또한 질환이 있거나 주관적으로 판단한 건강상태가 좋지 않을 경우에도 의료비 지출이 증가하며, 소득이 높을수록 의료비 지출이 통계적으로 유의하게 높다.

한편, 노인이 있는 가구의 의료비 지출은 노인이 없는 가구의 의료비 지출과 다를 수 있으므로 〈표 6〉에서는 추정표본을 노인이 있는 가구로 한정하여 위의 각 변수들이 의료비 지출에 미치는 영향을 분석하였다. 그 결과를 살펴보면, 개인의 연령과 특히 가구 내 노인가구원 수가 의료비 지출에 통계적으로 유의한 영향을 끼치며 사망 전 시기는 의료비 지출에 통계적으로 유의한 영향을 미치지 못한다. 따라서 노인가구의 경우 다른 조건이 일정하다면 사망 전 시기에 의료비 지출을 늘리지 않는 다. 그 외 변수들 가운데서는 가구원 수나 여성 여부는 의료비 지출에 더 이상 통계적으로 유의한 영향을 미치지 않으며, 학력, 건강, 소득은 여전히 의료비 지출에 통계적으로 유의한 영향을 미친다.

〈표 6〉 노인가구 내 사망 전 시기(time until death)와 의료비 지출(Tobit model)

변수	(1)	(2)
연령	1.100* (0.635)	1.081* (0.604)
2년 내 사망	21.289 (18.601)	
4년 내 사망		26.972 (19.316)
노인가구원 수	20.408** (9.714)	19.920** (10.049)
가구원 수	6.253 (4.745)	6.127 (4.803)

23 모든 통계치는 가구 내 의사결정이 서로 영향을 받을 수 있음을 고려한 통계치(robust standard errors, adjusted for within household clustering)이며, 표본가중치(sample weight)가 또한 적용되었다.

〈표 6〉의 계속

변수	(1)	(2)
여성	6.668 (6.065)	6.825 (6.047)
초등학교	32.130*** (8.410)	32.151*** (8.549)
중학교	39.695*** (11.229)	39.569*** (11.254)
고등학교	46.006*** (11.753)	45.705*** (11.697)
대학교 이상	72.288*** (16.712)	72.572*** (16.749)
질환	27.409*** (5.443)	27.466*** (5.483)
좋지 않은 건강상태	24.510*** (6.415)	24.312*** (6.563)
가구주	−4.268 (4.969)	−4.299 (4.961)
배우자 있음	13.276 (13.751)	12.620 (13.131)
은퇴	−7.757 (5.725)	−7.400 (5.676)
자가소유	3.151 (9.094)	3.411 (9.137)
민간보험	−0.443 (9.182)	−0.151 (8.950)
가구연간소득(백만원)	0.888*** (0.258)	0.891*** (0.258)
가구소득정보 무응답	17.556 (10.865)	17.909 (10.892)
독거가구	−17.298 (17.803)	−15.893 (16.618)
부부가구	6.045 (16.046)	7.189 (14.797)
부부 및 자녀 가구	−15.992 (13.831)	−14.218 (12.650)
서울	11.736 (10.936)	12.655 (10.757)
광역시	−14.269* (8.484)	−14.567* (8.626)
상수	−89.356* (47.005)	−89.172* (46.586)
Log-pseudolikelihood	−38749938	−38746253
관측치 수	4,834	4,834

주: 1) ( ) 안의 수치는 standard errors.
2) *** p<0.01, ** p<0.05, * p<0.1.

〈표 5〉와 〈표 6〉의 결과는 사망 전 시기(time until death)가 의료서비스 지출에 영향을 미치지만(노인이 있는 가구로 한정한 〈표 6〉의 결과와 같이) 사망 전 시기의 연령이 증가함에 따라 사망전 시기가 의료서비스 지출에 미치는 영향이 감소한다는 기존의 다른 연구 결과와 시사점이 같다(Norton[2000]; Lubitz and Riley[1993]). 따라서 〈표 7〉에서는 사망 전 시기의 연령이 의료비 지출에 미치는 영향을 직접적으로 보여준다. 즉, '2년 내 사망'의 더미변수와 사망한 사람의 나이의 곱인 변수(interaction variable)를 이용하여 사망 전 시기의 나이가 의료비 지출에 미치는 영향을 직접적으로 분석한다.

〈표 7〉 사망 전 시기의 연령과 의료비 지출(Tobit model)

변수	(1)	(2)
연령	1.027** (0.458)	1.061** (0.449)
2년 내 사망	88.089* (48.887)	
연령*2년 내 사망	−0.438* (0.257)	
4년 내 사망		79.083** (37.534)
연령*4년 내 사망		−0.409** (0.199)
노인가구원 수	6.067 (6.961)	5.318 (7.129)
가구원 수	11.953** (4.940)	11.734** (4.947)
여성	8.555* (4.752)	8.727* (4.849)
초등학교	22.017** (8.720)	21.716** (8.764)
중학교	41.086*** (13.155)	40.884*** (13.080)
고등학교	33.115*** (9.860)	32.612*** (9.839)
대학교 이상	55.293*** (12.011)	55.065*** (12.017)
질환	32.107*** (5.395)	32.280*** (5.489)

〈표 7〉의 계속

변수	(1)	(2)
좋지 않은 건강상태	25.297*** (5.451)	25.243*** (5.509)
가구주	−1.046 (4.782)	−0.869 (4.919)
배우자 있음	14.963 (13.103)	14.789 (12.839)
은퇴	2.494 (5.672)	3.012 (5.697)
자가소유	4.930 (10.231)	5.266 (10.228)
민간보험	7.379 (5.649)	8.127 (5.739)
가구연간소득(백만원)	0.415*** (0.108)	0.416*** (0.109)
가구소득정보 무응답	16.934 (10.522)	17.309* (10.492)
독거가구	−7.683 (12.199)	−7.243 (11.725)
부부가구	25.808 (16.388)	25.888* (15.652)
부부 및 자녀 가구	−7.524 (9.085)	−6.322 (8.637)
서울	−0.551 (8.231)	0.310 (8.125)
광역시	−23.332*** (6.829)	−23.397*** (6.859)
상수	−86.755** (35.183)	−89.759** (35.355)
Log−pseudolikelihood	−79200990	−79197508
관측치 수	8,508	8,508

주: 1) ( ) 안의 수치는 standard errors.
2) *** p〈0.01, ** p〈0.05, * p〈0.1.

그 결과를 살펴보면, '2년 내 사망'의 더미변수와 사망한 사람의 나이의 곱인 변수(interaction variable)의 계수가 통계적으로 유의한 값(−0.438)으

로 사망 전 시기의 나이가 많을수록 의료비 지출이 통계적으로 유의하게 적어진다. 두 번째 행에서의 '4년 내 사망'의 더미변수를 이용한 경우에서도 통계적으로 유의한 값(-0.409)으로 유사한 결과를 보인다. 그러므로 사망 전 시기에 의료서비스 지출이 증가하지만 그 영향은 사망 전 시기의 연령이 증가함에 따라 감소한다.[24]

4. 결 론

고령으로 인한 질병으로 심각한 의료비 지출과 그에 따른 경제적 파산의 위험에 노출되어 있는 노인인구는 사망률의 감소로 매년 늘어나고 있다. 이러한 노인인구수와 전체 인구 가운데 노인인구 비중의 증가는 우리나라의 경우 건강보험과 의료급여 재정에도 심각한 문제가 될 수 있다. 본 연구는 건강보험과 의료급여 내 노인진료비의 추이를 분석하며, 연령이 의료비 분포에 미치는 영향과 연령과 사망 전 시기가 의료비 지출에 미치는 영향을 분석하였다.

먼저, 우리나라 건강보험의 노인진료비는 1999년 이후 지속적으로 증가하여 2009년에는 11조 138억원(2005년=100)으로 전체 진료비 가운데 31.58%를 차지하였다. 한편, 노인들 가운데 상당수는 저소득 빈곤층으로 의료급여의 혜택을 받고 있으며, 의료급여의 노인진료비도 2001년 이후 지속적으로 증가하여 2009년에는 1조 7,432억원(2005년=100)으로 전체 진료비의 41.4%를 차지하였다. 이러한 노인진료비의 증가를 성별로 나누어 살펴보면 여자 노인의 진료비가, 의료서비스의 종류별로 나누어 살펴보면, 2000년 의약분업 이후 외래서비스와 의약품에 비해 입원서비스의 진료비가 크게 증가하였다.

---

24 한편, OLS결과를 추가적으로 살펴보면, '2년 내 사망'의 더미변수와 사망한 사람의 나이의 곱인 변수(interaction variable)의 계수가 통계적으로 유의한 값인 -.44(std. err.=0.257)이며, '4년 내 사망'의 더미변수를 이용한 경우에서도 통계적으로 유의한 값인 -.407(std. err.=0.199)로 유사한 결과를 보인다. 사망전 시기의 연령이 증가함에 따라 의료비 지출이 감소하는 이유는 의료서비스 제공자가 상대적으로 고 연령의 사망전 환자에게 의료서비스를 덜 사용하려는 경향이 있거나, 고연령자의 경우 질병사보다는 자연사일 가능성이 높기 때문일 수 있다(Cutler and Sheiner[2001]).

또한 우리나라 중·고령자 의료비 지출의 분포를 직접 살펴보면 평균값이 중위값보다 큰 오른쪽으로 치우친 분포를 보인다. 한 걸음 더 나아가, Quantile Regression을 이용하여 연령이 의료비 지출의 분포에 미치는 영향을 살펴보면, 분위수(quantiles)의 증가에 따라 연령의 계수(coefficient)가 증가함을, 즉 의료비 지출의 분포가 연령이 증가할수록 점점 퍼져나가는 결과를 보였다.

마지막으로, 연령과 더불어 사망 전 시기가 의료비 지출에 미치는 영향을 분석한 결과, 사망 전 시기가 의료비 지출에 큰 영향을 미치며, 사망 전 시기의 의료비 지출에 미치는 영향이 사망 전 시기의 연령이 증가함에 따라 감소하였다. 이러한 결과는 출생 후 시기인 연령보다는 사망 전 시기가 의료서비스 수요의 주요 설명요인이라는 기존의 다른 연구들의 결과와 같다(Fuch[1984]; Lubitz and Riley[1993]; Norton[2000]; Cutler and Sheiner [2001]).

인구 고령화가 노인가계와 국민건강보험의 재정에 미칠 위험이 지속적으로 제기되고 있는 상황에서 위의 연구 결과는 노인가계의 소득, 노인의 건강상태, 의료보험제도, 의료기술 등의 변화와 더불어 사망 전 생애 마지막 시기와 생애 마지막 시기의 연령이 노인의료비 지출을 결정하는 중요한 요인임을 의미한다. 따라서, 노인 사망률의 지속적인 감소로 인해 사망 전 시기에 있는 노인들의 수가 감소하고 사망 전 시기의 연령이 증가하고 있음이 관련 보건의료정책에서 고려되어야 한다.[25] 또한 노인 고액 환자 수의 증가와 오른쪽으로 치우친 노인의료비 분포의 특성을 고려할 때 일부 노인은 심각한 의료비 지출의 위험에 노출되어 있으므로 노인가계와 정부는 이러한 위험에 대비하여야 한다.

---

25 예를 들어, Stearns and Norton(2004)의 연구는 의료비 지출의 추계에 사망 전 시기가 반영되어야 함을 지적한 다. 그들의 연구에 의하면, 사망 전 시기를 고려하지 않은 경우의 의료비 지출의 추계는 사망 전 시기를 고려하였을 경우보다 약 9% 높다.

참고문헌

김미숙 외, 『고령화사회의 사회경제적 문제와 정책대응방안: OECD 국가의 경험을 중심으로』, 연구보고서 2003-14, 한국보건사회연구원, 2003.

보건복지부, 『2008년 국민기초생활보장 수급자 현황』, 2009.

정완교, 『고령화와 의료서비스 비용』, 정책연구시리즈 2010-05, 한국개발연구원, 2010.

정우진, 「인구고령화에 따른 국민건강보험 진료비 및 정부재정 지원규모 중·장기 예측」, 윤희숙 편, 『인구고령화와 보건·의료』, 경제·인문사회연구회 협동연구총서 05-10-03, 한국개발연구원, 2005.

정형선, 「인구고령화와 의료비」, 『보건경제와 정책연구』, 제13권 제1호, 한국보건경제·정책학회, 2007, pp.95~116.

최성은, 『의료급여 재정모형과 재정지출 전망』, 연구보고서 2008-23-4, 한국보건사회연구원, 2008.

최준욱·전병목, 『인구고령화와 재정-인구구조 고령화의 경제·사회적 파급효과와 대응과제』, 경제사회연구회 소관 연구기관 협동연구시리즈 04-07, 한국조세연구원, 2004.

Angrist, J. D. and J. Pischke, *Mostly Harmless Econometrics-An Empiricist's Companion*, Princeton University Press, 2009.

Cameron, A. C. and P. K. Trivedi, *Microeconometrics-Methods and Applications*, Cambridge University Press, 2005.

Cameron, A. C. and P. K. Trivedi, *Microeconometrics Using Stata*, Stata Press, 2009.

Costa, D. L., "Long-Term Decline in Disability among Older Men: Medical Care, Public Health, and Occupational Change," NBER Working Paper 7605, Cambridge, MA: National Bureau of Economic Research, 2000.

Cropper, M. L., "Health, Investment in Health, and Occupational Choice," *Journal of Political Economy*, Vol. 85, 1977, pp.1273~1294.

Cutler, D. M. and E. Meara, "The Medical Costs of the Young and Old: A Forty Year Perspective," NBER Working Paper 6114, Cambridge, MA: National Bureau of Economic Research, 1997.

Cutler, D. M. and L. Sheiner, "Demographics and Medical Care Spending: Standard and Non-Standard Effects," in Alan Auerbach and Ron Lee (eds.), *Demographic Change and Fiscal Policy*, Cambridge University Press, 2001.

Dranove, D. and M. L. Millenson, "Medical Bankruptcy: Myth Versus Fact," *Health Affairs*, Vol. 25, No. 2, February 2006, pp.w74~w83.

Fuchs, V. R., "Though Much Is Taken: Reflections on Aging, Health, and Medical Care," *Milbank Memorial Fund Quarterly*, Vol. 62, No. 2, Spring 1984, pp.143~166.

Fuchs, V. R., "Provide, Provide: The Economics of Aging," NBER Working Paper 6642, Cambridge MA: National Bureau of Economic Research, 1998a.

Fuchs, V. R., "Health Care for the Elderly: How Much? Who Will Pay For It?" NBER Working Paper 6755, Cambridge, MA: National Bureau of Economic Research, 1998b.

Grossman, M., "On the Concept of Health Capital and the Demand for Health," *Journal of Political Economy*, Vol. 80, No. 2, 1972, pp.223~255.

Himmelstein, D. U., E. Warren, D. Thorne, and S. Woolhandler, "Illness and Injury As Contributors to Bankruptcy," *Health Affairs*, Vol. 24, 2 February 2005, pp.w5.63~73.

Jones, R. S., "Health-Care Reform in Korea," OECD Economics Department Working Papers, No. 797, OECD, 2010.

Kim, H. and J. Ruger, "Pharmaceutical Reform in South Korea and the Lessons It Provides," *Health Affairs*, Vol. 27, No. 4. 2008.

Koenker, R. and G. Bassett, "Robust Tests for Heteroscedasticity based on Regression Quantiles," *Econometrica* 50, 1982, pp.43~62.

Lubitz, J. and G. F. Riley, "Trends in Medicare Payments in the Last Year of Life," The New England *Journal of Medicine*, Vol. 328, No. 15, 1993, pp.1092~1096.

Marshall, S., K. M. McGarry, and J. S. Skinner, "The Risk of Out-Of-Pocket Health Care Expenditure at End of Life," NBER Working Paper 16170, Cambridge MA: National Bureau of Economic Research, 2010.

Newhouse, J. P., “Medical Care Costs: How Much Welfare Loss?” *The Journal of Economic Perspectives*, Vol. 6, No. 3, 1992, pp.3~21.

Norton, Edward C., “Long-Term Care,” in A. J. Culyer and J. P. Newhouse (eds.), *Handbook of Health Economics*, Chapter 17, North Holland, 2000, pp.956~ 994.

OECD, *Pension at a Glance*, 2009.

Stearns, S. C. and E. C. Norton, “Time to Include Time to Death? The Future of Health Care Expenditure Predictions,” *Health Economics*, Vol. 13, No. 4, 2004, pp.315~327.

Sanderson, W. and S. Scherbov, “Rethinking Age and Aging,” *Population Bulletin*, Vol. 63, No. 4, December 2008.

Wooldridge, M. J., *Introductory Econometrics*, 3rd edition, Thomson/ South Western, 2006.

CHAPTER 9

The Role of Foreign Banks in Monetary Policy Transmission: Evidence from Asia during the Crisis of 2008-09

by
*Bang Nam Jeon**
(Drexel University, Philadelphia, PA, USA)
Ji Wu
(Penn State University, Harrisburg, PA, USA)

Abstract

Since the 1997-8 Asian financial crisis, the level of foreign bank penetration has increased steadily in Asian banking markets. This paper examines the impact of foreign banks on the monetary policy transmission mechanism in emerging Asian economies during the period from 2000 to 2009, with a specific focus on the global financial crisis of 2008-9. We present consistent evidence that on the whole, an increase in foreign bank penetration weakened the effectiveness of the monetary policy transmission mechanism in the host emerging Asian countries during crisis periods. We also investigate various conditions and environments, including the type of monetary policy shocks, the severity of shocks upon parent banks in global crisis, the dependence of parent banks on the wholesale funding market, country of origin of foreign banks, and entry modes, under which the effectiveness of

* Corresponding author. Department of Economics and International Business, Bennett S. LeBow College of Business, Drexel University, 3141 Chestnut Street, Philadelphia, PA 19104. Email: jeonbana@drexel.edu. Phone: (215) 895-2125, Fax: (215) 895-6975.

monetary policy transmission is reduced more severely due to the increasing presence of foreign banks in the emerging Asian banking markets.

1. Introduction

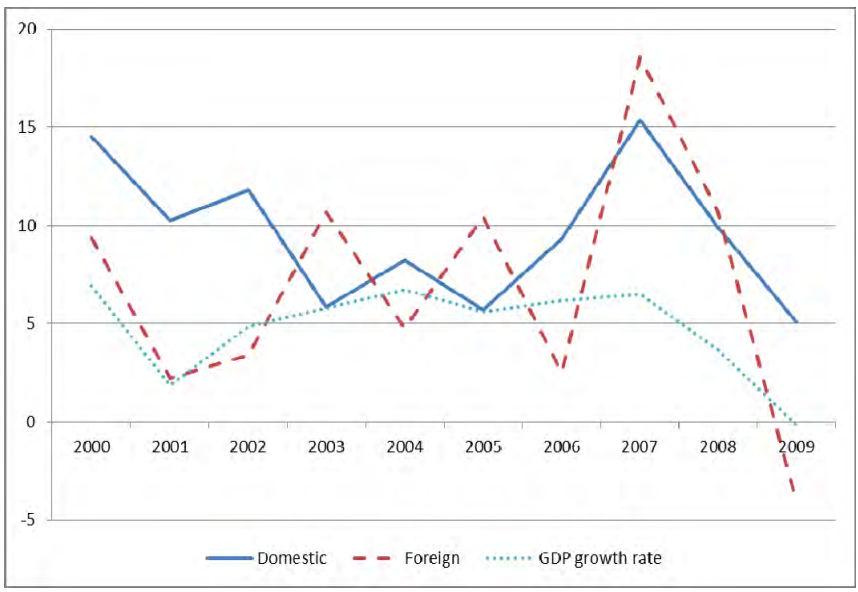
Since the 1997-8 Asian financial crisis, the banking system and domestic financial sectors in Asia have experienced significant structural changes and global integration. Domestic banks in Asia have become more consolidated, while they have faced more intensive competitive pressure from domestic and abroad. Through the efforts of opening up and international financial integration, with the policy recommendation from the International Monetary Fund, the presence of foreign banks has steadily increased. Between 1994 and 2009, emerging Asian banking markets have seen an increase in the level of foreign bank penetration from 17 percent to 25 percent when measured by the share of bank assets held by foreign banks, and from 26 percent to 43 percent when measured by the ratio of the number of foreign banks to the total number of banks in the host country.[1]

The recent global financial crisis of 2008-9 provides the first significant test for evaluating the stabilizing/destabilizing role of foreign banks in emerging Asia after experiencing a steady and substantial increase in foreign ownership in their banking sectors (Vogel and Winkler, 2011). Foreign banks are expected to enhance the financial stability of the host banking sector by providing an additional source of financing for lending. However, during the recent global financial crisis, it has been observed that many local subsidiaries of foreign banks in Asia reduced their credit by a larger extent than their domestic counterparts. The average growth rate of loans from foreign bank subsidiaries fell from 18.6% in 2007 to – 4.0% in 2009, while domestic

1 These ratios of foreign bank penetration are obtained from *BankScope* for selected emerging Asian economies, which include Hong Kong SAR, Indonesia, Korea, Malaysia, Philippines, Singapore, and Thailand. See Appendix 1.

banks only from 15.4% to 5.1% (see Figure 1).[2] Meanwhile, foreign banks' cross-border lending to Asian economies also decreased substantially during the 2008-9 crisis period (Figure 2). Since the collapse of Lehman Brothers in September 2008, foreign banks' cross-border claims to Asian economies were reduced by 127 billion dollars in six months, among which the shrinkage of the funds to Asian banks amounted to 69 billion.[3]

Figure 1 Average Loan Growth Rates of Domestic and Foreign Banks (year-on-year, in %), 2000-2009

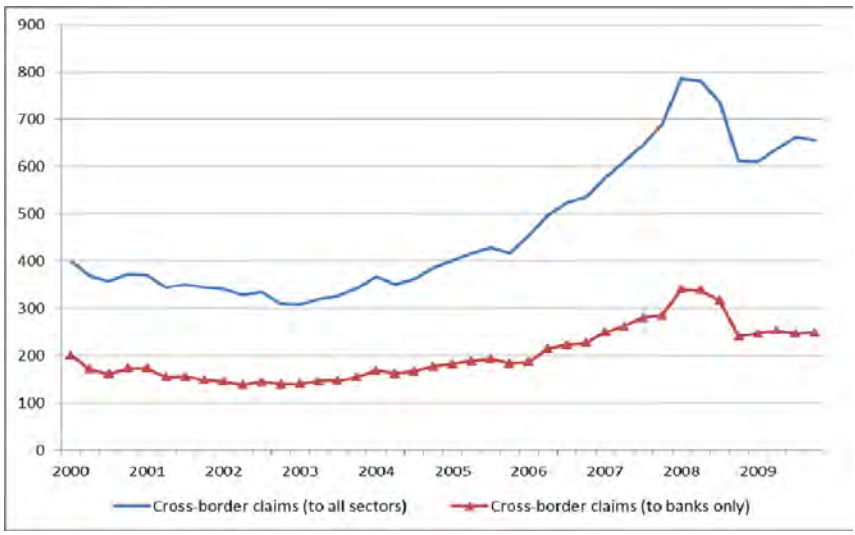


Note: Banks' loan and GDP are in real terms.
Source: BankScope, IFS and authors' own calculation.

2 The deeper reduction of foreign banks credit seems to be decoupled from the change in their deposits. In 2009, thanks to the expansionary monetary policy across Asian economies, foreign banks' deposits actually increased by 4.28% on average, although it is lower than domestic banks' average growth rate of 6.35%.

3 For a description on how Asian banking markets were affected by the financial turmoil in 2007, see McCauley and Zukunft (2008).

Figure 2 Foreign Banks' Cross-border Lending to the Asian Economies (in $billion), 2000-2009



Note: Foreign banks include all BIS reporting banks that have different nationality from host economies.
Source: BIS and authors' own calculation.

The volatility in the access to foreign credit brings up legitimate concerns about the advantages and disadvantages of foreign bank presence in host economies, in particular, at the time of credit contraction in host countries. The host economies in crisis actually need credit expansion to bail them out from the adverse international contagion effect of credit crunch spilled over from the origin country of financial turmoil. The accurate assessment of the impact of the increased foreign bank penetration into host emerging economies has been an important issue and has been called for by academicians as well as policymakers.

The proponents of foreign bank entry argue that foreign banks enhance competition in domestic banking markets, improve the efficiency of domestic bank operations, provide financial services with lower costs, and play a positive role in economic growth by boosting the efficiency of resource allocation (e.g., Clasessens *et al*., 2001; Crystal *et al*., 2002; Clasessens and Laven, 2005; Claessens and van Horen,

2009; Wu *et al*., 2010; Jeon *et al*., 2011). They also argue that foreign banks do not destabilize domestic banking markets nor distract the monetary policy transmission mechanism to a significant degree. They extend their argument further that foreign banks play a positive role to mitigate the credit crunch and banking crisis in host countries by bringing in additional liquidity from their headquarters in the home country (see, for example, De Haas and Lelyveld, 2010).

The opponents of the growing role of foreign banks are concerned that foreign banks lack hard information on the credit worthiness of smaller-size borrowers in local markets, tend to have higher interest margins and profitability than domestic banks in developing countries, and lead domestic banking markets to lower competition. They are also concerned about a sudden stop or reversal of capital and credits during difficult times, especially when the parent banks in home countries suffer from the credit crunch or capital loss. They present evidence that foreign banks are a major channel of the financial shock transmission or contagion, and pose a significant challenge to the effectiveness of monetary policy in host economies (see, for example, Jeon *et al*., 2012; Cetorelli and Goldberg, 2012a, 2012b).

However, extant literature reports only scarce (and even mixed) empirical evidence on the impact of foreign banks on the effectiveness of the monetary policy transmission in *host* economies. Wu *et al*. (2011) find evidence that foreign banks, compared to domestic counterparts, are less sensitive to changes in the host monetary policy in adjusting their loans and interest rate, even after controlling for the heterogeneity in liquidity, capitalization, size and cost efficiency at the individual bank level. Arena *et al*. (2007) also find difference between domestic and foreign banks in the loan growth rate and the lending interest rate in response to changes in monetary policy, but only as significant among lower liquid and capitalized banks. In addition, the research on the impact of foreign bank presence on the monetary policy transmission concentrates on Central and Eastern Europe and Latin America, but is still scanty for emerging Asian economies.

The insensitivity of foreign bank subsidiaries to host monetary policies might be explained by their parent banks' global-wide liquidity and assets management, especially when the global banks are hit by

various forms of financial stress. For example, the intra-group capital flows from U.S. banks' affiliates abroad to their head offices increased (or flows from head offices to their foreign affiliates decreased) when the liquidity condition is tightened in the U.S., as shown by Cetorelli and Goldberg (2010, 2011, 2012b). It was also reported that in 2008 and 2009, the U.S. branches of foreign banks used the Fed discount window actively to raise funds and channeled them back to their parent banks, thus alleviating the degree to which parent banks had to be engaged in "fire-sale" of assets to meet their liquidity demand. As a matter of fact, these reversed capital flows (from subsidiaries to parents) were not rare at the time of home crisis when head offices' uncertainty regarding their ability to meet capital requirement and maintain liquidity increased substantially.[4] Cross-border bank capital flows to emerging market economies were reversed considerably during the periods starting from the fall of Lehman Brothers to the second quarter of 2009. Foreign bank subsidiaries conduct assets transfer back to their parent banks through intra-group deposits and loans, off-balance sheet transactions, income flow (such as dividend), and internal transactions of other financial instruments, as reported by Vogel and Winkler (2011), Allen *et al*. (2011), and Giannetti and Laeven (2012).[5]

This upstreaming capital flow raises a question regarding the potency of host monetary policy, particularly the generally adopted expansionary policy in the context of the 2008-09 financial turbulence. Furthermore, had multinational banks reallocated, on a global basis, their liquidity and assets more concentratively toward their headquarters and reduced credit in host markets, the expansion in host money supply would have

---

4 Alternative reasons why multinational banks withdraw capital from oversea subsidiaries during crisis periods include that financial stress may cause banks less able to evaluate the creditworthiness of foreign borrowers, and as a result, engenders less foreign loans or a reversion of loans to domestic markets. Banks may also increase the share of domestic assets, by transferring resources from abroad, in order to increase the likelihood of being benefited from government bailout (Giannetti and Laeven, 2011).

5 Vogel and Winkler (2011), and some others, also find that the reverse of cross-border bank capital flows is not homogeneous across regions. Foreign banks in Eastern and Central Europe is found to be less affected by the shock on their parent banks' balance sheet, in contrast to foreign banks in other emerging market economies.

generated only less pronounced outcomes, particularly in the economies with higher foreign bank presence. Milesi-Ferretti and Tille (2011) observe that banks in advanced economies pull back their foreign investment remarkably during the global crisis period. This is done through both retrenching cross-border lending and oversea affiliates' activities in host countries, although the withdrawal via the latter displays a lower extent than the former. In emerging Asian markets, Mihaljek (2010) documents that banks reduced the growth of new loans and increased the holding of foreign bonds in 2009.

This paper examines the impact of increased foreign bank penetration on the monetary policy transmission mechanism in emerging Asian economies during the period from 2000 to 2009, with a specific focus on the recent global financial crisis. We specifically focus on the bank lending channel as the monetary policy transmission mechanism in seven Asian economies, namely, Hong Kong SAR, Indonesia, Korea, Malaysia, Philippines, Singapore, and Thailand.[6] Estimating the loan growth equation and loan interest rate equation, both of which control for bank-specific characteristics and demand factors using the bank-level panel data, allows us to identify the different effects of changes in host country monetary policy on lending by domestic banks and local foreign banks through the supply-side bank lending channel. We adopt different types of bank ownership—domestically owned vs. foreign owned—as an important factor of bank-specific characteristics affecting the capacity of financing for loans, along with other bank-specific characteristics including liquidity, capitalization, bank size, profitability, and levels of riskiness.

The main contributions of this paper are, first, to present consistent evidence on the buffering impact of foreign banks on the effectiveness of monetary policy in emerging Asian economies during the period of global financial crisis, and second, to identify specific conditions and environments under which that impact works more fully in the host banking markets, including the type of monetary policy shocks, the

6 The bank lending channel was pioneered by Bernanke and Blinder (1988, 1992) and further explored by Kashyap and Stein (1995, 2000), Kieshan and Opiela (2000), Gambacorta (2005), Cetorelli and Goldberg (2008), and many others.

severity of shocks upon parent banks during global crisis, the dependence of parent banks on wholesale funding markets, the country origin of foreign banks, and their entry modes. We also expect that the main findings of this paper will have useful policy implications for monetary authorities and bank regulators to minimize the adverse effects of the increasing presence of foreign banks on the stability and effectiveness of monetary policy in the region.

The remainder of this paper is organized as follows. Section 2 describes the model, data and methodology used in the study. Section 3 reports and discusses the empirical results, followed by robustness checks in section 4. Section 5 concludes.

2. The Model, Data and Econometric Methodology

2.1. The Model

We adopt the bank lending channel model for the estimation as follows:

$$\begin{aligned} Y_{i,j,t} = {} & c + \alpha \cdot Y_{i,j,t-1} + \beta \cdot mp_{j,t} + \chi \cdot crisis + \delta \cdot foreign_{i,j,t} + \phi \cdot mp_{j,t} \times crisis \\ & + \varphi \cdot foreign_{i,j,t} \times crisis + \gamma \cdot foreign_{i,j,t} \times mp_{j,t} + \eta \cdot foreign_{i,j,t} \times mp_{j,t} \times crisis \\ & + \lambda \cdot characteristics_{i,j,t} + \mu \cdot characteristics_{i,j,t} \times mp_{j,t} + \theta \cdot characteristics_{i,j,t} \times mp_{j,t} \times crisis \\ & + \rho \cdot hostmacro_{j,t} + f_{i,j} + \varepsilon_{i,j,t} \end{aligned}$$

where $Y_{i,\ j,\ t}$ represents the growth rate of loans (in real terms, loan growth equation) or the change in loan interest rates (loan rate equation) of bank *i* in country *j* in year *t*, and $Y_{i,\ j,\ t\text{-}1}$ is its one-year lag. $mp_{j,t}$ is the monetary policy shock of country *j* in year *t*, measured by the first-order difference of money market rates in year *t* relative to the previous year. A positive figure in $mp_{j,t}$ indicates a tightened monetary policy, while a negative value suggests that the central bank eases money supply. *crisis* is the dummy of global financial crisis in the year 2008-09, taking the fall of Lehman Brothers in September 2008 as the milestone of crisis. $foreign_{i,j,t}$ represents an ownership dummy, which is equal to 1 if bank *i*

in country j is foreign owned in year t, and otherwise 0. $characteristics_{i,j,t}$ is a vector of individual bank characteristics, including *liquidity*, *capitalization*, *size*, *riskiness* and *profitability*. To mitigate concern on the potential endogeneity between the dependent variable and bank characteristics, we use one-year lag values of the bank characteristics variables. $hostmacro_{j,t}$ includes a set of variables measuring the macroeconomic condition and the banking sector structure in the host Asian countries in our sample. $f_{i,j}$ is the time-invariant bank-specific effect, and $\varepsilon_{i,j,t}$ is the idiosyncratic error.

Following the literature of the bank lending channel, which suggests that banks play a non-neutral role in transmitting monetary policy, we expect the sign of the coefficient on $mp_{j,t}$ to be negative in the loan growth equation, implying that banks would reduce (increase) their lending in response to a tightened (relaxed) monetary policy due to their limited capacity to compensate for the reduced resources for lending after a contractionary monetary policy. We also expect that the coefficient on $mp_{j,t}$ in the loan rate equation has a positive sign, which implies that changes in interest rates by monetary authority are transmitted to changes in loan rates offered by individual commercial banks under its purview.

We introduce the following interaction terms to the estimation equation to detect the marginal effects of monetary policy conditional on the economic stress and bank ownership. We expect that $mp_{j,t} \times crisis$ will reflect the differences in the effectiveness of monetary policy during the 2008-09 crisis period relative to non-crisis, tranquil periods. The coefficient on $foreign_{i,j,t} \times mp_{j,t}$ will indicate if foreign banks show different responses to changes in monetary policy from domestic banks during non-crisis periods. In order to examine foreign banks' distinctive behavior in adjusting loan granting and loan rates during crisis periods from domestic banks, independent of host countries' monetary policy, we add the interaction term, $foreign_{i,j,t} \times crisis$.

We also include a 3-way interaction term, $foreign_{i,j,t} \times mp_{j,t} \times crisis$, to examine if foreign banks respond differently to changes in monetary policy during the 2008-09 crisis period. If global banks use internal capital markets to manage their assets and liquidity on a global scope and reallocate assets toward headquarters during the 2008-09 crisis

period, we expect the sign of the coefficient on $foreign_{i,j,t} \times mp_{j,t} \times crisis$ would be positive in the loan growth equation and negative in the loan rate equation. We interpreted it as the evidence that foreign banks only adjust their lending and price at a lower magnitude than their domestic peers, thus dampening the potency of the host monetary policy.

Since foreign banks may behave differently from domestic banks simply because of their different bank characteristics, say, *liquidity*, *capitalization*, and *size*, we include in our model the variables of bank-specific characteristics, separately and interactively with monetary policy and the crisis dummy. As the literature of the bank lending channel suggests, banks that are more liquid, more capitalized and larger in size would be less responsive to monetary policy shock due to their capacity of access to alternative options for financing loans. In addition to the above three most frequently cited bank characteristics, we also add the *riskiness* and *profitability* of individual banks and their interactions with monetary policy and crisis in the model. Banks facing more risky borrowers may be more aggressive to expand their loans (in order to compensate for their potential loss) when central banks increase the interest rate, thus offsetting the effectiveness of monetary policy. Banks with higher profitability, either due to owning more sophisticated management or serving clients with higher creditworthiness, are expected to have more stable financing sources and abilities to buffer the adverse effects of monetary policy shocks. To isolate foreign banks' distinctive responses to changes in monetary policy during the global crisis period, independent of their different bank characteristics, we interact the bank characteristics variables with $mp_{j,t}$ and *crisis*.

In order to control for the demand-side effects on bank credit from the demand side, we use a vector of host country macroeconomic variables, $hostmacro_{j,t,}$, which includes the real GDP growth rate and unemployment rate. Since banks' lending can also be affected by the banking sector structure, we also include market structure variables, including the financial depth variable, measured by the ratio of bank credit to the private sector to GDP, and the banking market concentration variable, measured by the Herfindal-Hirschman index (HHI) in each host Asian banking markets.

2.2. Data

We construct an unbalanced panel dataset using both bank-level data and macroeconomic data. The bank-level data are from Bureau van Dijk's *BankScope* database, which contains financial information (balance sheet data, income and expenses, ratios, and other annual financial data) on over 28,000 banks worldwide and covers on average more than 90% of banking sector assets worldwide.[7] We include only commercial banks in Asia in the dataset to reduce the possible bias due to the different nature and business scope among banks that have different objectives and conduct businesses in different specializations. The selected economies from Asia include: Hong Kong SAR, Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand, all of which have witnessed a high or an increasingly higher degree of foreign bank penetration among Asian countries. We use annual data for the period 2000 to 2009. The reason for starting at the year 2000 is to minimize the effects caused by the turmoil of the 1997-99 Asian financial crisis. We report the number of domestic and foreign banks in our data set and the level of foreign bank penetration, measured in terms of both assets and number, in Appendix 1.

A bank is defined as "foreign" if more than 50 percent of its capital is owned by foreign banks, firms or individuals.[8] To identify foreign-owned banks, we resort to various sources in addition to *BankScope*, taking the following steps. First, we check the brief overview of each bank recorded in *BankScope*, which identifies ownership for only some banks for limited years. Second, we review each bank's history from its

---

7 In the literature, the quality of *BankScope* data has been assessed as overall good. For example, using 1999 as a reference year, Cunningham (2001) observes that in 15 of 19 emerging market economies, *BankScope* data covers more than 90% of the total banking sector assets. The countries considered for the assessment are Argentina, Brazil, Chile, Colombia, Venezuela, Mexico, China, India, Indonesia, Korea, Malaysia, the Philippines, Taiwan, Thailand, the Czech Republic, Hungary, Poland, Russia and Turkey, many of which overlap with our country data set of Asia.

8 Most of the foreign banks in our dataset are foreign-owned subsidiaries. See Appendix 2 for the list of foreign banks in Asia in our data set.

own website. Third, we obtain banks' mergers and acquisitions (M&A) information using the *SDC Platinum* database. Finally, if ownership has not yet been identified after following these three steps, we resort to various other sources, such as banks' annual reports, central banks' publications, and news reports from the Internet. The list of parent banks and their subsidiaries operating in our selected Asian countries is shown in Appendix 2.

The constructions of other variables are quite standard by following the literature. The volume of loan is adjusted by using CPI to get its real value, and its growth rate is approximated by the first-order difference of its natural logarithms. We calculate the loan interest rate using end-of-year interest income divided by total earning assets, and then obtain their first-order differences to measure the banks' adjustment of their loan price.[9] Liquidity is calculated as the ratio of liquid assets to total assets, and capitalization is measured by the ratio of equity to total assets. The size in our model captures the relative dominance (share) of banks in banking markets, calculated as the ratio of a bank's assets to the entire banking sector assets in a host economy. Alternatively, we replaced this relative measure of size by an absolute measure, the natural log of assets (converted to constant US dollars), but our main results do not change. Riskiness is measured by using the ratio of loan loss provision to total loans, and profitability is represented by return on assets (ROA). HHI, as a measure of banking market competitive structure, is calculated as the sum of the square of an individual bank's market share.

In order to mitigate the effects of abnormally extreme and irregular values on the estimates, we drop the highest and lowest 1st percentile of total assets, growth rates of loans, liquidity, capitalization, riskiness and profitability. Additionally, we also remove the banks without at least 3 consecutive yearly observations. As a result, our dataset is composed of 1570 bank-year observations covering a total of 223 banks.

---

9 We are aware that the calculated loan interest rate is only an ex-post measure of banks' price of loans, but unfortunately, contractual (ex-ante) loan interest rates for individual banks are not reported in the *BankScope*, and the ex-post rates are only imperfect measures of the ex-ante rates, although they are highly correlated, as discussed in other studies.

Before we proceed to estimate the econometric model, it is worthwhile to conduct a simple analysis on the difference between foreign and domestic banks in Asian economies (Appendix 3). Domestic banks are observed to provide loans at a higher growth rate than foreign banks in terms of both mean and median. However foreign banks, although smaller in their market size, have higher liquidity and capitalization ratios and earn higher profits than their domestic counterparts. The identified distinction between foreign and domestic banks in their bank characteristics confirms the necessity to control for these factors in order to isolate foreign banks' different behavior caused by their foreign ownership. Since some of the bank characteristics variables may be correlated with each other, they may generate the problem of multicollinearity if included in the model simultaneously. Accordingly we examine the pair-wise correlation, and do not observe substantially high correlation between these variables.

2.3. Econometric Methodology

We estimate our empirical model using two alternative econometric methodologies, the fixed effects estimator and the system GMM estimator. In all estimations, we control for a full set of year-specific effects, and in the system GMM estimation we also control for the host country-specific effects.

The choice of fixed effects estimators is based on the Hausman test, which justifies that fixed effects are preferred over random effects because the regressors are shown to be correlated with the bank-specific variables. However, including the lagged dependent variable in the fixed effects estimation may cause inconsistent estimators when the time dimension is limited (Nickell, 1981). Accordingly, we drop the first-year lag of dependent variable in the fixed effects estimation.

To obtain unbiased, consistent and asymptotically efficient coefficients of the dynamic specification model which has a lagged dependent variable among the regressors, as in our cases of the loan growth equation and loan rate equation, we need to correct the possible endogeneity issue. To this end, we adopt the system GMM estimator,

following the methodology developed by Arellano and Bover (1995) and Blundell and Bond (1998), and use both level and differenced equations for estimation. It also instruments the lagged dependent variable by using lagged differences for the level equation and lagged levels for the differenced equation. We also obtain robust standard errors to correct for the heteroskedasticity across banks in the panel. Because the system GMM estimator requires no autocorrelation in the idiosyncratic errors, we test the first- and second-order autocorrelation in the first-differenced errors. We find that they are first-order serially correlated but not second-order serially correlated in most tests. This supports the moment conditions used by the system GMM estimator as valid. To test whether the instruments are as a group exogenous, we perform Hansen's *J*-test for overidentifying restrictions, and find that in almost all tests the null of the valid model cannot be rejected.

3. Empirical Results

3.1. Benchmark Estimation

We first examine how individual banks adjust their lending and loan interest rates in response to changes in monetary policy. Using the fixed effects estimator and the system GMM estimator, we estimate the loan growth equation and the loan rate equation. The estimation results for these two equations are reported in Tables 1 and 2.

As reported in Table 1, the benchmark estimations of the loan growth equation fit the data relatively well and the estimation results overall are reasonable. The coefficients on control variables, including bank characteristics and host country macroeconomic conditions and market structure, have expected signs with statistical significance overall. First, bank characteristics are shown to play important roles in determining a bank's loan growth, in particular, its liquidity and capitalization. A bank with higher liquidity and larger capitalization tends to increase its loans at a higher growth rate.[10] In line with Kishan and Opiela (2000) and

10 We find no conclusive evidence on the relevance of other bank characteristics to

Gambacorta (2005), we also find some evidence that the effects of monetary policy on bank loans are conditional on banks' capitalization. Undercapitalized banks seem to be more responsive to monetary policy shocks in adjusting the volume of their lending than well-capitalized banks.[11] However, we do not find any evidence that banks' characteristics may play a distinctive role in the impacts of monetary policy on banks' lending during the 2008-9 global financial crisis period. Second, macroeconomic conditions are shown to play a role in affecting a bank's loan growth in Asia. The higher the real GDP growth rate, the faster a bank's loan growth. But, the higher the unemployment rate, the slower a bank's loan growth. These macroeconomic variables control for the demand-side effect in determining a bank's loan growth at the macroeconomic level in host banking markets.

A negative sign of the coefficient on the foreign bank variable implies that loan growth is slower for foreign banks than for domestic banks. Negative coefficients on the interaction variable between *foreign* and *crisis* also imply that foreign banks' slow growth of loan becomes even slower during crisis periods. However, these interpretations need some caution because these coefficients are not statistically significant.[12]

---

banks' credit provision. Although the coefficient on size is negative and statistically significant in the fixed effects estimation, suggesting that large banks tend to have only a lower credit growth, the sign of the coefficient turns out to be positive and statistically insignificant in the system GMM estimation. Highly profitable banks also seem to increase their loans more than less profitable banks, but this is only supported by the positive and statistically significant coefficients on profitability in the fixed effects estimation. In the system GMM estimation, the statistical significance disappears and even the sign of the coefficient becomes reversed when all interaction terms are included.

11 The coefficient on the interaction term, *capitalization×mp*, in the loan growth equation estimation is highly significant in the fixed-effects estimation and only marginally not significant in the system GMM estimation. However, the coefficient on *capitalization×mp* is shown to be positive in the regression of the loan rate equation, suggesting more capitalized banks tend to charge higher prices to clients in the time of contractionary monetary policy.

12 The coefficient on *foreign×crisis* detects foreign banks' distinctive behavior during the crisis period, independent of the change in host monetary policy. The coefficient is found consistently negative, although insignificant, when using the growth rate of loans as the dependent variable. This seems to imply that foreign banks would

We next focus our discussion on the estimates of the loan growth equation associated with monetary policy and the heterogeneous impacts of monetary policy on domestic and foreign banks. First, we find evidence, as shown in Table 1, that banks reduce (increase) their credit in reaction to contractionary (expansionary) monetary policy. The coefficient on *mp* is negative and statistically significant in most of our estimations. As central banks tighten their money supply which leads to an increase in money market rates, banks tend to cut down the growth of their loans. In emerging and developing economies where firms are usually heavily dependent on banks to finance their investment, changes in monetary policy would greatly affect the credit available for firms and then impact their real output activities.

Second, during the *tranquil* periods, we do not find significant evidence that foreign banks differ from domestic ones in adjusting their loans in response to changes in monetary policy. The coefficient on *foreign*×*mp* shows mixed signs when using different estimation methodologies, and is not statistically significant in most of the regressions.

Third, the 3-way interaction term, *foreign*×*mp*×*crisis*, which is our most interested variable, shows a positive sign consistently in the estimation of the loan growth equation, and is statistically significant in almost all estimations.[13] This finding implies that foreign banks are less sensitive to monetary policy in adjusting the growth rate of their lending during crisis periods. This also indicates that there exists a dampening effect of foreign banks on the potency of monetary policy during the 2008-09 global financial crisis period.

---

retrench their credit during the 2008-9 global financial crisis period, even host monetary policy had not been changed. This finding may suggest foreign banks' increasing caution when they depend on potential borrowers' "hard information" to provide credit (Mian, 2003).

13 Since banks' characteristics may be highly correlated to each other, we also experimented to introduce the interaction terms of *characteristics* × *mp* × *crisis* progressively, and find the estimated coefficient on the interaction term, *foreign* × *mp* × *crisis*, is consistent with those reported and statistically significant in almost all regressions. The results are available from the authors upon request.

Table 1 The Effect of Changes in Monetary Policy on Loan Growth of Domestic and Foreign Banks in Asia, 2000-2009

Dependent variable:	Fixed effects		System GMM	
Δln(loans)i,j,t	(1)	(2)	(3)	(4)
$\Delta\ln(\text{loans})_{i,j,t-1}$			.052	.022
			(.443)	(.744)
foreign	-4.006	-5.023	-8.296	-2.635
	(.405)	(.288)	(.325)	(.757)
crisis	-4.371*	-5.443**	1.293	1.863
	(.070)	(.039)	(.698)	(.608)
mp	-.747**	-1.058	-1.303*	-2.963*
	(.018)	(.111)	(.082)	(.098)
foreign × crisis	-2.379	-2.320	-1.081	-3.137
	(.456)	(.438)	(.881)	(.656)
mp × crisis	.588	-1.492	-2.173	-3.971
	(.539)	(.544)	(.189)	(.462)
foreign × mp	-.728	-1.226**	.826	-1.152
	(.207)	(.031)	(.502)	(.293)
foreign × mp × crisis	2.716*	2.239	6.570**	6.955*
	(.083)	(.164)	(.024)	(.081)
Bank characteristics				
liquidity	.393***	.333***	.366***	.336***
	(.000)	(.000)	(.001)	(.002)
liquidity × mp		-.019*		.002
		(.098)		(.944)
liquidity × mp × crisis		.087		.010
		(.182)		(.935)
capitalization	.202	.426*	.768**	.712**
	(.323)	(.064)	(.016)	(.037)
capitalization × mp		.076***		.125**
		(.008)		(.045)
capitalization × mp × crisis		-.106		.170
		(.545)		(.674)
size	-1.142**	-1.142**	1.369	1.512
	(.036)	(.024)	(.188)	(.154)
size × mp		.035*		.109
		(.096)		(.513)
size × mp × crisis		-.115		.021
		(.175)		(.958)
riskiness	.259	.703*	-.313	1.148
	(.503)	(.074)	(.688)	(.221)
riskiness × mp		.090		.191**
		(.168)		(.014)
riskiness × mp × crisis		.080		.291
		(.898)		(.826)
profitability	1.140**	1.506***	.705	1.699*
	(.021)	(.003)	(.403)	(.089)
profitability× mp		-.037		-.129
		(.709)		(.306)
profitability × mp × crisis		1.243		.239
		(.129)		(.908)

Table 1 (Continue)

Dependent variable: Δln(loans)i,j,t	Fixed effects		System GMM	
	(1)	(2)	(3)	(4)
Host country macroeconomic conditions and market structure				
real GDP growth	.470**	.356**	.774***	.726***
rate	(.022)	(.040)	(.003)	(.001)
unemployment	-2.135**	-2.335***	-1.801	-1.721
	(.022)	(.010)	(.127)	(.257)
financial depth	-.019	-.063	-.244	-.259
	(.832)	(.502)	(.215)	(.211)
HHI	12.185	5.174	-109.98*	83.840
	(.795)	(.909)	(.055)	(.354)
year dummy	Yes	Yes	Yes	Yes
country dummy	No	No	Yes	Yes
observations	1,463	1,463	1,463	1,463
(banks)	(216)	(216)	(216)	(216)
R^2	.146	.166		
AR(1)/AR(2)			.000/.264	.000/.102
Hansen J test			.696	.472

Note: *p*-values are in parenthesis. ***: 1% significance level; ** 5% significance level; * 10% significance level.

Furthermore, the coefficient on *foreign*×*mp*×*crisis* is larger than that on *mp* plus *mp*×*crisis* (the latter of which is generally insignificant), suggesting that during the 2008-9 global financial crisis period, foreign banks actually responded to host monetary policy in a way opposite to domestic banks in the Asian countries of our sample. As an effort to bail out from a recessionary economy and credit-crunch stricken banks during the 2008-9 global financial crisis period, most monetary authorities in Asia adopted expansionary monetary policy in 2008 and 2009 (with exceptions in Indonesia and Korea in 2008)[14], which led to

14 Indonesia conducted a tight monetary policy in 2008 in order to ease the concern of inflation, which rose considerably from 6% to more than 12%. At the end of 2008, inflation still resided on a level higher than 11%. Korea increased its interest rate as well due to the rise of inflation. In 2008, inflation significantly exceeded the upper limit (2.5-3.5%) of the target zone for the first time since the introduction of inflation targeting in 1998. In July, inflation (measured by the rise of CPI) approached to 5.9%, causing the central bank, Bank of Korea (BOK), to increase its base rate in August by 25 basis points to 5.25%. However, since the effect of the unrest in international financial markets reached Korea in the 4th quarter of 2008, BOK changed its monetary policy direction toward expansionary monetary policy by lowering the BOK base rate. However, the overnights call rate increased slightly

an increase in loans by domestic banks (reflected by negative numbers for the sum of the coefficients on *mp* and *mp*×*crisis*). However, in contrast to the behavior of domestic banks, foreign banks have been observed only to cut down their lending (reflected by the sum of the coefficients on *mp*, *mp*×*crisis* and *foreign*×*mp*×*crisis*), resulting in less pronounced impacts of eased monetary policy on foreign banks' lending. This provides evidence that foreign banks in Asia weakened the effectiveness of the monetary policy transmission mechanism during the 2008-9 global financial crisis period.

Since we control for banks' different characteristics in our model, the weaker responses of foreign banks to changes in monetary policy should have been driven by reasons which are independent of banks' individual characteristics such as liquidity, capitalization, size, riskiness and profitability. As Cetorelli and Goldberg (2011) suggest, multinational banks manage their liquidity on a global base, such that the liquidity constraints and capital inadequacy in multinational banks during the global financial turmoil cause a "reversed" capital flow, via internal capital markets, from foreign subsidiaries in host countries to their headquarters in home countries. When host central banks relax their monetary policy, subsidiaries in the host country have more deposits available to lend and these resources can be reallocated toward the liquidity-seeking and capital-needing headquarters in the home country. As a result, subsidiaries reduce, rather than increase, their loans within the boundary of host countries in reaction to the expansionary monetary policy.

Table 2 reports the estimation results of the loan rate equation. In the test of how loan interest rates are affected by changes in monetary policy, the coefficient on *mp* in the loan rate equation estimation is shown to be consistently positive and statistically significant in all tests. This suggests that banks would also increase (decrease) their interest rate on loans as a contractionary (expansionary) monetary policy is conducted.

---

during the year of 2008. Relative to the previous year, 2008 overall was still a year of contractionary monetary policy. The Bank of Korea switched its monetary policy interest rate from overnight call rate targets to the BOK base rate in March 2008.

Table 2 The Effect of Changes in Monetary Policy on Loan Interest Rates of Domestic and Foreign Banks in Asia, 2000-2009

Dependent variable:	Fixed effects		System GMM	
$\Delta loan\ rate_{i,j,t}$	(1)	(2)	(3)	(4)
$\Delta \ln(loans)_{i,j,t-1}$			.015	-.052
			(.808)	(.420)
foreign	.073	.073	.570	.951
	(.826)	(.829)	(.625)	(.379)
crisis	.137	.126	-.524	-.424
	(.617)	(.651)	(.159)	(.251)
mp	.450***	.341***	.502***	.455**
	(.000)	(.000)	(.000)	(.034)
foreign × crisis	-.901***	-.899***	-1.027*	-1.093*
	(.001)	(.001)	(.068)	(.068)
mp × crisis	-.208**	-.168	-.084	-.818
	(.040)	(.377)	(.642)	(.111)
foreign × mp	-.058	-.129***	.011	.116
	(.208)	(.008)	(.930)	(.498)
foreign × mp × crisis	-.290**	-.263*	-.488*	-.670*
	(.026)	(.067)	(.086)	(.088)
Bank characteristics				
liquidity	-.006	-.007	-.009	-.007
	(.355)	(.327)	(.556)	(.612)
liquidity × mp		.000		.001
		(.796)		(.832)
liquidity × mp × crisis		.001		.012
		(.855)		(.375)
capitalization	-.050***	-.026	-.027	-.002
	(.007)	(.165)	(.310)	(.943)
capitalization × mp		.008***		.007
		(.008)		(.115)
capitalization × mp × crisis		.002		.013
		(.844)		(.410)
size	.049	.048	-.045	.001
	(.159)	(.169)	(.539)	(.980)
size × mp		-.002		.001
		(.276)		(.964)
size × mp × crisis		-.002		.044
		(.750)		(.322)
riskiness	-.058	-.037	-.001	-.172*
	(.219)	(.515)	(.981)	(.065)
riskiness × mp		.001		-.025***
		(.909)		(.006)
riskiness × mp × crisis		-.021		.206
		(.683)		(.185)
profitability	-.138**	-.094	-.063	-.242**
	(.020)	(.148)	(.500)	(.028)
profitability× mp		.006		-.021
		(.508)		(.155)
profitability × mp × crisis		-.046		-.081
		(.568)		(.527)

Table 2 (Continue)

Dependent variable: $\Delta loan\ rate_{i,j,t}$	Fixed effects		System GMM	
	(1)	(2)	(3)	(4)
Host country macroeconomic conditions and market structure				
real GDP growth rate	.016	.016	-.038*	-.014
	(.271)	(.282)	(.089)	(.473)
unemployment	-.033	-.051	-.399***	-.311**
	(.595)	(.426)	(.009)	(.029)
financial depth	-.006	-.008	.013	.012
	(.312)	(.143)	(.120)	(.102)
HHI	5.329	5.901	5.698	1.085
	(.181)	(.124)	(.168)	(.813)
year dummy	Yes	Yes	Yes	Yes
country dummy	No	No	Yes	Yes
observations	1,460	1,460	1,460	1,460
(banks)	(216)	(216)	(216)	(216)
R^2	.359	.374		
AR(1)/AR(2)			.000/.330	.000/.280
Hansen J test			.328	.362

Note : *p*-values are in parenthesis. ***: 1% significance level; ** 5% significance level; * 10% significance level.

The estimation results of the loan rate equation also show that during crisis periods, foreign banks do not lower their loan interest rates as much as domestic banks, insulating their clients from the increased liquidity provided by the central bank in the host country.[15] This is additional evidence that foreign banks reduce the effectiveness of the monetary policy transmission mechanism during crisis periods by responding to changes in monetary policy in adjusting their loan interest rates not as much as domestic banks.

To better understand the role of foreign banks in the transmission of monetary policy shocks in Asia, we conduct various additional empirical tests using the benchmark estimation equations. They are: (1) How do foreign banks respond differently from domestic banks to the different types of monetary policy shocks, i.e., easy monetary policy vs.

15 Acharya *et al*. (2011) also find that foreign banks borrowed more from the Fed's Term Auction Facility, lend less in the interbank market and charge higher interest rate on syndicated loan packages, although using the data of foreign banks in the U.S.

tight monetary policy? (2) How is the role of foreign banks different from that of domestic banks depending on the country of origin of foreign banks, i.e., Asian foreign banks vs. global foreign banks? (3) How do foreign banks respond to host country monetary policy differently depending on the extent to which their parent banks are affected by the global financial crisis of 2008-9? (4) How does parent banks' reliance on the wholesale funding market impact their subsidiaries abroad to host monetary policy? and (5) Are the roles of foreign banks in the monetary policy transmission affected by the different modes of entry to the host banking markets in Asia? We examine each of these issues.

3.2. Expansionary vs. Contractionary Monetary Policy

In this section, we divide domestic monetary policies into two phases: expansionary policy and contractionary policy. Most Asian central banks conducted expansionary monetary policy during the 2008-9 global financial crisis to insulate their domestic real economies from global financial retrenchment, with the exceptions of Indonesia and Korea in 2008 (see Table 3a). We examine if easy vs. tight monetary policies have heterogeneous effects on foreign banks' lending, and if foreign banks responded differently to the expansionary monetary policies conducted during the 2008-09 crisis period, compared with to the expansionary policies adopted during non-crisis periods. We divide our observations into two groups, depending on the type of monetary policy conducted by monetary authorities in the Asian countries in our sample. The estimation results are reported in Table 3.

When focusing on the case of expansionary monetary policies, we find that the estimation results reported in Panel A of Table 3 are consistent with our benchmark regression results reported earlier. The coefficient on $foreign \times mp \times crisis$ is positive and highly statistically significant in all regressions of the loan growth equation. This confirms the offsetting effects of foreign banks on the expansionary monetary policies conducted in the Asian economies during the global financial crisis of 2008-9. The estimation results on the loan rate equation, reported in Panel B, show that the coefficient on the 3-way interaction

Table 3 The Effect of Changes in Monetary Policy on Loan Growth and Loan Interest Rates of Domestic and Foreign Banks in Asia, 2000-2009: Expansionary vs. Contractionary Monetary Policy

	Panel A: Dependent variable: $\Delta ln(loans)_{i,j,t}$				Panel B: Dependent variable: $\Delta loan\ rate_{i,j,t}$			
	Fixed effects		System GMM		Fixed effects		System GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Expansionary policy								
mp	-1.074**	-1.940*	-.159	-3.064*	.533***	.550***	.386***	.354*
	(.029)	(.082)	(.822)	(.080)	(.000)	(.000)	(.000)	(.053)
foreign × mp	-1.163	-2.110**	.687	.256	-.057	-.154**	-.047	.042
	(.294)	(.022)	(.549)	(.844)	(.481)	(.029)	(.710)	(.729)
foreign × mp × crisis	7.680**	7.432**	7.305**	6.029*	-.334	-.332	-.653**	-.669*
	(.014)	(.017)	(.018)	(.096)	(.205)	(.175)	(.018)	(.073)
observations	874	874	874	874	872	872	872	872
(banks)	(202)	(202)	(202)	(202)	(202)	(202)	(202)	(202)
R2	.231	.261			.382	.416		
AR(1)/AR(2)			.000/ .780	.000/ .526			.000/.920	.000/.639
Hansen J test			.449	.516			.464	.543
Contractionary policy								
mp	2.086	2.562	-2.151***	-5.380*	.679***	1.031***	.609***	.811***
	(.247)	(.325)	(.007)	(.063)	(.000)	(.000)	(.000)	(.000)
foreign × mp	-6.601***	-7.183***	.823	2.190	-.331**	-.219*	-.027	-.065
	(.000)	(.000)	(.534)	(.420)	(.011)	(.067)	(.815)	(.739)
foreign × mp × crisis	.849	-.893	19.700*	11.175	.355	-.149	.638	.552
	(.794)	(.822)	(.099)	(.563)	(.250)	(.660)	(.303)	(.508)
observations	589	589	589	589	588	588	588	588
(banks)	(197)	(197)	(197)	(197)	(197)	(197)	(197)	(197)
R2	.163	.194			.183	.223		
AR(1)/AR(2)			.013/ .430	.042/.879			.005/.841	.012/.825
Hansen J test			.469	.708			.150	.189

Notes: To save space, we only report the most relevant variables. In all regressions, variables of bank individual characteristics, host macroeconomic conditions and banking market structure are included. In regression (2), (4), (6) and (8), the interaction of bank characteristics and monetary policy (*mp*) and 2008-09 crisis dummy are also included. *p*-values are in parentheses. ***: 1% significance level; ** 5% significance level; * 10% significance level.

Table 3a Monetary Policy Phases in Asian Countries, 2000-2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Hong Kong SAR	+	−	−	−	+	+	−	−	−	−
Indonesia	−	+	−	−	−	+	+	−	+	−
Korea	+	−	−	−	−	−	+	+	+	−
Malaysia	−	+	−	+	−	+	+	+	−	−
Philippines	+	−	−	−	+	+	+	−	−	−
Singapore	+	−	−	−	+	+	+	−	−	−
Thailand	+	+	−	−	−	+	+	−	−	−

Note: "+" represents contractionary monetary policy, and "-" denotes expansionary monetary policy.

term, *foreign*×*mp*×*crisis*, has a negative sign. This indicates a buffering effect of foreign banks on the monetary policy transmission in the interest rate, but only statistically significant in the system GMM estimation.

When we only use the sample of contractionary monetary policy, we find no evidence that foreign banks show different responses than domestic banks in 2008-09. This might be driven by fewer cases of conducting tight monetary policies during the 2008-9 global financial crisis period.

3.3. More Severely Affected Parent Banks vs. Less Severely Affected Parent Banks

As suggested by Cetorelli and Goldberg (2010), a lower response of foreign subsidiaries to changes in host country monetary policies during the 2008-09 global financial crisis may be caused by the reduced support from their parent banks in home countries. If so, it is expected that the foreign subsidiaries whose parent banks are more severely impacted by the 2008-9 global financial crisis would cut down their credit more aggressively than their peers whose parent banks are less affected. To test this, we divide foreign subsidiaries into two groups—the subsidiaries whose parent banks are more seriously impaired and others whose parent banks are impaired relatively less during the crisis period. A parent bank is characterized as more affected if the decrease

in its conglomerate assets lies within the lowest 10th percentile in the distribution of the growth of total assets of multinational banks during the period of 2000-09.[16, 17] In the estimation equation, we replace the previous dummy variable, *foreign*, by two new dummy variables, *foreign (parent more affected)* and *foreign (parent less affected)*, and add their interactions with *mp* and *crisis*.

The results, reported in Table 4, are consistent with our expectations. When using the growth rate of loans as the dependent variable, the coefficient on the 3-way interaction variable, *foreign (parent more affected)×mp×crisis* is positive and statistically significant in all regressions (Panel A). This finding implies that when facing an expansionary monetary policy adopted by host country central banks in Asia during 2008-09, the subsidiaries of multinational banks, which lost more assets during the crisis period, reduced their lending more greatly than the subsidiaries whose parent banks are less strained. This finding is consistent with Cetorelli and Goldberg (2010) who find that the crisis-hit multinational banks managed their assets on a global basis and thus caused a retrenchment worldwide.

For the subsidiaries whose parent banks are relatively less seriously affected, the coefficient on the 3-way interaction term, *foreign (parent less affected)×mp×crisis* is consistently positive but not statistically significant. This suggests that those foreign subsidiaries whose parents are less affected may also tend to reduce their credit, compared to their domestic counterparts, in response to an expansionary monetary policy. However, this behavioral divergence is unable to be detected with

---

16 Alternatively, we also split our sample of foreign banks using the criterion of whether their parent bank experienced a fall of total assets by more/less than 10 percent during the global crisis. The results are very similar to the results reported in Table 4. We also try dividing foreign subsidiaries simply by if their parent banks experience a fall in total assets. The results are still consistent and statistically significant. The subsidiaries whose parent banks are more impacted persistently show lower sensitivity to host monetary policy than not only their domestic counterparts but also the foreign subsidiaries whose parents are less impaired.

17 The foreign subsidiaries whose parent bank is more severely impacted by the global financial crisis include 9 from U.S., 6 from U.K., 5 each from Netherlands and Korea, 3 each from France and Germany, 2 each from Canada and Australia, and one each from Belgium, Indonesia, Malaysia and South Africa.

Table 4 The Effect of Changes in Monetary Policy on Loan Growth and Loan Interest Rates of Domestic and Foreign Banks in Asia, 2000-2009: Foreign Bank Subsidiaries whose Parent Banks are More Adversely Affected vs.Subsidiaries whose Parent Banks Are Less Affected

	Panel A: Dependent variable: Δln(loans)i,j,t				Panel B: Dependent variable: Δloan ratei,j,t			
	Fixed effects		System GMM		Fixed effects		System GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mp	-.671**	-1.142*	-1.000*	-2.795	.445***	.359***	.460***	.421*
	(.030)	(.096)	(.093)	(.115)	(.000)	(.000)	(.000)	(.080)
foreign (parent more	.764	.553	1.023	-.736	-.034	-.090	-.187	.007
affected)× mp	(.321)	(.427)	(.413)	(.597)	(.440)	(.136)	(.307)	(.967)
foreign (parent less	-1.277*	-	-.131	-1.500	-.060	-.101*	.106	.170
affected) × mp	(.068)	1.622***	(.913)	(.240)	(.283)	(.086)	(.574)	(.334)
		(.006)						
foreign (parent more	8.944***	7.938***	10.903**	10.374*	-.691**	-.743**	-1.103*	-1.314*
affected)× mp × crisis	(.001)	(.003)	(.023)	(.088)	(.020)	(.028)	(.092)	(.087)
foreign (parent less	1.412	1.128	2.751	4.095	-.222*	-.268*	-.614*	-.588
affected) × mp ×	(.443)	(.528)	(.400)	(.251)	(.093)	(.063)	(.078)	(.139)
crisis								
observations	1,463	1,463	1,463	1,463	1,460	1,460	1,460	1,460
(banks)	(216)	(216)	(216)	(216)	(216)	(216)	(216)	(216)
R^2	.168	.186			.362	.369		
AR(1)/AR(2)			.000/.419	.000/.125			.000/.570	.000/.174
Hansen J test			.697	.736			.303	.281

Note : To save space, we only report the most relevant variables. In all regressions, variables of bank individual characteristics, host macroeconomic conditions and banking market structure are included. In regression (2), (4), (6) and (8), the interaction of bank characteristics and monetary policy (*mp*) and 2008-09 crisis dummy are also included. *p*-values are in parentheses. ***: 1% significance level; ** 5% significance level; * 10% significance level.

statistical significance. Meanwhile, the coefficient on *foreign (parent more affected)×mp×crisis* is larger than that on *foreign (parent less affected)×mp×crisis*, which implies that the subsidiaries whose parent banks are less seriously affected are not as sensitive to changes in host country monetary policy as the subsidiaries whose parents are more seriously affected, compared to domestic banks as well as foreign peers.

In terms of changes in loan interest rates, as reported in Panel B of Table 4, the coefficients on *foreign (parent more affected)×mp×crisis* and *foreign (parent less affected)×mp×crisis* are, as expected, negative and statistically significant in almost all regressions. This suggests that the foreign subsidiaries whose parent banks are impaired by global financial crisis lowered their loan interest rates not as much as domestic banks, or even raised them, when host country central banks conducted an expansionary monetary policy during the crisis period. The coefficient on *foreign (parent more affected)×mp×crisis* is higher than that on *foreign (parent less affected)×mp×crisis*, and the sum of the coefficients on *mp* and *foreign (parent more affected)×mp×crisis* are negative. This indicates a raise in loan interest rates by the subsidiaries whose parent banks were affected by the 2008-9 global financial crisis more seriously, when host country central banks conduct an expansionary monetary policy during the crisis period. This pattern of loan interest rate adjustments by foreign banks would provide a hampering effect on the effectiveness of the monetary policy transmission mechanism during crisis periods.

3.4. More Wholesale Funding Dependent Parent Banks vs. Less Wholesale Funding Dependent Parent Banks

As the recent global financial crisis demonstrates, major banks sharply reduced their credit due to the dysfunction in wholesale funding markets. In this section, we examine how this illiquidity in wholesale funding markets would impact the Asian economies through foreign subsidiaries' lukewarm reaction to host monetary policy. Parent banks that were more dependent on bond and money markets as main funding sources of lending presumably incur illiquidity more seriously than others, and may withdraw funds more aggressively from their subsidiaries abroad, thus resulting in a lower response to host monetary policy.[18]

---

18 Consistent with the onset and development of the recent global financial crisis, Demirgüç-Kunt and Huizinga (2010) find that a predominant reliance on non-deposit funding in wholesale capital markets would result in higher banking riskiness.

Following Brei *et al*. (2011), parent banks' reliance on wholesale funding markets is measured by the share of total assets financed by non-deposits liabilities, i.e. total liabilities (excluding equity) minus total deposits. After calculating the average dependence on non-deposits liabilities for each parent bank during 2000-2007, we define a bank as highly wholesale funding market dependent if the ratio lies within the top 25th percentile of the distribution. We then replace the initial dummy *foreign* by using two other dummies, *foreign (high wholesale dependence)* for the subsidiaries of those highly wholesale-funding-market-dependent parent banks, and *foreign (low wholesale dependence)* for the other subsidiaries.[19] The regression results are reported in Table 5.

The results are in line with our expectations and the findings in Cetorelli and Goldberg (2012b).[20] The buffering effect of foreign banks on host monetary policy is found to be much stronger among foreign bank subsidiaries whose parent banks are more dependent on wholesale funding markets than those whose parent banks are less dependent on those markets. As reported in Panel A of Table 5, in the loan growth equation, the coefficient on the 3-way interaction term, *foreign (parent more dependent)×mp×crisis*, for the former group is statistically significant in all but one regression, while the coefficient for the latter group by contrast is statistically significant in only two of four estimations with mixed signs. Meanwhile, in terms of coefficient size, it is notably larger for subsidiaries whose parent banks are more wholesale funding dependent than others.

As shown in Panel B of Table 5, in the loan rate equation, the effect of monetary policy on loan interest rate also displays a similar pattern. The coefficient on the 3-way interaction term, *foreign (parent more*

---

19 The subsidiaries whose parent banks are higher in the wholesale funding dependence measure include 10 from U.S., 6 each from France, Netherlands, and U.K., 4 each from Germany and Korea, 3 from Japan, 2 from Australia, and 1 each from Belgium, South Africa, and Spain.

20 Cetorelli and Goldberg (2012b), using the data of foreign branches in the U.S. during the period of global financial crisis, find that the internal capital market transfer from branches to headquarters are stronger for the multinational banks with higher ex ante exposure to commercial paper market.

Table 5 The Effect of Changes in Monetary Policy on Loan Growth and Loan Interest Rates of Domestic and Foreign Banks in Asia, 2000-2009: Foreign Bank Subsidiaries whose Parent Banks are More Dependent on Wholesale Funding vs. Subsidiaries whose Parent Banks Are Less Dependent on Wholesale Funding

	Panel A: Dependent variable: Δln(loans)i,j,t				Panel B: Dependent variable: Δloan ratei,j,t			
	Fixed effects		System GMM		Fixed effects		System GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mp	-.687**	-1.226*	-1.156	-1.496	.447***	.336***	.432***	.419*
	(.028)	(.056)	(.151)	(.304)	(.000)	(.000)	(.000)	(.067)
foreign (parent more dependent)× mp	.225	-.416	1.345	-1.767	-.011	-.069	-.065	.046
	(.762)	(.612)	(.273)	(.182)	(.867)	(.328)	(.686)	(.811)
foreign (parent less dependent) × mp	-1.105	-	.435	-2.080*	-.074	-.155***	.142	.169
	(.122)	1.508**	(.789)	(.075)	(.158)	(.004)	(.380)	(.373)
		(.012)						
foreign (parent more dependent)× mp × crisis	6.156*	4.966	8.036*	9.981*	-.698**	-.837**	-1.120*	-1.304*
	(.066)	(.139)	(.092)	(.097)	(.023)	(.016)	(.067)	(.069)
foreign (parent less dependent) × mp × crisis	1.291	.912	6.084*	7.947*	-.157	-.128	-.285	-.269
	(.434)	(.581)	(.077)	(.059)	(.224)	(.332)	(.384)	(.498)
observations	1,463	1,463	1,463	1,463	1,460	1,460	1,460	1,460
(banks)	(216)	(216)	(216)	(216)	(216)	(216)	(216)	(216)
R^2	.159	.176			.366	.383		
AR(1)/AR(2)			.000/.179	.000/.103			.000/.473	.000/.145
Hansen J test			.703	.489			.226	.131

Note : To save space, we only report the most relevant variables. In all regressions, variables of bank individual characteristics, host macroeconomic conditions and banking market structure are included. In regressions (2), (4), (6) and (8), the interaction of bank characteristics and monetary policy (*mp*) and 2008-09 crisis dummy are also included. *p*-values are in parentheses. ***: 1% significance level; ** 5% significance level; * 10% significance level.

dependent)×mp×crisis, is statistically significant in all regressions, while the coefficient on *foreign (parent less dependent)×mp×crisis* is not statistically significant. The hampering effect of foreign banks in the monetary policy transmission mechanism in the interest rate channel is shown to be much greater among foreign bank subsidiaries whose

parent banks are more dependent on non-deposit wholesale market funding than among subsidiaries whose parents are less dependent on the wholesale markets as funding sources. Our findings shed some light on the parent banks' funding source channel via which the liquidity shock can propagate to emerging Asian economies through global bank networks, and have important policy implications on the need for international coordination among central banks to provide proper sources of wholesale market funding for global banks to maintain the effectiveness of the monetary policy transmission mechanism in the home and host countries. The Federal Reserve launched the liquidity swap line program in December 2007 to help other central banks have access to additional sources of U.S. dollar funding and replenish their short-term liquidity shortages.

3.5. Global Foreign Banks vs. Regional Foreign Banks

In this section, we examine if foreign banks' responses to changes in monetary policy in the host economy are homogeneous to the regional scope and country of origin of foreign banks, that is, whether their responses are different depending on the global vs. regional orientation of foreign banks.

We divide foreign banks into two groups according to the geographical range of the presence of their parents and affiliates. A foreign bank is defined as a "regional" bank if its headquarters is located in one of the Asian economies and its subsidiaries abroad are concentrated mainly in Asia. We define a foreign bank as "global" if its headquarters is registered outside the Asian countries and most of their foreign subsidiaries operate in continents other than Asia.[21] Since global foreign banks are expected to be more greatly integrated with international

---

21 The group of "regional" foreign banks is composed of 16 subsidiaries from Singapore, 12 from China and Malaysia respectively, 6 from Taiwan, 5 from Korea, 2 from India, and 1 from Indonesia, Macau, Philippines and Thailand. The "global" foreign banks include 14 subsidiaries from U.S., 11 from U.K and Japan respectively, 8 from Netherlands, 6 from France, 4 from Canada and Germany, respectively, 2 from Australia and South Africa, respectively, and 1 each from Belgium, Liechtenstein, Spain and Saudi Arabia.

capital markets, they might be affected more severely by the global financial crisis and then be forced to reallocate their assets toward their headquarters in the home country upon the pressure of replenishing liquidity and capital. This may result in more lukewarm responses of their foreign subsidiaries to changes in host monetary policy.

In order to test the heterogeneity of the impact of monetary policy on "regional" and "global" foreign banks, we replace the original dummy, *foreign*, by using two dummies, *foreign (regional)* and *foreign (global)*, and interact them with *mp* and *crisis*, respectively and jointly. The estimation results are reported in Table 6.

Table 6 The Effect of Changes in Monetary Policy on Loan Growth and Loan Interest Rates of Domestic and Foreign Banks in Asia, 2000-2009: Global vs. Regional Foreign Banks

	Panel A: Dependent variable: Δln(loans)i,j,t				Panel B: Dependent variable: Δloan ratei,j,t			
	Fixed effects		System GMM		Fixed effects		System GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mp	-.661**	-.940	-.976	-2.868	.448***	.342***	.499***	.454**
	(.035)	(.162)	(.138)	(.172)	(.000)	(.000)	(.000)	(.036)
foreign (regional)×	-.073	-.680	1.658	1.033	-.007	-.114**	.056	.081
mp	(.909)	(.277)	(.149)	(.520)	(.880)	(.042)	(.708)	(.593)
foreign (global) × mp	-1.390	-	-2.083	-3.310	-.113*	-.136**	-.035	.120
	(.108)	1.746**	(.266)	(.126)	(.081)	(.042)	(.872)	(.616)
		(.018)						
foreign (regional)×	.976	.970	5.368*	4.797	-.134	-.075	-.214	-.298
mp × crisis	(.585)	(.622)	(.075)	(.270)	(.304)	(.586)	(.501)	(.451)
foreign (global) × mp	4.184*	3.667	9.941*	8.808*	-.445**	-.454**	-	-
× crisis	(.062)	(.116)	(.069)	(.097)	(.029)	(.034)	1.003**	1.198**
							(.028)	(.026)
observations	1,463	1,463	1,463	1,463	1,460	1,460	1,460	1,460
(banks)	(216)	(216)	(216)	(216)	(216)	(216)	(216)	(216)
R^2	.156	.171			.365	.378		
AR(1)/AR(2)			.000/.1	.000/.0			.000/.4	.000/.3
			78	54			52	23
Hansen J test			.449	.503			.247	.219

Note: To save space, we only report the most relevant variables. In all regressions, variables of bank individual characteristics, host macroeconomic conditions and banking market structure are included. In regressions (2), (4), (6) and (8), the interaction of bank characteristics and monetary policy (*mp*) and 2008-09 crisis dummy are also included. *p*-values are in parentheses. ***: 1% significance level; ** 5% significance level; * 10% significance level.

We find that both regional and global foreign banks are shown to have a positive coefficient on the 3-way interaction term, *foreign (regional/global)×mp×crisis*, in the regression of the loan growth equation (Panel A, Table 6), and a negative coefficient in the regression of the loan rate equation (Panel B, Table 6). This suggests that both regional and global foreign banks alike adjust the quantity and price of their loans in response to changes in monetary policy in the host country in a way opposite to their domestic counterparts. However, the coefficients on the 3-way interaction terms are statistically significant only for global foreign banks. This provides consistent evidence that the hampering effects of foreign banks to the effectiveness of the monetary policy transmission mechanism in the Asian host economies are most conspicuous among global foreign banks during the global financial crisis of 2008-9. Those global banks seem to play a somewhat positive role during tranquil, non-crisis periods, evidenced by a negative coefficient on *foreign (global)×mp* in the loan growth equation, which implies a supportive role for the intention of monetary policy conducted by monetary authority in the host economy. However, this positive role played by global foreign banks during tranquil periods is shown to be reversed to an adverse role during crisis periods.

The same sign, but smaller size and lack of statistical significance of the coefficient on the 3-way interaction term for regional foreign banks implies that the foreign banks, which are from Asia and are concentrated in the region, are closely integrated with their host economies and do not act distinctively from domestic banks, compared with global banks, during the crisis period in terms of lending loans and setting loan interest rates. The foreign banks' adverse effect on the effectiveness of the monetary policy transmission during the 2008-9 global crisis is shown to be much greater for the non-Asian global foreign banks than the Asian regional foreign banks.

This finding is consistent with the evidence that the recent financial crisis originated in non-Asian developed countries and was transmitted to emerging Asian countries through the global banking channel. The policy implication of this finding is that to alleviate the (adverse) impact of foreign banks on the effectiveness of host country monetary policy during crisis periods of their home country, the host banking markets

need to encourage a diversification of the country of origin of foreign banks.

3.6. De Novo Foreign Banks vs. M&A Foreign Banks

Banks enter foreign markets by adopting different modes of entry, which might imply different types and extent of linkages between parent banks in the home country and their foreign subsidiaries in host countries. De novo (or greenfield-established) subsidiaries are expected to be more closely connected with their headquarters in the home country than foreign subsidiaries established through mergers and acquisitions (M&A).[22] If so, a foreign subsidiary that is de novo established would be affected more greatly than a subsidiary established in the host country through M&A by the shocks inflicted on the parent bank in the home country. De Haas and Lelyveld (2006, 2010) suggest that de novo subsidiaries might receive more financial support from their parent banks than M&A subsidiaries, and thus are more likely to be exposed to the financial contagion triggered by less financial resources available from their parent banks.

To examine if the role of foreign banks in the monetary policy transmission differs according to different modes of entry of foreign banks, we replace the dummy, *foreign*, by two dummies representing the different entry modes of foreign banks, *foreign (de novo)* and *foreign (M&A)*. As the liquidity shocks on parent banks cause a liquidity reallocation from foreign subsidiaries to their headquarters, we expect that de novo subsidiaries, which are closely tied to their headquarters, would be more insulated from domestic monetary policy in the host country than M&A foreign banks. We report the empirical results in Table 7.

---

22 It has been reported in the literature that greenfield subsidiaries are more closely integrated within the conglomerate, and have better access to funds from their parents or other subsidiaries (see, for example, De Haas and Lelyveld, 2006; Havrylchyk and Jurzyk, 2006). In contrast, M&A banks take the existing personnel and portfolio of the incumbent institutions and therefore, are typically less integrated within the conglomerate (Curry *et al*., 2003).

Table 7 The Effect of Changes in Monetary Policy on Loan Growth and Loan Interest Rates of Domestic and Foreign Banks in Asia, 2000-2009: De Novo vs. M&A Foreign Bank Subsidiaries

	Panel A: Dependent variable: Δln(loans)i,j,t				Panel B: Dependent variable: Δloan ratei,j,t			
	Fixed effects		System GMM		Fixed effects		System GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mp	-.652**	-1.310**	-1.039	-1.799	.444***	.322***	.434***	.379*
	(.037)	(.039)	(.181)	(.446)	(.000)	(.000)	(.000)	(.100)
foreign (de novo)× mp	-1.155*	-	1.090	-3.016**	-.071	-.154***	.088	.165
	(.090)	1.799***	(.466)	(.042)	(.209)	(.004)	(.536)	(.434)
		(.002)						
foreign (M&A) × mp	.306	.077	-.526	-1.547	-.028	-.070	-.094	-.050
	(.668)	(.910)	(.683)	(.275)	(.564)	(.240)	(.680)	(.833)
foreign (de novo)× mp	5.038**	4.631*	9.235*	8.330*	-.314*	-.368	-.802*	-.993*
× crisis	(.043)	(.076)	(.087)	(.073)	(.099)	(.132)	(.072)	(.094)
foreign (M&A) × mp ×	.085	-.674	6.804	2.058	-.287*	-.232	.085	.019
crisis	(.956)	(.671)	(.272)	(.558)	(.064)	(.136)	(.892)	(.976)
observations	1,463	1,463	1,463	1,463	1,460	1,460	1,460	1,460
(banks)	(216)	(216)	(216)	(216)	(216)	(216)	(216)	(216)
R^2	.156	.179			.366	.382		
AR(1)/AR(2)			.000/.727	.000/.070			.000/.368	.000/.315
Hansen J test			.157	.316			.252	.221

Note: To save space, we only report the most relevant variables. In all regressions, variables of bank individual characteristics, host macroeconomic conditions and banking market structure are included. In regressions (2), (4), (6) and (8), the interaction of bank characteristics and monetary policy (*mp*) and 2008-09 crisis dummy are also included. *p*-values are in parentheses. ***: 1% significance level; ** 5% significance level; * 10% significance level.

To be consistent with our expectations, in the loan growth equation as reported in Panel A of Table 7, the coefficients on the interaction term, *foreign(de novo)×mp*, are mostly negative and statistically significant, and the coefficient on the 3-way interaction term, *foreign(de novo)×mp×crisis*, is positive and statistically significant in all regressions. To the contrary, the coefficients on the 2-way and 3-way interaction terms for the M&A subsidiaries are mixed in sign and statistically insignificant in most regressions. This suggests that when central banks conduct expansionary monetary policy, greenfield foreign

bank subsidiaries increase their loans even more than domestic banks in the host countries during tranquil periods, but they actually curtail, instead of expand, their loans during the 2008-9 global financial crisis period when their parent banks in the home country suffer from a sharp fall in liquidity and capital. During crisis periods, de novo foreign subsidiaries are shown to inflict more conspicuous hampering effects on the host monetary policy than M&A foreign subsidiaries.

When using the change in loan interest rates as the dependent variable, the coefficient on *foreign(de novo)×mp×crisis* is negative and statistically significant in most all regressions (Panel B). This is interpreted as that during the crisis period, greenfield subsidiaries are reluctant to reduce, or even increase, their loan interest rate in response to expansionary monetary policy. From both perspectives of loan growth and loan interest rates, it is shown that host monetary policy only generates less pronounced effects on de novo foreign banks' lending than M&A foreign banks' lending. For M&A foreign subsidiaries, we do not find conclusive evidence that they respond differently from domestic banks to changes in host monetary policy during tranquil periods as well as crisis periods.

Many Asian countries have increased the extent of the liberalization of their banking sectors after the 1997-9 Asian financial crisis by allowing higher shares of foreign bank ownership via merging and acquiring domestic banks more often than establishing de novo foreign banks. Due to the heritage of management and customer pools from domestic predecessors, M&A foreign banks are expected be more deeply integrated with domestic banks and economies, and as a result, more likely affected by changes in domestic monetary policies than de novo foreign banks, but less affected by the contagion of adverse shocks afflicted on parent banks in the home country.

4. Robustness Tests

In this section we conduct various robustness tests to access whether our main findings on the role of foreign banks on the effectiveness of

the monetary policy transmission mechanism in the emerging and developing Asian countries are affected when further modification of the sample set or alternative measures or estimations are used for our analysis.

First, we use an alternative measure of the host monetary policy, which is the change in the interest rate adjusted by inflation, i.e. the variation in real interest rates. The results from using real terms, reported in Table 8, test 1, are consistent with our benchmark estimation results reported earlier for both changes in loan growth and loan interest rates in nominal term. This implies that as monetary policy is eased in real terms during the global financial crisis of 2008-9, foreign bank subsidiaries reduced, instead of increased, their loan provision and adjusted the price of their loans by a smaller magnitude than did domestic banks.

Second, we re-estimate the loan growth and loan rate equations after dropping the banks in Hong Kong SAR and Singapore from our sample. The reason is that since these two economies, as regional financial centers, serve not only local clients but also customers from other countries, the sensitivity of banks' lending and loan rates to domestic monetary policies may be different from banks in other Asian economies. In addition, the Hong Kong Monetary Authority adopts the Currency Board System for the stability of exchange rates, and does not conduct regular monetary policies. The results, as reported in Table 8, test 2, are consistent with our findings from the benchmark estimations that foreign banks buffer the effects of host monetary policies on bank lending during the global financial crisis of 2008-9. In the estimations of the loan growth equation, the coefficient on *foreign*×*mp*×*crisis* is positive and statistically significant in the system GMM estimations and only marginally not significant in the fixed effects estimations. And in the estimations of the loan interest rate equation, the coefficient on the three-way interaction term is negative and also statistically significant in most regressions. These robust estimation results confirm that our main findings are not driven by the banks which would be less policy responsive due to the global business scope beyond their host countries like Hong Kong and Singapore.

Table 8 Robustness Tests

	Panel A: Dependent variable: Δln(loans)i, j, t				Panel B: Dependent variable: Δloan ratei, j, t			
	Fixed effects		System GMM		Fixed effects		System GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Robustness test 1: alternative measure of monetary policy								
mp	-.840***	-1.103**	-.909**	-.452	.305***	.314***	.381***	.335***
	(.000)	(.021)	(.049)	(.652)	(.000)	(.000)	(.000)	(.003)
foreign × mp	-.553	-.894**	.284	-.457	-.032	-.064**	.022	.047
	(.175)	(.021)	(.735)	(.514)	(.245)	(.040)	(.721)	(.624)
foreign × mp ×	1.340**	1.136*	2.490*	3.487**	-.092**	-.048	-.203**	-.216*
crisis	(.031)	(.074)	(.059)	(.046)	(.045)	(.355)	(.018)	(.079)
observations	1,463	1,463	1,463	1,463	1,460	1,460	1,460	1,460
(banks)	(216)	(216)	(216)	(216)	(216)	(216)	(216)	(216)
R^2	.167	.193			.346	.359		
AR(1)/AR(2)			.000/.196	.000/.187			.000/.296	.000/.234
Hansen J test			.662	.555			.193	.202
Robustness test 2: without Hong Kong SAR and Singapore								
mp	-.580*	-1.027	-.236	-3.047	.470***	.447***	.386***	.449***
	(.076)	(.153)	(.735)	(.136)	(.000)	(.000)	(.000)	(.004)
foreign × mp	-.695	-1.510**	.441	-1.163	-.077	-.142**	.035	.117
	(.301)	(.015)	(.671)	(.281)	(.131)	(.013)	(.741)	(.389)
foreign × mp ×	2.458	2.413	7.858**	9.501**	-.270*	-.270*	-.453*	-.466
crisis	(.130)	(.162)	(.013)	(.021)	(.054)	(.083)	(.096)	(.174)
observations	1,134	1,134	1,134	1,134	1,134	1,134	1,134	1,134
(banks)	(161)	(161)	(161)	(161)	(161)	(161)	(161)	(161)
R^2	.184	.213			.379	.382		
AR(1)/AR(2)			.000/ .32 5	.000/ .23 9			.000/.317	.000/.224
Hansen J test			.890	.969			.871	.893
Robustness test 3: the extended crisis period of 2007-09								
mp	-.569*	-1.204*	-1.995*	-2.656	.444***	.314***	.503***	.421**
	(.082)	(.069)	(.065)	(.164)	(.000)	(.000)	(.000)	(.044)
foreign × mp	-.649	-1.223**	.557	-1.413	-.074	-.151***	-.006	.091
	(.292)	(.040)	(.701)	(.263)	(.119)	(.003)	(.962)	(.610)
foreign × mp ×	1.009	1.481	5.942*	4.988*	-.108	-.042	-.121	-.199
crisis	(.444)	(.283)	(.087)	(.081)	(.279)	(.687)	(.679)	(.522)

Table 8 (Continue)

	Panel A: Dependent variable: Δln(loans)i,j,t				Panel B: Dependent variable: Δloan ratei,j,t			
	Fixed effects		System GMM		Fixed effects		System GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
observations	1,463	1,463	1,463	1,463	1,460	1,460	1,460	1,460
(banks)	(216)	(216)	(216)	(216)	(216)	(216)	(216)	(216)
R^2	.145	.165			.349	.371		
AR(1)/AR(2)			.000/ .373	.000/ .132			.000/.330	.000/.337
Hansen J test			.292	.483			.341	.362
Robustness test 4: to add foreign × real GDP growth × crisis and foreign × unemployment × crisis								
mp	-.629*	-1.072*	-.696	-3.644*	.426***	.327***	.501***	.431*
	(.051)	(.088)	(.324)	(.052)	(.000)	(.000)	(.000)	(.053)
foreign × mp	-.773	-1.284**	-.170	-.641	-.035	-.103**	.013	.127
	(.145)	(.017)	(.886)	(.616)	(.435)	(.024)	(.914)	(.481)
foreign × mp ×	3.092*	3.006*	9.494***	7.331*	-.697***	-.655***	-.597*	-.838*
crisis	(.059)	(.087)	(.009)	(.078)	(.000)	(.000)	(.080)	(.068)
observations	1,463	1,463	1,463	1,463	1,460	1,460	1,460	1,460
(banks)	(216)	(216)	(216)	(216)	(216)	(216)	(216)	(216)
R^2	.156	.178			.371	.385		
AR(1)/AR(2)			.000/.266	.000/.167			.000/.439	.000/.126
Hansen J test			.586	.579			.336	.362

Note : To save space, we only report the most relevant variables. In all regressions, variables of bank individual characteristics, host macroeconomic conditions and banking market structure are included. In regression (2), (4), (6) and (8), the interaction of bank characteristics and monetary policy (*mp*) and 2008-09 crisis dummy are also included. *p*-values are in parentheses. ***: 1% significance level; ** 5% significance level; * 10% significance level.

Third, we extend the period of global financial crisis from 2008-9 to 2007-9 to take into account earlier episodes of financial turmoil even before Lehman Brothers collapsed in 2008. We find that the results are qualitatively consistent (Table 8, test 3) with our benchmark estimation results, but the coefficient on the 3-way interaction term is only statistically significant in the system GMM estimations for the loan growth equation. Most banks in Asia experienced credit expansion before the fall of Lehman Brothers, which seems to dampen the statistical significance of foreign banks' contractionary responses to monetary policy afterwards. Although not reported, we also experimented to divide the 2008-09 crisis dummy into two separate yearly dummies. It

is found that foreign banks' inert responses to changes in host monetary policy took place more during 2009 than 2008, implying that the foreign banks in the Asian economies were affected by the contagion of the recent global financial crisis from the U.S. and Europe rather gradually with the culminating effects realized in 2009.

Finally, it can be argued that foreign banks' reduction in loans during the crisis periods, when the central bank in the host country conducts an expansionary monetary policy, might be driven simply by the demand side. To test if this argument is true, we add four more regressors which account for macroeconomic-level demand factors by interacting *GDP growth rate* with *foreign* and *crisis*, and *unemployment* with *foreign* and *crisis*. If foreign banks reduce their loans because of the lowered demand during the crisis period, rather than the global reallocation of liquidity and capital from foreign bank subsidiaries in host countries toward their headquarters in the home country, the statistical significance of the coefficient on *foreign*×*mp*×*crisis* would diminish.

As shown in Table 8, test 4, we find that the estimation results are still consistent with our benchmark results. The coefficient on the interaction variable, *foreign*×*mp*×*crisis*, still shows an expected sign and is statistically significant in all regressions, not affecting our main findings from the benchmark estimations reported earlier. This lends support to our conjecture that, when parent banks suffer from reduced liquidity and limited access to alternative funding sources, foreign banks are forced to lower the growth of their loans in local markets due to a global reallocation of capital or liquidity toward headquarters in the home countries, rather than due to a weakened demand for foreign banks' loans from their customers in the host countries. This is true even when the central banks in the host countries conduct expansionary policies.

5. Conclusion

Although the level of penetration of foreign banks into the domestic banking sectors is observed to be on a steadily ascending trend in Asia, particularly in the wake of the 1997-98 Asian financial crisis, there has

not been much research that explores the impact of the foreign bank presence on the bank lending channel as a monetary policy transmission mechanism in the Asian emerging economies. This paper presents consistent evidence that there exist heterogeneous responses on loan growth and loan interest rates between domestic banks and foreign-owned banks in response to changes in monetary policy in the host emerging Asian economies during the recent global financial crisis of 2008-9.

We find that first, foreign banks overall do not show distinctive behavior from domestic banks in adjusting loan growth and loan interest rates in host Asian banking markets during non-crisis, tranquil periods, and second, during crisis periods, however, foreign banks play a buffering or even hampering role in affecting the monetary policy transmission mechanism by adjusting loan growth and loan interest rates in a way opposite to domestic banks. The empirical results are robust to various alternative measures, different sample countries and periods, and incorporating demand factors in the estimations. This finding is consistent with the proposition that, when global banks encounter liquidity shocks in their home countries, they conduct a global reallocation of liquidity from foreign subsidiaries in host countries to the parent banks in home countries using internal capital markets (Cetorelli and Goldberg, 2011; Jeon *et al*., 2012) As a result, global banks cause a dampening effect on the potency of monetary policy conducted by monetary authorities in the host countries of their subsidiaries overseas.

In addition, we present empirical evidence that the buffering effects of foreign banks in the Asian banking markets on the efficiency of monetary policy transmission during crisis periods become more conspicuous, (1) when an expansionary monetary policy, instead of a contractionary monetary policy, is conducted in the host countries; (2) for foreign banks whose parent banks in home countries are more adversely affected; (3) for foreign banks whose parent banks are more dependent on non-deposits, wholesale markets funding; (4) for global foreign banks more than Asia-regional foreign banks; and (5) for foreign banks entered the host banking markets via a greenfield entry mode rather than an M&A entry mode.

Our findings suggest an important policy implication for both policy makers and banking regulators that, when monetary authorities in host countries conduct monetary policies—expansionary or contractionary-during crisis periods to bail them out from the credit crunch and spillover effects of financial shocks from abroad, they must take into account the buffering or hampering effects of foreign banks on the effectiveness of the monetary policy transmission mechanism in the host countries. The magnitude of the offsetting effects by foreign banks varies according to different factors originated from various bank-specific, host banking-market specific, and policy-specific conditions, as identified in this paper. This challenge facing monetary authorities in emerging Asian economies is expected to remain significant and become even larger as the level of foreign bank penetration in the Asian banking markets continues rising in the near future.

References

Allen, F., Gu, X., Kowalewski, O., 2011. Corporate governance and intra-group transactions in European banking holding companies during the crisis. University of Pennsylvania, Wharton Financial Institutions Center Working paper No. 11-35.

Acharya, V., Afonso, G., Kovner, A., 2011. How do banks scramble for liquidity: evidence from the asset-backed commercial paper freeze of 2007. University of New York Working paper.

Arena, M., Reinhart, C., Vazquez, F., 2007. The lending channel in emerging economies: Are foreign banks different? IMF Working paper No. 07/48.

Arellano, M., Bover, O., 1995. Another look at the instrumental-variable estimation of error-component models. *Journal of Econometrics* 58 (1), 5-28.

Bernanke, B., Blinder, A., 1988. Is it money or credit, or both or neither? Credit, money and aggregate demand. *American Economic Review* 78 (2), 435-439.

Bernanke, B., Blinder, A., 1992. The federal fund rate and the channels of monetary transmission. *American Economic Review* 82 (4), 901-921.

Blundell, R., Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87 (1), 115-143.

Brei, M., Gambacorta, L., von Peter, G., 2011. Rescue package and bank lending. BIS Working paper No. 357.

Cetorelli, N., Goldberg, L.S., 2010. Global banks and international shock transmission: evidence from the crisis. NBER Working paper No. 15974.

Cetorelli, N., Goldberg, L.S., 2011. Liquidity management of U.S. global banks: internal capital markets in the Great Recession. Federal Reserve Bank of New York Staff Report No. 511.

Cetorelli, N., Goldberg, L.S., 2012a. Follow the money: quantifying domestic effects of foreign bank shocks in the great recession. *American Economic Review, Papers and Proceedings*, forthcoming.

Cetorelli, N., Goldberg, L.S., 2012b. Banking globalization and monetary transmission. *Journal of Finance*, forthcoming.

Claessens, S., Demirguc-Kune, A., Huizinga, H., 2001. How does foreign entry affect

domestic banking markets? *Journal of Banking and Finance* 25, 891-911.

Claessens, S., Laeven, L., 2005. Financial dependence, banking sector competition and economic growth. *Journal of the European Economic Association* 3 (1), 179-207.

Claessens, S., van Horen, N., 2009. Being a foreigner among domestic banks: asset or liability? IMF Working paper WP/09/273.

Crystal, J. S., Dages, B. G., Goldberg, L.S., 2002. Has foreign bank entry led to sounder banks in Latin America? *Federal Reserve Bank of New York Current Issues in Economics and Finance*, January, Vol. 8, No. 1.

Cull, R., Martinez Peria, M., 2007. Foreign bank participation and crises in developing countries. World Bank Policy Research Working paper No. 4128.

Cunningham, A., 2001. Assessing the stability of emerging market economies' banking systems. Financial Stability Review, 11, December, 187-192.

Curry, E., Fung, J., Harper, I., 2003. Multinational banking: historical, empirical and case perspectives. in A.W. Mullineux and V. Murinde, editors, Handbook of International Banking, Edward Elgar: UK and USA, 27-59.

Dages B. G., Goldberg L.S., Kinney, D., 2000. Foreign and domestic bank participation in emerging markets: Lessons from Mexico and Argentina. *Federal Reserve Bank of New York Economic Policy Review*, September, 17-36.

De Haas, R., van Lelyveld, I., 2006. Foreign banks and credit stability in Central and Eastern Europe: A panel data analysis. Journal of Banking and Finance 30, 1927-1952.

De Haas, R., van Lelyveld, I., 2010. Internal capital market and lending by multinational bank subsidiaries. *Journal of Financial Intermediation* 19 (1), 1-25.

Demirgüç-Kunt, A., Huizinga, H., 2010. Bank activity and funding strategies: The impact on risk and returns. *Journal of Financial Economics* 98 (3), 626-650.

Gambacorta, L., 2005. Inside the bank lending channel. *European Economic Review* 49 (7), 1737-1759.

Giannetti, M., Laeven, L., 2012. The flight home effect: Evidence from the syndicated loan market during financial crises. *Journal of Financial Economics* 104 (1), 23-43.

Havrylchyk, O., Jurzyk, E., 2006. Profitability of foreign and domestic banks in Central and Eastern Europe: Does the mode of entry matter? LICOS Discussion Paper, No. 16606.

Jeon, B. N., Olivero, M.P., Wu, J., 2011. Do foreign banks increase competition? Evidence from emerging Asian and Latin American banking markets. *Journal of Banking and Finance* 35(4), 856-875.

Jeon, B. N., Olivero, M.P., Wu, J., 2012. Multinational banking and the international transmission of financial shocks: Evidence from foreign bank subsidiaries. LeBow

College of Business, Drexel University, Working paper.

Kashyap, A., Stein, J., 1995. The impact of monetary policy on bank balance sheets. Carnegie Rochester Conference Series on Public Policy 42 (1), 151-195.

Kashyap, A., Stein, J., 2000. What do a million observations on banks say about the transmission of monetary policy? *American Economic Review* 90 (3), 407-428.

Kishan, R., Opiela, T., 2000. Bank size, bank capital and bank lending channel. *Journal of Money, Credit and Banking* 32 (1), 121-141.

Martinez Peria, M. S., Mody, A., 2004. How foreign participation and market concentration impact bank spreads: Evidence from Latin America. *Journal of Money, Credit, and Banking* 36(3), 511-537.

McCauley, R. N., Zukunft, J., 2008. Asian banks and the international interbank market. *BIS Quarterly Review*, June, 67-79.

Mian, A., 2003. Foreign, private domestic, and government banks: New evidence from emerging markets. University of Chicago Working paper.

Mihaljek, D., 2010. Domestic bank intermediation in emerging market economies during the crisis: locally owned versus foreign-owned banks. BIS Paper No. 54.

Milesi-Ferretti, G., Tille, C., 2011. The great retrenchment: International capital flows during the global financial crisis. *Economic Policy* 55, 285-342.

Nickell, S., 1981. Biases in dynamic models with fixed effects. *Econometrica* 49 (6),1417–1426.

Soedarmono, W., Machrouh, F., Tarazi, A., 2011. "Bank market power, economic growth and financial stability: Evidence from Asian banks. *Journal of Asian Economics* 22, 460-470.

Takats, E., 2010. Was it credit supply? Cross-border bank lending to emerging economies during the financial crisis. *BIS Quarterly Review*, June, 49-56.

Van Horen, N., 2007. Foreign banking in developing countries: Origin matters. *Emerging Markets Review* 8 (2), 81-105.

Vogel, U., Winkler, A., 2011. Foreign banks and financial stability in emerging markets: Evidence from the global financial crisis. Frankfurt School of Finance & Management Working paper, No. 149.

Wu, J., Jeon, B. N., Luca, A., 2010. Foreign bank penetration, resource allocation and economic growth: Evidence from emerging economies. *Journal of Economic Integration* 25, 167-193.

Wu, J., Jeon, B. N., Luca, A., 2011. Foreign bank penetration and the lending channel in emerging economies: Evidence from bank-level panel data. *Journal of International Money and Finance* 30 (6), 1128-1156.

Appendix 1 Foreign Bank Penetration Levels in Asia (2000-2009)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Hong Kong	Assets	88.608	91.168	91.874	92.082	92.282	91.802	91.803	91.655	93.058	93.181
	Number	76.744	80.488	80.952	79.487	77.143	75.000	77.419	75.862	77.778	78.261
	Number: Domestic/foreign	10/33	8/33	8/34	8/31	8/27	8/24	7/24	7/22	6/21	5/18
Indonesia	Assets	5.025	4.325	6.426	15.435	22.109	26.380	25.499	27.994	28.289	27.869
	Number	33.333	32.727	32.075	35.714	40.000	43.636	40.351	50.909	50.943	56.250
	Number: Domestic/foreign	40/20	37/18	36/17	36/20	33/22	31/24	34/23	27/28	26/27	21/27
Korea	Assets	4.499	4.412	4.560	13.050	16.454	16.445	17.395	16.197	17.879	16.570
	Number	10.526	11.111	11.765	17.647	23.529	23.529	18.750	20.000	20.000	20.000
	Number: Domestic/foreign	17/2	16/2	15/2	14/3	13/4	13/4	13/3	12/3	12/3	12/3
Malaysia	Assets	26.240	23.507	22.474	24.092	24.265	22.243	22.386	23.577	23.459	22.327
	Number	52.000	50.000	50.000	50.000	52.000	52.000	54.167	56.522	56.522	56.522
	Number: Domestic/foreign	12/13	12/12	13/13	13/13	12/13	12/13	11/13	10/13	10/13	10/13
Philippines	Assets	2.595	1.338	2.565	2.486	1.486	1.619	1.716	1.171	1.058	.972
	Number	24.138	17.857	18.182	15.152	12.500	16.667	20.690	16.667	13.636	13.636
	Number: Domestic/foreign	22/7	23/5	27/6	28/5	28/4	25/5	23/6	20/4	19/3	19/3
Singapore	Assets	4.754	6.305	6.881	5.767	4.016	5.059	4.818	5.918	5.658	5.133
	Number	50.000	57.142	61.538	58.333	50.000	54.545	58.333	58.333	58.333	54.545
	Number: Domestic/foreign	9/9	6/8	5/8	5/7	5/5	5/6	5/7	5/7	5/7	5/6
Thailand	Assets	6.197	6.257	6.025	5.856	3.961	4.836	4.712	5.315	5.504	6.626
	Number	22.222	22.222	21.053	21.053	16.667	15.000	15.000	15.000	15.000	22.222
	Number: Domestic/foreign	14/4	14/4	15/4	15/4	15/3	17/3	17/3	17/3	17/3	14/4

Note : Assets presents the share of foreign banks' assets in banking sector total assets, and numbers represent the ratio of the number of foreign banks to the total number of banks in the banking sector.

Appendix 2a List of Multinational Banks which Operate Foreign Subsidiaries in Asia, 2000-2009

	Multinational bank	Home country	Host countries
	U.S. and Canada		
1	Bank of America	US	HK(2), MY
2	Bank of New York Mellon	US	HK
3	Bank of Nova Scotia (The) - SCOTIABANK	CA	HK, MY
4	Canadian Imperial Bank of Commerce	CA	HK, SG
5	Citigroup	US	HK(3), KR, MY, PH, SG
6	JP Morgan Chase	US	HK(2), MY
7	Lone Star Fund	US	KR
8	Newbridge Capital	US	KR
9	Royal Bank of Canada	CA	SG
10	Toronto Dominion Bank	CA	SG
	Europe		
11	ABN Amro	NL	MY, PH, TH
12	Banco Santander	ES	PH
13	Bayerische Landesbank	DE	SG
14	BNP Paribas	FR	ID
15	Commerzbank AG	DE	ID
16	Credit Agricole S.A.	FR	ID
17	Credit Lyonnais	FR	ID
18	Deutsche Bank AG	DE	MY
19	Fortis	BE	HK
20	HSBC	GB	HK(2), ID, MY
21	ICB Financial Group Holdings AG	CH	ID
22	ING Bank	NL	ID, SG
23	Rabobank Group	NL	ID(2), SG
24	Royal Bank of Scotland Group	GB	ID, MY
25	Societe Generale	FR	ID, KR, TH
26	Standard Chartered	GB	HK(3), ID, KR, MY, TH
27	WestLB AG	DE	SG
	Japan		
28	Bank of Tokyo - Mitsubishi UFJ	JP	ID, MY, PH
29	Dai-Ichi Kangyo Bank Ltd DKB	JP	HK
30	Fuji Bank	JP	ID
31	Mizuho Financial Group	JP	HK, ID
32	Resona Bank	JP	ID
33	Sumitomo Mitsui Banking Corporation	JP	ID, SG
34	UFJ Bank	JP	ID
	Other Asian economies		
35	Allied Banking Corporation	PH	HK
36	Banco Delta Asia S.A.R.L.	MO	HK
37	Bangkok Bank Public Company Limited	TH	MY
38	Bank of Baroda	IN	HK

Appendix 2a (Continue)

	Multinational bank	Home country	Host countries
39	Bank of China	CN	HK(4), MY
40	Bank of India	IN	ID
41	Bank Internasional Indonesia	ID	HK
42	China Construction Bank	CN	HK(2)
43	China Merchants Bank Co Ltd	CN	HK
44	Chinatrust Financial Holding Company	TW	HK, ID, PH
45	Chohung Bank	KR	HK
46	CIMB Bank Berhad	MY	ID, TH
47	CITIC Industrial Bank	CN	HK
48	DBS Group	SG	HK(2), ID(2), PH, TH
49	Fubon Financial Holding Co Ltd	TW	HK
50	Grand Commercial Bank	TW	HK
51	Hana Bank	KR	ID
52	Hong Leong Bank Berhad	MY	HK(2), PH, SG
53	Industrial & Commercial Bank of China (The) - ICBC	CN	HK(2), ID
54	Khazanah Nasional Bhd	MY	ID
55	Kookmin Bank	KR	HK
56	Korea Exchange Bank	KR	ID
57	Malayan Banking Berhad (Maybank)	MY	ID(2), PH
58	Mega International Commercial Bank	TW	TH
59	Oversea-Chinese Banking Corporation Limited OCBC	SG	ID(2), MY
60	Overseas Union Bank	SG	MY
61	Public Bank Berhad	MY	HK
62	RHB Capital Bhd	MY	ID
63	Shanghai Commercial & Savings Bank	TW	HK
64	Shinhan Bank	KR	HK
65	Southern Bank Berhad	MY	SG
66	United Overseas Bank	SG	ID(2), MY, PH, TH(2)
67	Woori Bank	KR	ID
	Other		
68	Absa Group	ZA	HK
69	Australia and New Zealand Banking Group	AU	ID
70	Commonwealth Bank of Australia	AU	ID
71	Islamic Development Bank	SA	ID
72	LGT Bank in Liechtenstein	LI	SG
73	National Australia Bank	AU	SG
74	Standard Bank Group	ZA	HK

Note: The number of subsidiaries in parenthesis. AU=Australia, BE=Belgium, CA=Canada, CN=China, DE=Germany, ES=Spain, FR=France, GB=U.K., HK=Hong Kong SAR, ID=Indonesia, IN=India, JP=Japan, KR=Korea, LI= Liechtenstein, MO=Macau, MY=Malaysia, NL=Netherlands, PH=Philippines, SA=Saudi Arabia, SG=Singapore, TH=Thailand, TW=Taiwan, US=U.S.A., ZA=South Africa.

Appendix 2b Distribution of the Home Country of Foreign Banks Subsidiaries During the Period 2000-2009

	U.S.	Europe	Japan	Other Asian Countries	Other	Total
Hong Kong	8	6	2	28	4	48
Indonesia	0	12	6	17	3	38
Korea	3	2	0	0	0	5
Malaysia	3	5	1	5	1	15
Philippines	1	2	1	5	0	9
Singapore	1	5	1	2	4	13
Thailand	0	3	0	5	0	8
Total	16	35	11	62	12	136

Appendix 3 The Summary Descriptive Statistics: Domestic vs. Foreign Banks in Asia, 2000-2009

Panel A: Mean, standard deviation and median				Panel B: Correlation coefficient						
	Domestic banks									
	Mean	Std. dev	Median	Δln(loans)	Δ(loan rate)	liquidity	capitalization	size	riskiness	profitability
Δln(loans)	9.197	22.059	8.403	1						
Δ (loan rate)	-.436	3.643	-.153	.018	1					
liquidity	21.989	15.044	18.417	.153***	-.074**	1				
capitalization	10.228	6.297	9.245	-.063**	-.033	.050*	1			
size	5.094	6.697	2.065	-.032	-.015	-.104***	-.186***	1		
riskiness	1.545	2.688	.934	-.091***	-.191***	-.039	-.039	.027	1	
profitability	.663	2.084	.900	.118***	.112***	.140***	.277***	.006	-.597***	1
	Foreign banks									
	Mean	Std. dev	Median	Δln(loans)	Δ(loan rate)	liquidity	capitalization	size	riskiness	profitability
Δln(loans)	5.393	28.539	4.584	1						
Δ(loan rate)	-.381	3.627	-.337	-.093***	1					
liquidity	27.517	17.226	24.246	.011	-.021	1				
capitalization	15.011	10.275	12.138	.037	-.150***	.106***	1			
size	2.213	6.227	.601	.012	.017	-.038	-.236***	1		
riskiness	1.619	4.192	.621	-.128***	-.219***	.070**	-.032	-.068*	1	
ofitability	1.220	2.927	1.320	.119***	-.060*	.144***	.336***	-.003	-.439***	1

Note: ***: 1% significance level; ** 5% significance level; * 10% significance level.

CHAPTER 10

금융위기의 고용파급효과에 대한 실증분석

신 석 하
(한국개발연구원)
조 동 철
(KDI 국제정책대학원)

〈초 록〉

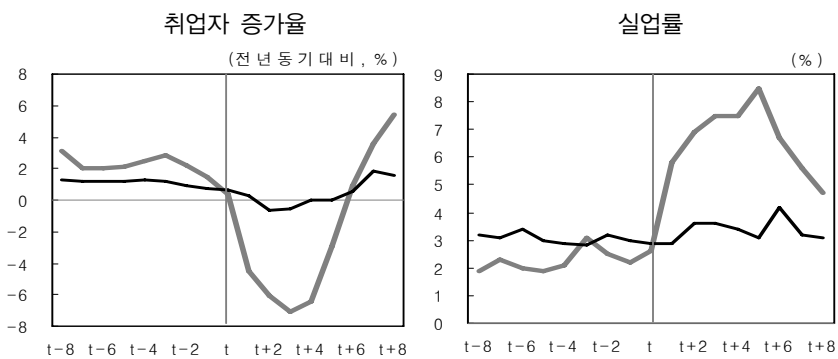
본 연구는 금융위기가 고용 및 실업에 미친 영향을 분석하였다. 특히 이번 금융위기 동안의 고용조정이 외환위기 당시나 여타 선진국의 경험과 비교하여 매우 완만하게 나타난 원인이 무엇이었는지에 분석의 초점을 맞추었다. 오차수정모형을 이용하여 분석한 결과, 최근의 금융위기 기간 동안 고용조정이 외환위기에 비해 완만했던 일차적 원인은 성장률의 하락폭이 상대적으로 작았던 데 기인한 것으로 나타났다. 이 외에도 외환위기와 달리 이전에 누적되었던 과잉고용의 부담이 거의 없었다는 점과, 수요구성 측면에서 수출수요에 비해 고용민감도가 높은 국내수요가 금융위기 기간 동안에는 어느 정도 유지되었다는 점도 추가적인 완화 요인으로 작용하였던 것으로 보인다. 특히 외환위기와 달리 대규모 연쇄부도를 초래할 정도의 금융경색이 발생하지 않았다는 점이 최근의 완만한 고용조정을 설명할 수 있는 주요 요인이었던 것으로 나타났다. 이와 같은 현상은 OECD 국가를 대상으로 한 분석에서도 관측되었다. 이러한 분석 결과는 경제위기 시 고용의 급격한 위축을 방지하기 위해서, 우선적으로 성장률의 급변동을 완화하는 거시경제운용, 금융경색을 방지하기 위한 금융기관 및 기업의 재무건전성 유지, 내수의 안정적 유지 및 '과잉고용' 누적 방지를 위한 정책적 노력이 중요함을 시사한다.

제1절 서 론

경기침체 혹은 경제위기가 국민경제적으로 가장 큰 고통을 미치는 경로는 아마도 고용시장을 통해서일 것이다. 경기침체는 통상적인 기업이윤의 감소 및 근로자의 임금상승 속도 둔화 등에서 그치지 않고, 신규취업을 제한하거나 기존 근로자의 일자리를 박탈하기도 한다. 세계적인 경제위기 속에서 경기위축이 가시화되었던 2008년 4/4분기 이후 우리나라의 고용도 감소하기 시작하여, 2009년에는 1998년 이래 연간 기준으로는 처음으로 감소세를 기록하였다.

그러나 이번 경제위기가 심각한 수준이었음을 감안할 경우, 2009년 우리나라의 고용조정 충격은 상대적으로 경미한 편이었다고 할 수 있다. 세계 경제위기의 중심에 있었던 미국·영국 등 주요 선진국들의 고용조정 폭뿐 아니라 1998년 외환위기 기간 중 우리나라의 고용조정 폭과 비교하여서도 2009년 경제위기 시의 고용조정 폭은 상대적으로 완만하였다. 1997~98년 경제위기 때와 2008~09년 경제위기 시의 고용증가율과 실업률 변화를 비교한 [그림 1]은 그와 같은 사실을 단적으로 나타낸다. 이처럼 2008~09년 경제위기 때에 고용조정이 상대적으로 경미한 수준에 머무른 결과, 경제위기에서 파급되는 국민의 고통이 결정적으로 확대되지 않을 수 있었던 것은 분명하다.

[그림 1] 경제위기와 고용



주: 1) 진한 선은 이번 금융위기 기간을 나타내며, 세로선의 t는 2008년 3/4분기임.
2) 흐린 선은 외환위기 기간을 나타내며, 세로선의 t는 1997년 4/4분기임.

본 연구에서는 이처럼 고용시장의 반응이 상이하게 나타난 원인에 대하여 살펴보고자 한다. 고용증가율과 실업률 중 어느 변수가 노동시장 상황을 보다 잘 반영하는지에 대해서는 논란의 여지가 있으나, 실업률의 경우 경제활동참가율의 변동과 함께 고려해야 노동시장의 상황이 보다 정확히 파악될 수 있다는 점을 감안하여 본고에서는 분석의 초점을 고용증가율에 맞추는 한편 실업률에 대한 분석도 병행하고자 한다.

본 연구에서는 고용에 영향을 미친 요인으로 성장률, 총수요 구성(특히 소비)의 변화, 미래에 대한 기대 및 금융 환경, 정책 대응 등을 검토하고자 한다. 물론 이 모든 요인들이 고용에 영향을 미쳤을 것이나, 논의의 편의상 가장 영향력이 컸을 것으로 예상되는 성장률을 먼저 살펴보고 여타 변수들이 추가적인 설명력을 지니는지 단계적으로 살펴보았다.

우선 제2절에서 제4절까지는 주로 거시 · 금융 변수들과 고용 변수와의 관계에 대해 분석한다. 제5절에서 공공부문 고용의 역할에 대해 살펴보았으며, 제6절에서는 OECD 국가에 대한 분석을 통해 우리나라 자료에 대한 분석 결과가 여타 선진국에 대해서도 어느 정도 성립하는지에 대해 검토할 것이며. 제7절에서는 본고의 분석결과들을 요약 · 정리하고자 한다.

제2절 성장률과 고용조정

우선 2009년도 고용조정이 1998년의 위기 시와 비교하여 상대적으로 경미한 수준에 머무를 수 있었던 가장 큰 원인은 1998년에 비해 2009년의 성장률 둔화 폭이 상대적으로 작았던 데에 있었다고 할 수 있다. 취업자 수가 6.2%(127만명 내외)나 감소하고 실업률이 4.4%p 상승하였던 1998년에는 성장률이 -5.9%를 기록하였던 반면, 취업자 수가 0.3%(7만명 내외) 감소하고 실업률이 0.4%p 상승하는 데에 그친 2009년에는 성장률도 0.2%로 하락하는 데에 머물렀던 것으로 집계되었다. 실제 'Okun's Law'로 널리 알려져 있는 바와 같이 GDP 성장률과 고용증가율 사이에는 뚜렷한 정(+)의 관계가, GDP 성장률과 실업률 증감 사이에는 뚜렷한 부(-)의 관계가 존재하며, 이와 같

은 관계는 1990년 이후 각 연도의 GDP 성장률과 고용증가율 및 실업률 증감을 제시하고 있는 [그림 2]에서도 명확히 확인된다.[1]

한편, [그림 2]에는 고용증가율과 실업률 증감을 성장률에 각각 회귀분석한 추정식의 결과도 직선으로 표시되어 있는데, 1998년의 경제위기 시 고용증가율은 이 회귀선을 크게 하회하고 실업률 증감은 회귀선을 크게 상회하고 있는 반면, 2009년 경제위기시의 고용증가율은 회귀식을 오히려 상회하고 실업률 증감은 회귀식을 하회하고 있는 것으로 나타나고 있다. 즉, 이와 같은 간단한 그림으로부터 1998년에는 고용조정이 성장률 하락에 의해 평균적으로 예상될 수 있는 정도 이상으로 급격히 진행된 반면, 2009년에는 경제위기였음에도 불구하고 실제 고용조정이 성장률 둔화에 의해 예상될 수 있는 정도 이상으로 진행되지는 않았던 것으로 해석될 수 있다.[2]

고용과 GDP간의 관계를 더욱 면밀히 살펴보기 위해 두 변수의 계절조정된 분기별 자료(1990: Ⅰ~2010: Ⅲ)를 사용한 모형을 추정하였다. 우선 로그-총고용과 로그-GDP 두 변수는 각각 단위근을 포함하고 있으며 공적분 관계를 보유하고 있는 것으로 검정되어, 오차수정모형(Error Correction Model)을 사용하는 것이 적절한 것으로 판단되었다.[3] 즉, 총고용과 GDP 사이에는 일정한 장기균형관계가 존재하며, 실제 고용이 이 수준에서 한없이 이탈하지는 못한다는 것이다. l_t와 y_t가 각각 t-분기의 로그-총고용 및 로그-GDP를 나타내고 Δ가 1차 차분을 나타낸다고 할 때, 따라서 Δl_t와 Δy_t

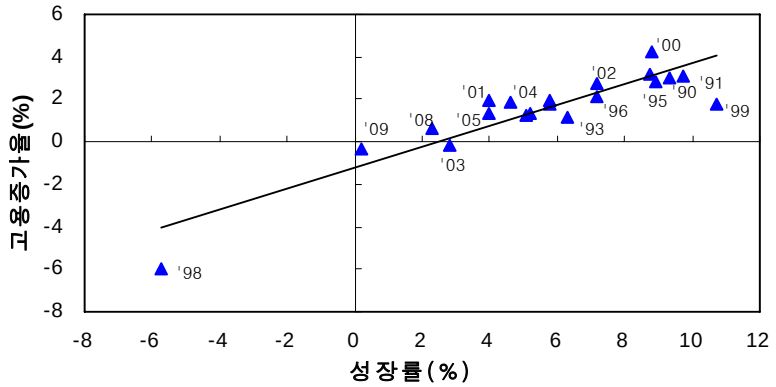
---

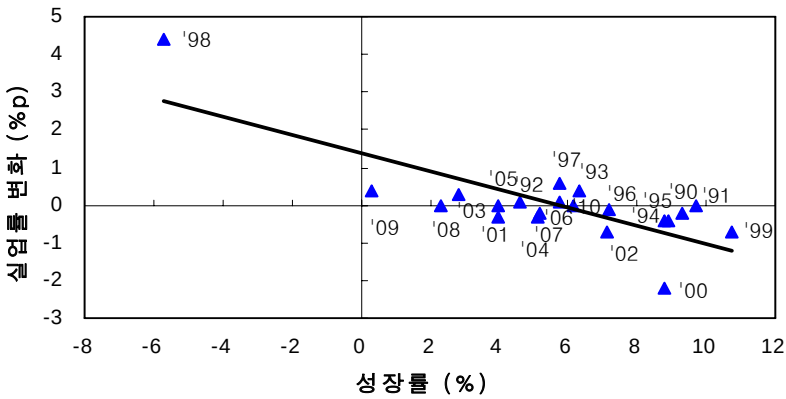
1 1990년 이후의 자료를 대상으로 한 것은 고용과 성장의 관계가 대체로 1990년을 전후하여 구조변화를 겪고 있을 가능성이 높을 것으로 추정한 유경준 외(2011)의 연구 결과를 준용한 것이다.

2 1998년의 고용조정은 같은 시기에 위기를 겪었던 여타 국가들과 비교하여서도 급격하였던 것으로 보고되고 있다. Betcherman and Islam(2001)은 외환위기를 겪은 인도네시아, 한국, 말레이시아, 필리핀, 태국의 고용상황 변화를 비교하면서, 이들 국가 중에서 한국이 실물경제 측면에서의 충격이 상대적으로 작은 편임에도 불구하고 실업률의 상승이나 고용감소는 가장 큰 편이며 실질임금의 감소 폭도 컸음을 지적하고 있다. Kang *et al.*(2001) 역시 한국의 고용조정이 다른 국가에 비해 컸음에 동의하며, 1987년 이후의 경직적인 노사관계와 연공서열 및 집단교섭으로 인한 임금 경직성 등을 외환위기 당시 노동시장의 문제로 제기하고 있다. 아울러 Fallon and Lucas(2002)도 금융위기를 겪은 인도네시아, 한국, 말레이시아, 태국, 아르헨티나, 멕시코, 터키의 고용상황 변화를 분석하여, 이들 국가 중에서 한국만이 GDP 감소에 상응하는 수준의 고용 감소를 겪었음을 지적하고 있으며, 실업률의 상승도 한국과 아르헨티나에서만 현저하였던 것으로 보고하고 있다.

3 두 변수의 단위근 및 공적분 검정 결과는 [부록 1]을 참조하시오.

[그림 2] 성장률과 고용증가율, 실업률 증감





가 각각 전분기 대비 총고용 증가율과 GDP 성장률을 나타낼 때, 오차수정모형의 추정 결과는 다음과 같다 (괄호 속의 수치는 표준오차를 나타낸다):[4, 5]

---

4 본고에서는 오차수정모형을 FM2SLS(Fully Modified 2-Step Least Squares) 방법과 Johansen 방법을 사용해 추정해 보았는데 결과는 거의 유사하였다. FM2SLS 추정방식은 1단계에서 공적분 관계를 Phillips and Hansen(1990)의 FMOLS에 의해 추정하고, 여기로부터의 잔차를 2단계 추정식에서 오차수정항으로 이용하는 방법이다. 일반적으로 Johansen 방식이 보다 널리 사용되는 오차수정모형의 추정방법임에도 불구하고 본고에서는 FM2SLS 추정 결과를 논의하고자 하는데, 그 가장 큰 이유는 동기의 GDP를 외생변수로 포함한 추정 결과를 명시적으로 제시하고자 하는 데에 있다. 즉, Johansen 추정방식에서도 축약형 잔차의 Cholesky 분해과정에서 GDP 충격을 외생변수로 가정함으로써 동일한 모형을 추정할 수 있는 것이 사실이나, 그 추정치를 추정 결과의 일부로서 명시적으로 제시하기 어려운 반면, FM2SLS 추정방식에서는 고용방정식에 동기의 GDP를 직접 포함한 결과를 제시할 수 있어, 추정 결과를 보다 직관적으로 논의하기 편리한 측면이 있다.

5 추정과정에서는 상수항과 잔차항이 포함되었으나 보고하지 않았으며, 적정 시차변수의

$$(1)\quad \Delta \hat{l}_t = \underset{(0.039)}{0.256\Delta y_t} + \underset{(0.051)}{0.118\Delta y_{t-1}} + \underset{(0.101)}{0.181\Delta l_{t-1}} - \underset{(0.042)}{0.074}[l_{t-1} - \underset{(0.022)}{0.256 y_{t-1}}]$$

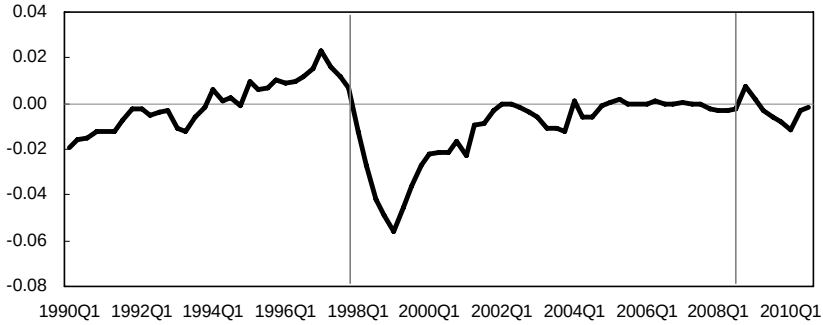
우선 추정 결과는, 장기적으로 GDP가 1% 증가할 때 총고용은 0.26% 내외 증가하나, 어떠한 이유로 인해 고용수준이 장기 균형 고용수준과 괴리될 경우, 그 조정에는 상당한 시간이 걸린다는 점을 함축하고 있다. 즉, 오차수정항 계수의 추정치 -0.074는, GDP에 의해 결정되는 장기균형 수준과 괴리된 '과잉고용' 혹은 '과소고용'이 분기당 7~8%(연율 25% 내외)의 속도로 서서히 조정된다는 점을 함의하는 결과다.[6]

[그림 3]은 총고용과 GDP의 장기균형관계에 대비하여 과잉고용 혹은 과소고용이 어느 정도였는지를 살펴보기 위해 장기균형관계식의 오차항을 보고하고 있다. 이 결과에 따르면, 외환위기가 도래하기 이전인 1996년까지 우리 경제는 GDP에 의해 설명될 수 있는 수준의 고용에 비해 2% 내외의 '과잉고용'이 존재했던 것으로 추정된다. 이와 같은 이른바 '과잉고용'은 1997~98년의 외환위기 과정에서 고용조정이 보다 급격하게 이루어져야 했던 하나의 원인으로 작용했던 것으로 해석될 수 있다. 물론 이 그림에 따르면, 1998년의 고용조정은 단순히 장기균형관계를 복원하는 정도에 머무르지 않고, 1999년 초에는 5%를 상회할 정도의 극심한 '과소고용'이 나타나기까지 진행되었던 것으로 보인다. 이처럼 외환위기 기간 중 급격히 발생한 '과소고용'은 1999년 이후 3년의 기간에 걸쳐 점진적으로 해소되었으며, 2002년 이후에는 균형수준에서 크게 이탈하지 않았던 것으로 추정된다. 즉, 1997~98년의 경제위기와 비교할 때, 2008~09년의 경제위기가 발발할 당시의 고용사정은 누적된 '과잉고용'의 문제가 존재하지 않았으며, 이에 따라 기업들은 급격한 고용조정의 필요성을 덜 느꼈던 것으로 해석될 수 있다.[7]

개수는 AIC 기준에 의해 1로 결정되었다.

6 통상적으로 두 변수 사이에 장기 균형관계가 존재하는 오차수정모형의 경우, 두 변수 중 어느 변수가 조정되는지는 명확하지 않다. 그러나 본고에서는, 전반적인 경제상황을 나타내는 GDP가 외생적으로 결정되고, 그 수준에 맞추어 고용이 조정되는 상황을 가정하고자 한다. 이는 노동수요를 파생수요로 보는 미시경제적 견해와도 부합한다. 실제 오차수정모형을 추정한 결과도 고용방정식의 오차수정항 계수가 항상 올바른 음(-)의 부호를 보이고 있어 장기균형 수준에서 이탈한 고용수준은 고용조정을 통해 장기균형을 회복하는 경향이 뚜렷이 관찰되는 반면, GDP방정식에 나타난 오차수정항 계수는 그와 같은 모습을 보이지 않고 있다. 즉, 동시에 발생하는 고용과 GDP 변동 사이의 관계가, GDP의 변동에 의해 고용이 반응하는 것이지, 그 반대의 경로가 아닌 것으로 나타났다. GDP 방정식에 대한 추정 결과 및 해석은 [부록 2]에 수록되어 있다.

[그림 3] 실제 총고용의 장기균형 수준으로부터의 괴리

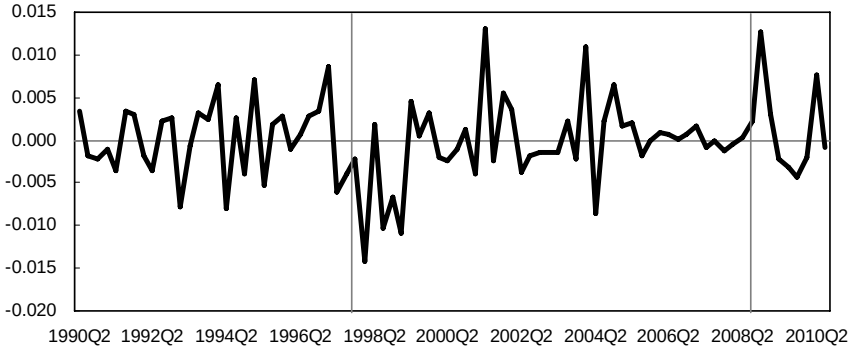


주: 1) 1990Q1은 1990년 1/4분기(Quarter)를 의미함.
2) 세로선은 각각 1997년 4/4분기, 2008년 3/4분기 시점을 나타냄.

한편, [그림 4]는 오차수정모형 식 (1)의 잔차를 보여주고 있다. 가장 눈에 띄는 부분은 역시 1998년의 마이너스 잔차이다. 즉, GDP 증가율로 대변되는 경기침체와 '과잉고용'에 대한 조정 등을 감안해서 추정된 '예측치'에 비해 여전히 0.5~1% 내외의 추가적인 고용조정이 수분기 동안 지속적으로 발생했던 것으로 나타난다. 반면, 2008~09년의 고용조정은 경기하강에 적응하는 정도의 통상적인 모습 이상이었다고 보기 어렵다. 눈에 띄는 부분이 있다면 그것은 오히려 2008년 4/4분기의 예측오차가 1% 내외의 양(+)의 값을 보인다는 것이다. 이 결과는 Lehman Brothers 파산보호신청 이후 급격한 GDP 위축이 발생했음에도 2008년 4/4분기에는 GDP 급락에 의해 설명되어야 할 정도의 고용조정이 발생하지 않았음을 의미하는 것이다. 즉, 2008년 우리 경제의 기업부문은, 적어도 1997~98년 당시에 비해 고용조정과 관련

7 1977년 1월~2007년 12월 기간 동안의 매월노동통계조사 자료를 이용하여 제조업 부문에서의 경기변동과 고용 및 근로시간의 조정 간 관계를 분석한 윤윤규(2010)의 결과는 이와 관련된 시사점을 제공하고 있다. 즉, 분석기간을 3개의 시기(시기 1: 1977년 1월~1987년 6월, 시기 2: 1987년 7월~1997년 6월, 시기 3: 1999년 7월~2007년 12월)로 나누어 추정한 결과, 6개월 누적 고용탄력성의 경우 시기 1에 비해 시기 2에서 크게 감소하였으나 시기 3에서는 다시 증가한 것으로 나타나고 있는데, 이러한 결과를 윤윤규는 1980년대 하반기의 노동운동을 통해 고용안정성이 강화된 반면, 외환위기 이후에는 기업들의 노동유연화 전략으로 고용조정이 탄력적으로 이루어지게 된 점을 반영하는 것으로 해석하였다. 한편 외환위기를 통제한 경우의 노동탄력성이 외환위기를 통제하지 않은 경우보다 매우 작게 나타나, 외환위기 기간 동안 단기적인 고용조정이 이례적으로 컸을 가능성을 제기하였다.

[그림 4] 고용증가율 예측 오차: 성장률



주: 1) 1990Q2은 1990년 2/4분기(Quarter)를 의미함.
2) 세로선은 각각 1997년 4/4분기, 2008년 3/4분기 시점을 나타냄.

하여 상대적으로 여유가 있었던 것으로 보이며, 이는 아마도 기업부문의 재무상태 및 '과잉고용'의 정도와 무관하지 않았을 것으로 추측된다.

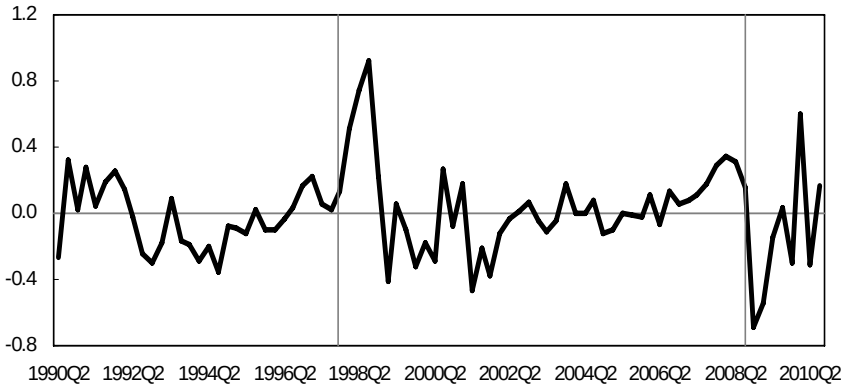
이상의 결과들을 종합하면, GDP 성장률의 급락으로 대변되는 거시경제의 위축이 경제위기 시 고용조정의 중요한 원인이기는 하나, 위기 이전에 누적된 부담도 추가적인 고용조정의 발생 여부에 영향을 미치는 요인으로 작용했다는 것이다. 그러나 1997~98년의 급격한 고용조정은 위기이전의 누적된 부담을 고려한 모형을 통해서도 충분히 설명하기 어려운 수준이었던 것으로 보인다.

고용증가율 대신 실업률에 대해서도 유사한 분석을 수행하였다. 다만 고용과 GDP간에는 공적분 관계가 성립하지만, 실업률과 GDP 간에는 공적분 관계가 성립하기를 기대하기 어려우므로 다음과 같이 실업률과 GDP갭 간의 관계를 추정하였다 (괄호 속의 수치는 표준오차):

$$(2)\quad \widehat{u_t - u_t^*} = \underset{(0.002)}{-0.155}(y_t - y_t^*) \underset{(0.029)}{-0.021}(y_{t-1} - y_{t-1}^*) \underset{(0.061)}{-0.524}(u_{t-1} - u_{t-1}^*)$$

여기서 u_t는 계절조정 실업률을 나타내며, u^*와 y_t^*는 각각 Hodrick-Prescott 필터로 추정한 자연실업률과 (로그) 잠재 GDP를 나타낸다. 추정 결과는 GDP갭과 실업률이 통계적으로 유의한 관계를 유지함을 보여주며,

[그림 5] 실업률갭 예측 오차: 성장률



주: 1) 1990Q2은 1990년 2/4분기(Quarter)를 의미함.
2) 세로선은 각각 1997년 4/4분기, 2008년 3/4분기 시점을 나타냄.

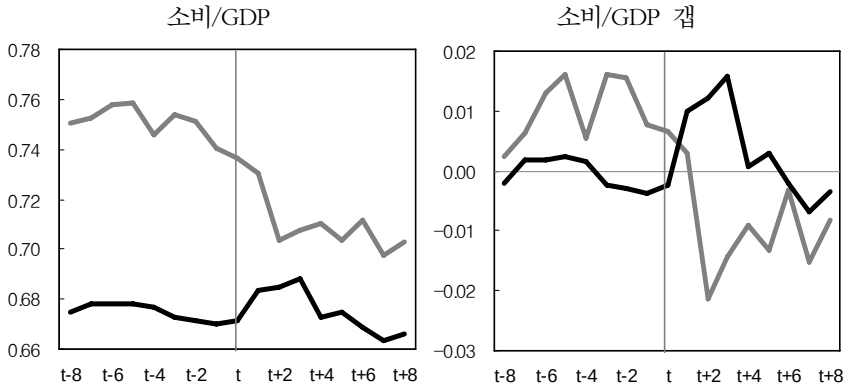
GDP갭이 1%p 하락할 때 실업률이 해당 분기에 0.155%p, 장기적으로는 0.326%p (=0.155/(1-0.524)) 내외 상승함을 나타낸다. 이러한 장기 추정치를 적용할 경우, 1998년과 2009년의 GDP 갭(각각 -7.0% 및 -2.3%) 차이 4.7%p는 두 연도의 실업률 격차를 1.5%p 정도 설명할 수 있을 것으로 보이나, 실제 실업률 격차는 이를 크게 상회하였던 것으로 나타나 고용증가율뿐 아니라 실업률에 대해서도 GDP갭 이외의 추가적인 설명이 필요한 것으로 보인다.

실업률갭의 예측오차를 나타낸 [그림 5]에서도 1998년의 경우에는 GDP 변동으로 설명될 수 없는 실업률 증가분이 1%p에 이르는 것으로 나타나고 있는 반면 2008~09년의 경우에는 실업률이 GDP 변동을 감안한 수준을 오히려 하회하는 모습을 보이고 있다.

제3절 수요 구성

두 경제위기 기간 중 고용조정의 폭에 영향을 미칠 수 있는 또 다른 요인은 총수요 구성의 격차이다. 조동철 · 김현욱(2011)에서 설명하는 바와 같이,

[그림 6] 경제위기 기간 소비비중의 변화



주: 1) 진한 선은 이번 금융위기 기간을 나타내며, 세로선의 t는 2008년 3/4분기임.
2) 흐린 선은 외환위기 기간을 나타내며, 세로선의 t는 1997년 4/4분기임.

1997~98년에는 세계경제 호조에 따른 수출수요의 지속적 확대가 있었음에도 불구하고 국내수요가 급락한 반면, 2008~09년에는 세계경제 위기에 따라 수출수요가 급락하였음에도 불구하고 국내수요는 상대적으로 완만한 하락세를 보였다. [그림 6]은 GDP대비 소비의 비율을 나타내고 있는데, 이 비율이 1997~98년 위기를 거치며 급격히 하락한 반면 2007~09년 위기 시에는 오히려 소폭 상승하는 모습을 보이고 있다. 이러한 차이는 GDP대비 소비 비중의 추세를 Hodrick-Prescott 필터를 이용하여 제거한 '소비/GDP 비율갭'에서 더욱 현저하게 관측된다.

우리나라의 고용이 수출수요보다는 국내수요에 훨씬 민감하게 반응한다는 기존의 연구 결과(신석하 · 김희삼[2008] 참조)를 감안할 때, 이와 같은 총수요 구성의 격차는 1997~98년의 극심한 고용조정을 설명할 수 있는 하나의 요인이 될 수 있을 것으로 보인다. 제조업 위주의 수출에 비해 내수, 특히 소비는 상대적으로 노동집약적인 품목의 비중이 높다는 점에서 고용에 미치는 영향이 클 것으로 생각된다.

수요 구성변화가 고용에 미치는 영향을 분석하기 위해 단기추정식에 소비비중(c_t) 변화를 추가하여 추정한 아래의 결과는, 동일한 성장률 하에서도 소비비중의 1%p 증가는 고용증가율을 0.2% 높이는 요인으로 작용함을 나타

내고 있다(괄호 속의 수치는 표준오차):[8]

$$(3)\quad \Delta \hat{l}_t = \underset{(0.039)}{0.269}\,\Delta y_t + \underset{(0.050)}{0.127}\,\Delta y_{t-1} + \underset{(0.077)}{0.236}\,\Delta c_t + \underset{(0.099)}{0.152}\,\Delta l_{t-1}$$

$$- \underset{(0.041)}{0.061}\,[l_{t-1} - \underset{(0.022)}{0.256}\,y_{t-1}]$$

그러나 GDP대비 소비비중 등 수요 구성을 고려하더라도 1997~98년의 고용급락은 여전히 설명되지 않는 부분이 남는 것으로 보인다. 식(1)의 예측오차와 소비비중을 감안한 식(3)의 예측오차를 비교해보면 1998년 1/4분기에 식(1)의 예측오차 1.4%에 비해 식(3)의 예측오차가 0.7%로 줄어들었다는 점을 제외하면 1997~98년 대부분 분기에서 큰 차이가 나타나지 않고 있다. 이러한 결과를 감안하면 총수요 구성의 격차는 1997~98년 경제위기와 2008~09년 경제위기 시의 고용조정 차이를 이해하는 데에 도움을 줄 수 있는 하나의 요인이기는 하나, 여전히 1997~98년의 극심한 고용조정을 설명하기에는 한계가 있는 것으로 보인다.

한편 소비비중의 변화는 실업률에도 유의한 영향을 주는 것으로 분석된다. 식(2)의 실업률 추정식에 '소비/GDP 비율갭'을 추가하여 추정한 결과는, 고용증가율에서의 결과와 마찬가지로 소비비율의 증가가 추가적으로 실업률을 낮추는 방향으로 작용하는 것으로 나타난다(괄호 속의 수치는 표준오차). 그러나 예측오차의 측면에서는 소비비중의 변화를 고려한 경우에도 1998~99년의 이례적인 실업률 상승을 충분히 설명하기에는 한계가 있는 것으로 나타난다.

---

8 투입산출표를 이용하여 수입을 내수용 수입과 수출용 수입으로 분해하고, 이를 이용하여 '국내수요'(≡소비+투자−내수용 수입)와 '수출수요'(≡수출−수출용 수입)를 추산한 후 GDP 대신 사용한 오차수정모형도 추정하여 보았다. 그 결과, 단기적인 측면 및 장기적인 측면 모두 총고용이 수출수요보다는 국내수요에 보다 민감하게 반응하는 것으로 나타났다. 장기적인 관점에서 내수의 1% 증가는 고용을 0.3% 내외 증가시키는 반면, 수출의 1% 증가는 고용을 0.05% 내외 증가시키는 요인인 것으로 추정된다. 단기탄력성의 측면에서도 고용의 내수에 대한 탄력성은 수출에 대한 탄력성의 5배 내외인 것으로 추정된다. 국내수요가 수출수요의 2~3배에 이른다는 점을 감안할 때, 이와 같은 결과는 동일한 액수의 국내수요 증가가 수출수요 증가에 비해 고용을 2배 정도 확대시키는 효과가 있는 것으로 해석될 수 있다.

$$(4)\quad \widehat{u_t - u_t^*} = \underset{(0.020)}{-0.156}(y_t - y_t^*) \underset{(0.029)}{-0.021}(y_{t-1} - y_{t-1}^*) \underset{(0.034)}{-0.139}(c_t - c_t^*) \underset{(0.061)}{-0.525}(u_{t-1} - u_{t-1}^*)$$

제4절 기대 및 금융경색 요인과 고용

이상에서는 GDP 혹은 총수요 변동의 함수로서 고용증가율 변동을 고려하였다. 그러나 현재의 수요 여건이 동일하게 주어진다고 할 경우에도, 미래에 대한 전망이 어두울 경우 고용을 위축시킬 수 있으며, 혹은 기업의 재무상황이 어느 정도의 수요위축을 견딜 수 있는 경우와 그렇지 못하여 파산에 이르는 경우의 고용조정 강도는 차이가 존재할 수 있다고 보인다. 이들 변수들을 식(3)과 식(4)에 단계적으로 추가하여 추정한 결과가 〈표 1〉과 〈표 2〉에 수록되어있다.[9] 미래에 대한 기대를 반영하는 지표로서 기업경기기대지수(BSI, (B)열), 소비자기대지수(CSI, (C)열) 및 경기선행지수(Leading, (D)열)를 고려하였으며, 금융시장 상황을 반영하는 지표로서는 어음부도율((E)열)을 고려하였다. 특히 어음부도율의 경우 경기상황에 따른 비대칭성을 검토하기 위해 성장률과의 교차항을 포함시켰다((F)열).

미래에 대한 기대를 반영하는 지표들 중에는 고용증가율 회귀식의 경우 CSI만이 유의하게 추정되었으며, 실업률 회귀식의 경우에는 BSI, CSI, 경기선행지수 모두 단일변수로는 유의하였으나 모두 함께 회귀식에 포함되는 경우에는 CSI와 BSI가 유의하게 나타났다. 이러한 결과는 고용조정의 주체가 기업이라는 측면에서 생각할 때 다소 의외의 결과인 것으로 보이나, 일반적인 경기에 대한 기대보다는 소비에 대한 기대가 고용과 좀 더 밀접한 관계를 나타낸다는 해석도 가능하다. 다른 한편으로 CSI는 향후 6개월 후의 상

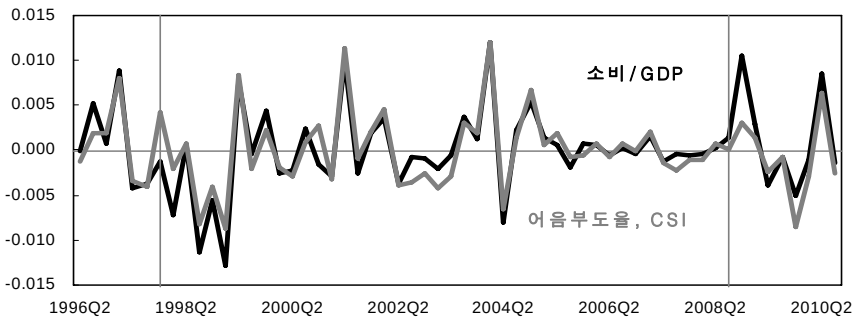
9 〈표 1〉과 〈표 2〉의 (A)~(E)열에 수록된 성장률의 추정계수가 대체로 일정한 값을 유지하고 있으며, 식(1)과 (2)의 추정계수 값과도 유사한 것으로 보인다. 이는 소비비율 또는 미래기대 및 금융변수가 성장률과 대체로 직교성을 유지하여 식(1)과 식(2)의 추정결과가 누락변수의 영향을 크게 받지 않았음을 시사한다. 또한 소비비율의 경우에도 추정계수 값이 미래기대 및 금융변수의 포함 여부에 크게 영향받지 않는 것으로 나타났다.

황에 대한 지표인 반면 BSI는 다음 달 상황에 대한 지표라는 차이에 기인했을 가능성도 존재한다.[10]

두 표에서 가장 눈에 띄는 부분은 어음부도율에 대한 결과이며, 특히 어음부도율과 성장률의 교차항이 매우 유의하게 추정되고 있다는 점이다. 이러한 결과는 동일한 수요여건하에서라도 어음부도율이 높아지면서 금융시장 경색이 심화될 경우 고용조정 폭이 더욱 커질 뿐 아니라, 경기침체와 금융경색이 맞물릴 경우에는 고용조정의 폭이 가파르게 증가한다는 점을 나타낸다.[11]

이와 같은 추정결과는 1997~98년 경제위기 시에 극심한 금융경색으로 연쇄적인 기업부도가 발생하고 향후 내수에 대한 기대가 크게 위축됨에 따라 추가적인 고용조정이 발생하였을 가능성과 부합한다. 예측오차를 나타낸 [그림 7]과 [그림 8]에서 볼 수 있듯이, 어음부도율과 CSI를 추가하는 경우 1997~98년 위기시의 이례적인 실업률 상승이 상당 부분 설명이 되며, 고용감소도 부분적으로 설명되는 것으로 보인다.

[그림 7] 고용증가율 예측오차: 소비비중, 어음부도율과 CSI

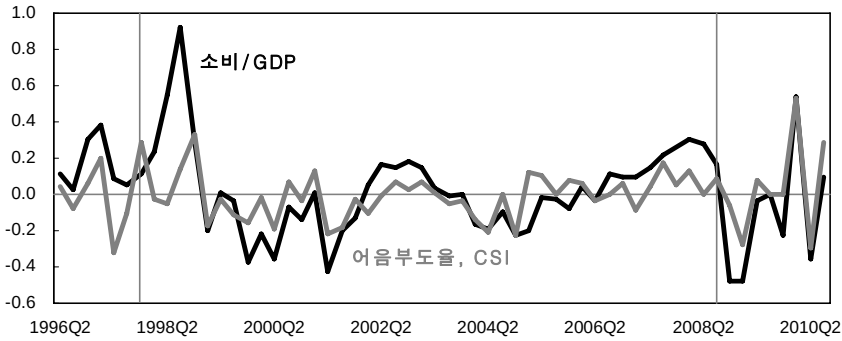


주: 1) 1996Q2은 1996년 2/4분기(Quarter)를 의미함.
2) 세로선은 각각 1997년 4/4분기, 2008년 3/4분기 시점을 나타냄.

10 익명의 심사자가 제기한 바와 같이, 외환위기와 달리 이번 금융위기는 이미 2007년부터 우려하는 의견이 제시되었음을 감안할 때, 기대변수의 전망기간이 추정결과에 상당한 영향을 미칠 수 있을 것으로 사료된다.

11 교차항에 대한 계수의 의미는, 어음부도율이 높아 금융상황이 불안한 경우 고용 또는 실업률이 GDP변동에 더 민감하게 반응한다는 것이며, 이는 GDP가 감소하는 위기시에는 어음부도율 상승이 고용을 감소시키는 효과가 확대되거나 실업률을 상승시키는 효과가 늘어남을 의미하기도 한다.

[그림 8] 실업률갭 예측오차: 소비비중, 어음부도율과 CSI



주: 1) 1996Q2은 1996년 2/4분기(Quarter)를 의미함.
2) 세로선은 각각 1997년 4/4분기, 2008년 3/4분기 시점을 나타냄.

〈표 1〉 고용증가율 회귀분석 결과

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
$\triangle(l_{t-1})$	0.152 (0.099)	0.142 (0.101)	0.062 (0.107)	0.143 (0.101)	0.163 (0.098)	0.102 (0.098)	0.026 (0.106)
$\triangle y_t$	0.269*** (0.039)	0.253*** (0.049)	0.168*** (0.046)	0.258*** (0.047)	0.254*** (0.040)	0.120* (0.066)	0.044 (0.069)
$\triangle y_{t-1}$	0.127** (0.050)	0.117** (0.054)	0.049 (0.053)	0.116** (0.057)	0.123** (0.050)	0.144*** (0.049)	0.068 (0.052)
$\triangle(C_t/Y_t)$	0.236*** (0.077)	0.229*** (0.078)	0.194** (0.080)	0.237*** (0.078)	0.222*** (0.077)	0.108 (0.087)	0.068 (0.093)
오차수정항	−0.061 (0.041)	−0.061 (0.041)	−0.167*** (0.051)	−0.062 (0.041)	−0.079* (0.043)	−0.061 (0.042)	−0.159*** (0.052)
$BSI_{t/100}$		0.003 (0.006)					
$CSI_t/100$			0.031*** (0.008)				0.028*** (0.008)
$Leading_t/100$				0.010 (0.023)			
어음부도율(%)					−0.005 (0.004)	−0.008** (0.004)	−0.006 (0.004)
어음부도율* $\triangle y_t$						0.477** (0.188)	0.421** (0.188)
N	78	78	58	78	78	78	58
R^2	0.656	0.657	0.758	0.656	0.665	0.693	0.785
adjusted R^2	0.632	0.628	0.729	0.627	0.636	0.662	0.750

주: l_t와 y_t는 로그-총고용 및 로그-GDP를 나타내며, C_t는 소비를, Y_t는 GDP를 나타냄.

〈표 2〉 실업률갭 회귀분석 결과

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
$y_t - y_t^*$	−0.156***	−0.108***	−0.115***	−0.121***	−0.151***	−0.057**	0.062*
	(0.020)	(0.023)	(0.037)	(0.024)	(0.021)	(0.023)	(0.031)
$y_{t-1} - y_{t-1}^*$	−0.021	−0.049*	−0.049	−0.034	−0.026	−0.037	−0.084***
	(0.029)	(0.028)	(0.034)	(0.028)	(0.029)	(0.024)	(0.024)
$u_{t-1} - u_{t-1}^*$	0.525***	0.570***	0.507***	0.573***	0.523***	0.552***	0.604***
	(0.061)	(0.059)	(0.070)	(0.063)	(0.062)	(0.050)	(0.051)
$C_t/Y_t - (C_t/Y_t)^*$	0.139***	−0.127***	−0.108**	−0.128***	−0.134***	−0.087***	−0.030
	(0.034)	(0.032)	(0.044)	(0.033)	(0.035)	(0.029)	(0.031)
$BSI_t/100$		−0.007***					−0.006***
		(0.002)					(0.002)
$CSI_t/100$			−0.009				−0.013***
			(0.005)				(0.004)
$Leading_t/100$				−0.021**			
				(0.009)			
어음부도율(%)					0.166	0.112	−0.031
					(0.197)	(0.160)	(0.152)
어음부도율* $(y_t - y_t^*)$						−0.344***	−0.396***
						(0.055)	(0.052)
N	79	79	58	79	79	79	58
R^2	0.934	0.943	0.943	0.938	0.934	0.957	0.975
adjusted R^2	0.930	0.939	0.938	0.934	0.930	0.954	0.972

주: u_t는 계절조정 실업률, y_t는 로그-GDP를, C_t는 소비를, Y_t는 GDP를 나타내며, u_t^*와 y_t^*는 각각 Hodrick-Prescott 필터로 추정한 자연실업률과 (로그) 잠재 GDP를 나타냄.

제5절 민간부문과 공공부문의 고용

두 경제위기 기간 동안에 발생한 고용조정의 격차를 설명할 수 있는 또 하나의 가설로서, 상이한 노동시장 정책대응을 고려해 볼 수 있다. 예를 들어 1997~98년의 경제위기 기간에 비해 2008~09년의 기간에 더욱 적극적이고 적시의 고용확대 정책이 사용되었는지를 살펴볼 수 있다.

〈표 3〉 경제위기 기간 정부 일자리 대책 월평균 수혜자

(단위: 천명, 월평균)

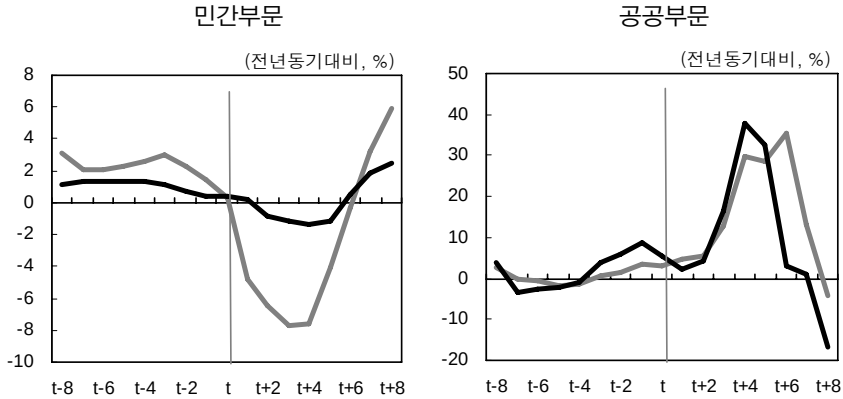
	1998	1999	증가분	2008	2009	증가분
	(A)	(B)	(B−A)	(C)	(D)	(D−C)
공공일자리사업	219	379	160	127	321	194
청년인턴제	–	47	47	3	54	51
사회서비스	–	–	–	105	144	39
전체	219	426	207	235	519	284
	(1.1%)	(2.1%)		(1.0%)	(2.2%)	

주: 괄호 안의 숫자는 총 취업자 대비 비율임.
자료: 노동부, 실업대책백서(2001), 고용백서(2011).

정부는 2008~09년 금융위기 동안 공공일자리 사업, 청년인턴제, 사회서비스 일자리 등에 대한 지원을 확대함으로써 2009년에는 수혜인원이 전체 취업자의 1.2%에 해당하는 28만 4천명 증가하였다. 그러나 이러한 일자리 대책 수혜 증가규모는 외환위기와 비교하여 크게 다르지 않은 것으로 보인다. 1999년에도 수혜인원이 전체 취업자의 1.0%에 해당하는 20만 7천명 증가하였다.

이러한 일자리 대책의 결과로 공공부문 취업자도 경제위기 동안 증가하였는데, [그림 9]에 경제위기를 전후한 민간부문과 공공부문 취업자의 변화가 제시되어 있다. 공공부문 취업자는 공공행정, 국방 및 사회보장행정의 취업자로 정의하였으며, 민간부문은 전산업에서 공공부문을 차감하여 구하였다. 2009년의 경우, 이렇게 분류된 공공부문 취업자는 103만명으로서, 전체 취업자의 4.4%를 차지한다. 이는 2008년 공공부문 취업자(84만명, 전체 취업자의 3.6%)보다 19만 2천명(전체 취업자의 0.8%) 증가한 것이다.

[그림 9] 경제위기와 고용: 민간부문 vs. 공공부문



주: 1) 진한 선은 이번 금융위기 기간을 나타내며, 세로선의 t는 2008년 3/4분기임.
2) 흐린 선은 외환위기 기간을 나타내며, 세로선의 t는 1997년 4/4분기임.

[그림 9]에서 나타나듯이, 두 경제위기 기간 동안 공공부문의 취업자는 위기 발생 이후 약 2분기를 경과한 시점부터 증가하기 시작하여, 1년 뒤에는 경제위기 이전의 기간에 비해 무려 30~40% 증가했던 것으로 나타난다. 이와 같은 정책대응은 경제위기에 따른 민간부문의 고용조정이 극심한 상황에서, 경제 전반의 고용위축을 완충하는 데에 어느 정도 기여한 것으로 보인다. 그러나 두 경제위기 기간 동안의 공공부문 고용 패턴은 놀라울 정도로 유사하여, 두 기간의 고용증가율 격차는 정부정책의 차이보다 대부분 민간부문 반응의 격차에서 비롯되었음을 알 수 있다.

한편, 민간부문 취업자(위첨자 P)와 공공부문 취업자(위첨자 G) 각각에 대해 전절에서 제시된 오차수정모형을 추정해 본 결과는 다음과 같다.

$$(5)\quad \Delta \widehat{l_t^P} = \underset{(0.046)}{0.249}\Delta y_t + \underset{(0.057)}{0.116}\Delta y_{t-1} + \underset{(0.099)}{0.293}\Delta l_{t-1}^P - \underset{(0.041)}{0.073}\,[l_{t-1}^P - \underset{(0.033)}{0.241}\, y_{t-1}]$$

$$(6)\quad \Delta \widehat{l_t^G} = \underset{(0.287)}{0.240}\Delta y_t + \underset{(0.295)}{0.195}\Delta y_{t-1} - \underset{(0.294)}{1.137}\Delta y_{t-2} - \underset{(0.329)}{1.226}\Delta y_{t-3}$$

$$- \underset{(0.124)}{0.142}\Delta l_{t-1}^G + \underset{(0.109)}{0.073}\Delta l_{t-2}^G - \underset{(0.144)}{0.059}\Delta l_{t-3}^G - \underset{(0.069)}{0.119}[l_{t-1}^G - \underset{(0.076)}{0.468} y_{t-1}]$$

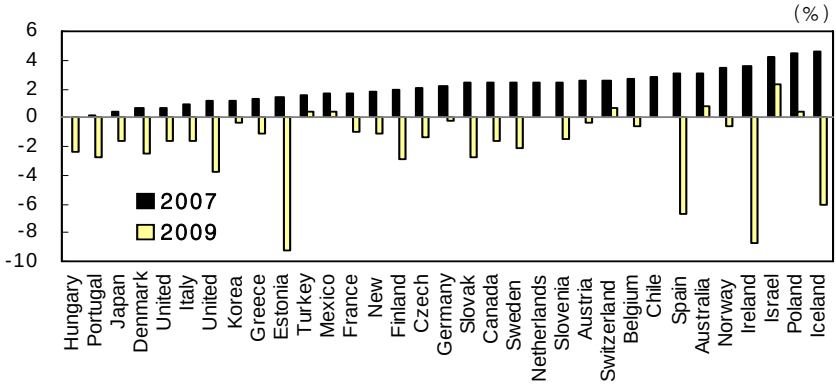
전반적으로 민간부문 취업자에 대한 결과는 전절의 결과와 거의 동일하게 나타나는 반면, 공공부문 취업자에 대한 결과는 상당히 다르다. 우선 공공부문 취업자에 대해서는 적정 시차변수의 개수가 1을 상회하는 것으로 추정되는데, 이는 [그림 9]에서 확인되는 바와 같이, 2~3분기 이전의 경기상황에 대해 공공부문 취업자가 매우 유의하게 반응하기 때문인 것으로 보인다. 특히 2~3분기 이전의 경기상황에 대한 계수들이 매우 유의한 음(-)의 부호를 보이고 있어, 공공부문 취업자가 전체 고용시장의 충격을 완충시키는 역할을 수행하고 있음을 나타내고 있다. 한편, 공공부문 취업자도 GDP 수준에 의해 결정되는 장기균형 수준으로 회귀해가는 것으로 나타나고 있어, 경제위기 발생 이후 증가한 공공부문 취업자 수가 궁극적으로는 장기 균형수준으로 회귀해 간다는 점을 함축하고 있다. 그러나 GDP에 대한 장기탄력성은 공공부문 취업자가 0.468로 민간부문 취업자의 0.241에 비해 두 배 이상 크게 추정되는데, 이는 우리 경제가 성장하는 과정에서 공공부문 취업자가 민간부문 취업자보다 빠르게 증가하여, 장기적으로 공공부문 취업자의 비중이 높아지고 있음을 나타내는 결과이다.

제6절 OECD 국가들과의 비교

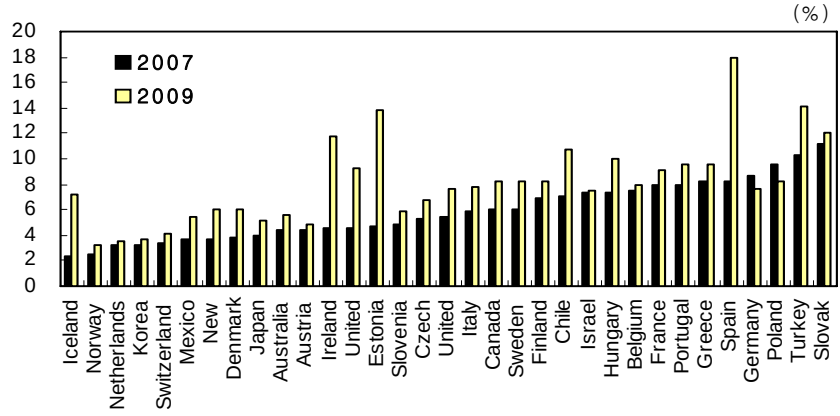
지금까지 2008~09년 기간 동안의 고용조정을 1997~98년 기간과의 비교를 통해서 분석해보았다. 본 절에서는 이번 금융위기 동안 우리 경제의 고용상황을 여타 OECD 국가들의 고용상황과 비교분석함으로써 앞에서의 논의가 국제적인 관점에서도 타당한지 검토해 보고자 한다. 물론 공공부문의 역할이나 노동시장의 제도적 차이가 중요한 국가간 격차를 설명하는 요인으로 작용할 수 있는 것이 사실이다. 그러나 이에 대한 상세한 분석은 본 연구의 범위를 넘어서는 것으로 생각되어 여기에서는 성장률, 내수, 금융요인이 고용에 미친 영향에 대해 초점을 맞추어 분석하고자 한다.

우선 우리나라는 이번 금융위기 동안 고용상황이 거의 악화되지 않은 국가라고 할 수 있다. [그림 10]과 [그림 11]에서 볼 수 있듯이, 우리 경제는 금

[그림 10] OECD 국가의 고용증가율 변화



[그림 11] OECD 국가의 실업률 변화



융위기 기간 동안 고용증가율의 감소폭이 상대적으로 작았던 편에 속하며, 실업률도 노르웨이, 네덜란드, 스웨덴 등과 더불어 OECD 국가 중에서 가장 낮은 편에 속하였다.

앞 절에서의 분석은, 이처럼 금융위기 동안 우리 경제의 고용상황이 다른 국가에 비해 악화되지 않은 것이 성장률 하락폭, 특히 소비 증가율 하락폭이 상대적으로 작았던 점과 금융부문에서의 경색이 상대적으로 경미하였던 데에 기인하였을 가능성을 시사한다. 금융위기 이전 우리 경제의 주택가격 상승폭은 여타 OECD 국가들에 비해 상대적으로 크지 않았으며, 따라서 위기 이후의 하락폭도 상대적으로 경미하였다. 이로 인해 국제금융시장에서

발생한 충격이 국내 금융시장에 미칠 수 있는 부정적 영향의 여지가 작았을 것으로 보이며, 실제 우리나라의 부실채권 비율은 여타 국가들에 비해 매우 낮은 수준에 머물러 있었던 것으로 보고되고 있다.[12]

이러한 가설을 검증하기 위해 2007~09년 OECD 국가들의 자료를 사용하여 고용증가율과 실업률 각각에 대해 회귀분석을 실시하였다. 회귀식은 앞에서의 분석과 유사한 형태를 유지하고자 하였으나, 각국의 고용 추세 및 장기균형이 상이하다는 점을 감안하여 오차수정모형과 같은 형태의 분석보다는 다음과 같이 다소 단순화된 모형을 추정하였다.

(7) $\Delta l_{i,t} = \beta \Delta y_{i,t} + \gamma \Delta c_{i,t} + \delta \Delta f_{i,t}$

(7') $\Delta u_{i,t} = \beta(\Delta y_{i,t} - \Delta y^{*}_{i,t}) + \gamma \Delta c_{i,t} + \delta \Delta f_{i,t}$

여기서 하첨자 i는 국가를 나타내며, 차분(Δ)은 위기이후 연도인 2009년에서 위기이전 연도인 2007년을 차감함을 나타낸다. 변수 c는 GDP대비 소비의 비중이며, $\Delta y^{*}_{i,t}$ 는 각국의 잠재성장률로서 여기서는 2000~07년 기간의 평균성장률을 사용하였다. $f_{i,t}$는 금융경색을 반영하는 변수이다. 고용증가율과 실업률 모형의 유일한 차이는 각국의 잠재성장률 포함 여부인데, 이는 고용증가율이 각국의 상이한 잠재성장률을 반영하고 있는데에 반해, 실업률 변동은 잠재GDP로부터의 괴리인 GDP갭의 변동을 반영하고 있을 것으로 기대되기 때문이다.

OECD 31개국을 대상으로 추정한 〈표 4〉의 결과들은, 금융위기로 인해 성장률이 크게 하락한 나라일수록 고용증가율의 감소폭이나 실업률 상승폭이 컸음을 보여주고 있을 뿐 아니라, 금융위기가 소비에 상대적으로 큰 충격을 미친 나라에서 고용조정의 폭이 컸음을 나타낸다. 〈표 4〉의 주요 추정계수들을 〈표 1〉과 〈표 2〉의 결과들과 비교하면 추정계수의 부호뿐 아니라 크기도 크게 다르지 않은 것으로 나타나고 있다.[13] 특히 실업률을 종속변수로 한

---

12 OECD 국가들의 주택가격 변동에 대해서는 OECD(2010)를 참고할 수 있으며, 주요국의 부실채권 비율은 IMF(2010)에 보고되어 있다. 이 두 보고서를 인용한 자료는 조동철 · 김현욱(2011)에서도 찾을 수 있다.

13 〈표 4〉의 (A)열과 (C)열은 식(1)을 반영한 것이며, (B)열과 (D)열은 〈표 1〉의 (A)열을 반영한 것이다. (E)열은 〈표 1〉의 (E)열에 상응한다.

경우, 성장률과 소비비율의 계수가 0.30 내외로 추정되고 있는데, 이는 식 (2)의 추정결과에 함의된 장기탄력성과 크게 다르지 않은 정도의 크기인 것으로 나타나고 있음은 주목할 만한 결과인 것으로 보인다.[14]

〈표 4〉 금융위기 기간 고용변화 회귀분석 결과: OECD 국가, 2007~09

취업자 증가율	31개 국가		24개 국가		19개 국가	
	(A)	(B)	(C)	(D)	(E)	(F)
상수	0.011**	0.002	−0.008	−0.007	0.018	0.013
	(0.005)	(0.006)	(0.009)	(0.010)	(0.014	(0.017)
성장률[1)]	0.545***	0.575***	0.577***	0.552***	0.048	0.167
	(0.087)	(0.081)	(0.090)	(0.134)	(0.257)	(0.386)
소비비율		0.374**	0.623**	0.577**	−0.809	−0.650
(GDP대비)의 변화		(0.150)	(0.272)	(0.333)	(0.536)	(0.666)
주택가격비율/100						−0.047
(소득대비)						(0.110)
M3 증가율				0.022		
				(0.089)		
R^2	0.575	0.653	0.662	0.663	0.230	0.239

실업률 증감	(A')	(B')	(C)	(D)	(E')	(F')
상수	−0.256	0.089	0.547	0.547	0.281	0.172
	(0.307)	(0.329)	(0.435)	(0.446)	(0.587)	(0.581)
성장률[2)]	−0.277***	0.278***	−0.302***	−0.301***	0.443***	−0.327**
	(0.053)	(0.050)	(0.056)	(0.094)	(0.122)	(0.150)
소비비율		−0.268**	−0.629**	−0.627**	−0.708**	−0.572*
(GDP대비)의 변화		(0.122)	(0.226)	(0.268)	(0.282)	(0.296)
주택가격비율						−0.057
(소득대비)						(0.043)
M3 증가율				−0.071		
				(4.271)		
R^2	0.482	0.558	0.608	0.608	0.482	0.534

주: 1) 2007년대비 2009년의 누적 성장률임.
2) 2008~09년의 평균성장률에서 2001~07년의 평균 성장률을 차감한 값.

14 식 (2)의 추정결과는 실업률의 GDP갭에 대한 장기탄력성이 −0.155/(1−0.524)=−0.326임을 함의하고 있으며, 〈표 2〉 (A)행의 추정 결과는 장기탄력성이 (−0.156−0.021)/(1−0.525)=−0.373임을 함의하고 있다.

OECD 국가에 대해서는 어음부도율에 대한 자료를 구할 수 없어 금융경색을 대리하는 변수로 통화(M3)증가율과 소득대비 주택가격을 사용하였다.[15] 통화증가율의 경우 자료가 가용한 24개국에 대해 2007～09년 기간 평균 증가율에서 2000～07년 기간의 평균 증가율을 차감하여 사용하였다. 소득대비 주택가격 상승률은 자료가 가용한 19개국을 대상으로 2007~09년 기간 연평균 소득대비 주택가격 상승률에서 2000~07년 기간 연평균 소득대비 주택가격 상승률을 차감하여 회귀식에 추가하였다[16].

추정결과 통화증가율 추정계수의 부호는 통화증가율이 크게 하락한 국가에서 고용이 감소하고 실업률이 높아졌음을 시사하나, 통계적 유의성은 없는 것으로 나타났다. 소득대비 주택가격의 경우에도 통계적으로 유의하지는 않으나 소득대비 주택가격이 크게 하락한 나라에서 실업률이 더욱 상승하였던 것으로 나타났다.

이상의 분석 결과들은, 경제위기 기간 중 고용조정이 성장률뿐 아니라 소비비율 등의 요인에 의해서도 크게 영향 받는 현상이 우리 경제에만 국한되는 것이 아니라 비교적 일반적인 현상일 수 있다는 점을 나타내는 것으로 이해된다. 위기 기간 중 금융경색의 정도도 노동시장 성과에 영향을 미치는 요인일 가능성이 높아 보이기는 하나, 본고에서 고려한 대리변수들의 통계적 유의성을 확보하지는 못하였다.

제7절 요약 및 시사점

본 연구에서는 두 경제위기 기간 중의 대조적인 고용조정 패턴의 원인에

---

15 익명의 심사자가 소득대비 주택가격이 금융경색을 대리하는 변수로서 한계가 있다는 점을 제기하여 통화증가율을 사용하는 방안을 추가적으로 고려하였다. 그러나 유로권이 출범한 이후 국가별 통화가 집계되지 않아 관측치가 크게 줄어드는 문제가 발생하였다. 여기에서는 유로권 국가의 경우 각국 중앙은행이 공식 또는 비공식적으로 제공하는 통화 기여치(contribution to M3) 자료를 사용하였다.

16 자료는 OECD(2010)에서 추출하였으며, 조동철 · 김현욱(2011)에서 확인할 수 있다. 가용한 자료가 2000~07년과 2007~09년 소득대비 주택가격상승률뿐이어서 변수를 이와 같이 정의하여 사용하였다.

대해 다양한 형태의 자료분석을 통해 살펴보았다. 1997~98년의 기간에 비해 2008~09년의 고용조정이 매우 완만하게 나타난 일차적인 원인이 ① 성장률의 하락 폭이 상대적으로 작았던 데에 있었다는 점은 의심의 여지가 없다. 그러나 여기에 더하여 2008~09년에는 1997~98년에 비해 ② 경제위기가 발생할 당시 누적된 '과잉고용' 문제가 거의 없었다는 점, ③ 수출수요에 비해 상대적으로 고용민감도가 높은 국내수요가 어느 정도 유지되었다는 점, 그리고 ④ 대규모 연쇄부도를 초래할 정도의 금융경색이 발생하지 않았다는 점 등이 추가적인 원인으로 제시될 수 있을 것으로 보인다. 세 개의 추가적인 원인들 중에는 특히 금융경색 요인이 경기침체와 맞물리면서 1997~98년의 극심한 고용조정을 초래하는 데에 가장 크게 기여했던 것으로 보인다. 한편 공공부문을 통한 고용확대 정책은 2~3분기의 시차를 두고 민간부문의 고용조정 충격을 완충하는 데에 기여했던 것으로 보이나, 1997~98년에 비해 2008~09년의 고용조정이 상대적으로 완만하게 나타나게 하는 요인으로 거론되기는 어려운 것으로 보인다.

이러한 결과들은, 고용의 급격한 위축을 방지하기 위해서는 일차적으로 거시경제의 급변동을 초래하지 않도록 거시경제 정책을 적절히 활용해야 함을 시사하고 있다. 특히, 경기침체가 금융경색을 동반할 경우 고용조정이 보다 극심해질 수 있음을 감안하여, 기업 및 금융기관의 재무건전성이 유지될 수 있도록 정책을 운영하는 것이 긴요한 것으로 보인다. 이와 함께, '과잉고용'은 경기위축이 발생할 경우 고용조정의 폭을 크게 확대시킬 수 있는 요인이라는 점을 감안하여 그와 같은 문제점들이 누적되지 않도록 주의해야 할 필요가 있으며, 고용은 수출보다 내수에 민감하다는 점을 감안하여 내수의 안정적인 유지에 초점을 맞출 필요가 있는 것으로 보인다.

참고문헌

신석하 · 김희삼, 「최근의 취업자 증가세 둔화에 대한 분석」, 『KDI 경제전망』, 2008년 상반기호, 2008, pp.153~164.

유경준 · 신석하 · 류덕현, 「성장과 고용 및 실업의 관계연구」, 『일자리 창출의 패러다임 개편을 위한 정책과제 I –성장과 고용의 선순환 구축을 위한 패러다임 전환』, 한국개발연구원, 2011.

윤윤규, 「경기변동과 고용 · 근로시간 조정패턴의 변화」, 『경제위기와 고용』, 노동연구원, 2010, pp.27~71.

조동철 · 김현욱, 「세계 경제위기와 우리 경제」, 『경제세계화와 우리 경제의 위기대응역량』, 한국개발연구원, 2011.

Betcherman, G. and R. Islam, 2001, "East Asian Labor Markets and the Economic Crisis: An Overview," in Betcherman, G. and R. Islam (eds.), *East Asian Labor Markets and the Economic Cirisis: Impacts, Responses and Lessons,* World Bank, pp.3~37.

Kang, S., J. Keun, D. Kim, and D. Shin, 2001, "Korea: Labor Market Outcomes and Policy Responses after the Crisis," in Betcherman, G. and R. Islam (eds.), *East Asian Labor Markets and the Economic Cirisis: Impacts, Responses and Lessons,* World Bank, pp.97~140.

Fallon, P. and R. Lucas, 2002, "The Impact of Financial Crises on Labor Markets, Household Incomes, and Poverty: A Review of Evidence," *The World Bank Research Observer*, Vol. 17, No. 1, pp.21~45.

IMF, 2010, Financial Soundness Indicators (http://fsi.imf.org/).

OECD, 2010, *Economic Review – Korea*, Organization for Economic Cooperation and Development, May 2010.

Okun, A., 1962, "Potential GNP: its measurement and significance," in

American statistical association, Proceedings of the Business and Economics and Statistics, pp.98~104.

Phillips, P. C. B. and Hansen, B., 1990, "Statistical Inference in instruemental variables regressions with I(1) processes," *Review of Economic Studies*, pp.99~125.

부록

<부 록 1>

〈부표 1〉 단위근 검정 결과

		ADF 추세	DF-GLS 추세	KPSS 추세
GDP	전산업	-2.309	-1.496	4.402***
취업자	전산업	-3.014	-2.444	0.869***
	민간	-3.825**	-3.705***	0.225**
	공공	-2.560	-2.500	1.676***

주: 1) 단위근 검정에서 귀무가설은 ADF 및 DF-GLS검정의 경우 '시계열이 단위근을 가짐'이며, KPSS검정은 '시계열이 단위근을 갖지 않음'임.
2) 검정통계량의 ***, ** 및 *는 유의수준 1%, 5% 및 10%에서 각각 귀무가설이 기각됨을 나타냄.
3) 모든 변수는 자연로그값을 취한 후, 상수항과 추세항을 포함시켜 검정하였고 추정기간은 1990:Ⅰ~2010:Ⅲ임.
자료: 한국은행, 『국민소득』; 통계청, 『고용동향』.

〈부표 2〉 고용-GDP 공적분 검정 결과

	통계량	전체		민간		공공	
Engle-Granger based	τ -통계량	-3.354*		-3.332*		-2.417	
lag: AIC 시차선택	z-통계량	-27.404		-27.193**		-10.930	
Phillips-Ouliaris based	τ -통계량	-2.672		-2.480		-2.728	
lag: AIC 시차선택	z-통계량	-13.867		-12.185		-14.201	
Johansen based	귀무가설	r=0	r≤1	r=0	r≤1	r=0	r≤1
	Trace 통계량	11.747	3.397	11.056	3.780	12.946	2.194
	λ_{max} 통계량	8.350	3.397	7.277	3.780	10.752	3.841

주: 1) Engle-Granger 및 Phillips-Ouliaris 공적분 검정의 귀무가설은 '공적분관계가 존재하지 않음'임.
2) 검정통계량의 ***, ** 및 *는 유의수준 1%, 5% 및 10%에서 각각 귀무가설이 기각됨을 나타냄.
3) 모든 변수는 자연로그값을 취한 후 검정하였으며, 추정기간은 1990:Ⅰ~2010:Ⅲ임.
자료: 한국은행, 『국민소득』; 통계청, 『고용동향』.

<부 록 2>

GDP를 종속변수로 하는 오차수형모형을 FM2SLS 방법을 이용하여 추정한 결과는 아래와 같으며, Johansen 방법을 이용한 결과도 이와 유사하였다.

$$\Delta \hat{y}_t = \underset{(0.213)}{1.405\Delta l_t} - \underset{(0.242)}{0.020\Delta l_{t-1}} - \underset{(0.123)}{0.048\Delta y_{t-1}} - \underset{(0.100)}{0.065}[l_{t-1} - \underset{(0.022)}{0.256 y_{t-1}}]$$

GDP의 공적분계수가 음수(-0.256)임을 감안할 때 오차수정항의 부호가 양수이어야 GDP가 장기균형관계로 조정되나, 추정결과 오차수정항 계수가 음수로 나타나고 있어 GDP가 고용과 GDP간의 장기균형관계를 회복하기 위해 조정되는 경향이 없음을 의미하고 있다. 아울러 GDP 방정식의 오차수정항 계수가 통계적으로 유의하지 않게 나타나고 있다는 점을 감안하면, GDP와 고용간 장기균형으로의 조정은 주로 고용에 의해 이루어지는 것으로 생각된다.

한편, GDP 방정식의 오차수정항이 통계적으로 유의하게 나타났다고 하더라도 오차수정항 계수의 절대값(0.065)이 크지 않아 고용과 GDP간의 장기균형관계는 고용조정에 의해 회복될 수 있음에 주의할 필요가 있다. 즉, 장기균형수준에서 괴리된 과잉고용 혹은 과소고용이 분기당 7~8%의 속도로 균형을 회복하는 방향으로 조정되는 반면, GDP는 분기당 2% 내외(≒ 6.5×0.256)의 속도로 균형에서 이탈하므로 전체적으로는 5% 내외의 속도로 고용과 GDP 간의 장기관계가 회복되는 경향이 있다.

CHAPTER 11

Asymmetric Loss in the Greenbook and the Survey of Professional Forecasters

by
*Yiyao Wang **
(Department of International Finance Fudan University)
*Tae-Hwy Lee***
(Department of Economics University of California, Riverside)

Abstract

This paper examines rationality of forecasts of the Greenbook and the Survey of Professional Forecasters (SPF) under asymmetric loss functions, using the method proposed by Elliott, Ko-munjer and Timmermann (2005) with a rolling window strategy. We find that (1) the degree and direction of the asymmetry are time-varying over the rolling windows, (2) rationality of forecasts of output growth and inflation is not rejected under asymmetric loss over nearly all rolling windows, (3) real output growth is consistently underpredicted in 1990s and the inflation rate is consistently overpredicted in 1980s and 1990s, (4) inflation forecast generally exhibits a greater asymmetric level in magnitude and frequency than output growth forecast, (5) long horizon inflation forecasts generally exhibit greater asymmetric loss compared to short horizon inflation forecasts, and (6) all these results similarly hold in the Greenbook forecasts and the SPF forecasts.

* Department of International Finance, Fudan University, Shanghai, China. E-mail: wangyiyao30@gmail.com

** Corresponding author. Department of Economics, University of California, Riverside, CA 92521, USA. E-mail: taelee@ucr.edu

1 Introduction

Rationality of forecast is critical in decision making. A rational forecast uses information efficiently.[1] Most forecasting literature is, from the forecast producer's perspective, about how to produce optimal forecasts given the information and a loss function. Some recent literature takes the forecast user's perspective, to develop econometric methods to test for rationality of forecasts that have been produced by someone else, typically government, even when the loss function of the producer of forecasts is unknown. These methods have been applied to some well-known forecasts such as the "Greenbook" forecast made by Federal Reserve, and the "Survey of Professional Forecasters (SPF)" forecast in which the forecasters come largely from the business world or Wall Street.

Under the squared error loss, many papers have tested for the rationality of forecast. Under the symmetric squared error loss, the rational forecast is unbiased, the single-period horizon forecast errors are serially uncorrelated, and the unconditional variance of the forecast error is a non-decreasing function of forecast horizon, etc. (cf. Granger and Newbold, 1986; Diebold and Lopez, 1996; Patton and Timmermann, 2005). These properties make it convenient to test for forecast rationality under the squared error loss. Romer and Romer (2000) find that the unbiasedness of the Greenbook inflation forecast is not rejected by using Mincer-Zarnowitz (1969) test. However, Capistran (2008) argues that by dividing the whole data period into two smaller periods, the unbiasedness is rejected in both sub-periods by the Mincer-Zarnowitz test. Rossi (2012) applies the Mincer-Zarnowitz test to rolling samples over time and finds that the unbiasedness result is time-varying. Besides, Patton and Timmermann (2012) develop a new testing strategy called the "optimal revision regression tests", using the properties of optimal multi-horizon forecast under squared error loss, and reject rationality of the Greenbook multi-horizon forecasts for quarter-over-quarter changes in GDP, GDP deflator and CPI. Similar to the

1 We use optimality, rationality, and efficiency of forecasts synonymously, following the forecasting literature.

Greenbook results, under the squared error loss, Croushore (2010) finds that the SPF forecasts are biased, rejecting the rationality of the SPF inflation forecast.

The strong rejection of rationality under the squared error loss in these well-known forecasts, which are believed to be rational, leads to taking a serious look at asymmetric loss. While symmetric loss seems more concise and convenient to use, asymmetric loss may be more sensible in real world, as it's reasonable to think that certain forecast objectives may lead the forecasters to have different proportions of punishment for under-prediction and over-prediction, and that the degree of asymmetry may not be stable across time. Elliott, Komunjer, and Timmermann (2008) point out, "One would, if anything, typically expect asymmetric loss as a reflection of the primitive economic conditions of the problem such as, e.g., asymmetric stockout and inventory holding costs or as a reflection of differences in the penalty associated with overshooting or falling short of a target in the case of policy makers." In policy making, Patton and Timmermann (2007b) show that for Greenbook forecast, in recession time the asymmetric level of output growth forecast is much higher than that in a high GDP period. They explain that it is perhaps because "such forecasts may incorrectly signal a recovery from a recession and could result in an overly tight monetary policy at a critical point in time". Another example for explanation of asymmetric loss is in the forecasts of international organizations. Elliott, Komunjer, and Timmermann (2005) argue that the existence of asymmetric loss on deficit forecast for developed countries, produced by OECD and IMF, is conjectured to be caused by "the political pressure facing the international organizations". Frankel (2011) studies forecasts of real growth rates and budget balances made by official government agencies among 33 countries and finds the forecasts have a positive average bias, are more biased in booms, and even more biased at the 3-year horizon than at shorter horizons. This asymmetric behavior in many official forecasts can help explain excessive budget deficits in many of these countries.

As the asymmetric loss can be justified, sometimes more suitable for real-world scenario, the rejection of forecast optimality may, to a large extent, be caused by false assumption of the sym-metric squared error

loss rather than lack of forecast rationality. However, under asymmetric loss, optimal forecast no longer satisfies the forecast optimality properties derived under the squared error loss. As a result, new methods with asymmetric loss have been developed and adopted in research related to testing forecast rationality. Many results suggest that by assuming an asym-metric loss, forecast optimality is much less rejected, compared with assuming symmetric squared error loss.

One way to deal with asymmetric loss is to develop new properties to test for forecast opti-mality under asymmetric loss. For example, in Patton and Timmermann (2007b), by "trading off conditions on the data-generating process against conditions on the loss function", new testable properties, which are similar to properties under the squared error loss, are established and applied to test forecast optimality. On the other hand, in some literature, a particular class of asymmetric loss function is assumed to test rationality or to assess the asymmetry with the observed fore-casts and realized target values. For example, Patton and Timmermann (2007a) use the Linex loss function of Varian (1975) together with a regime switching model to develop properties to test for optimality. Capistran and Timmermann (2008) also apply the Linex function in context of dispersion in the SPF inflation forecast. Elliott, Komunjer, and Timmermann's 2005 paper "Estimation and Testing of Forecast Rationality Under Flexible Loss" (EKT hereafter) estimates the asymmetric parameter from a class of asymmetric loss functions and also develops a test for rationality under asymmetric loss based on the GMM framework. The novelty of this method is that no strict condition is needed on the data generating process, that the asymmetric parameter can be "backed out" by only using public information, and that the GMM J-test can be used to test for rationality.

Since the EKT method is useful in terms of forecast rationality of big agents with asymmetric loss, many extensions and empirical work have been made in the literature. Patton and Timmer-mann (2007b) introduce a more flexible asymmetric loss function based on the EKT method. Using a linear spline model, the loss function is no longer a function solely depending on forecast error, but a more complex function taking realized value into account. Applying the method, rationality of Greenbook real output forecast is not rejected. In Elliott, Komunjer, and

Timmermann (2008), the EKT (2005) method is used to find that for SPF forecasts of nominal and real output growth, "only a modest degree of asymmetry is required for the survey expectations to be consistent with ratio-nality". Capistran (2008) applies the EKT method to the inflation forecast of Greenbook. Instead of using the whole data period, he separated it into 2 periods, pre-Volcker and since-Volcker (Paul Volcker was the FRB chairman from 1979 to 1987), and conducted the EKT method separately for each period. He found that there was significant difference in direction of asymmetry between the two periods, suggesting that "the cost of having inflation above an implicit time-varying target was larger than the cost of having inflation below it for the since-Volcker period, and that the opposite was true for the pre-Volcker era". Komunjer and Owyang (2012) extend the EKT framework with a multivariate nonseparable asymmetric loss function to deal with multivariate forecasts jointly (instead of one variable at a time).

Following the above literature, this paper investigates the forecast rationality of big agents by applying the EKT method. We make several contributions in this paper. First, we adopt a rolling sample strategy to the EKT method and find that the potential asymmetric level is time-varying and not stable. For both Greenbook and SPF, the rationality of the real output growth and inflation forecasts is not rejected under the asymmetric squared error loss. The output growth forecasts in 1990s are found to be produced with an asymmetric loss that punishes over-predicting more than under-predicting, while the inflation forecasts in 1980s and 1990s are produced with an asymmetric loss in opposite direction that punishes under-predicting much more than over-predicting.[2] While rationality under symmetric loss is clearly rejected, rationality under asymmetric loss is hardly rejected. These findings confirm EKT (2005) and Capistran (2008) that the asymmetry reflects the forecasters' cautious risk attitude rather than forecast irrationality. The direction and the degree of the cautious view have varied over the rolling periods of time. Second, both Greenbook and SPF forecasts are included in our analysis of forecast rationality under asymmetric loss.

2 Hereafter, output means real output

We apply the EKT method to both Greenbook and SPF forecasts and find there is significant similarity in time-varying asymmetric level between the two forecasts. The similarity is valuable information, especially because the SPF forecasts are 5-year ahead of publication of Greenbook.[3] Third, for both Greenbook and SPF, inflation forecast seems to embrace a higher level of asymmetry both in magnitude and frequency compared to output growth forecast, and in the meantime, long horizon inflation forecasts might generally have a greater asymmetric level used, compared to short horizon inflation.

This paper is organized as follows. Sections 2 describes the Greenbook and the SPF forecast data. Section 3 provides a brief review of the EKT (2005) method. Section 4 presents a list of main empirical findings with the Greenbook and the SPF forecasts. Section 5 concludes.

2. Data

Let f_{t+h} be the h-step-ahead forecast of y_{t+h} (output growth or inflation). We obtain the forecasts from the Greenbook or from the SPF. The frequency of the forecasts and realized values are both quarterly at the source. The realized values y_{t+h} of output growth or inflation are obtained from the real-time data vintages or from the most recently revised data vintage.

The Greenbook forecasts f_{t+h} are produced by the Board of Governors of the Federal Reserve Board before each meeting of the Federal Open Market Committee, starting from the fourth quar-ter of 1965. Sims (2002) suggests that the forecast project is broken down into forecasts of several sub-variables for different Fed experts to model and forecast. Then, according to the forecasts for those variables, they currently use a primary macroeconomic model named FRB/US model to

3 This is different from investigating the potential "asymmetric information" between the government (Greenbook forecasters) and other commercial forecasters (SPF) as studied in Romer and Romer (2000), D'Agostino and Whelan (2008), and Capistran (2008). Despite the asymmetric information available to forecasters of Greenbook and SPF, we find SPF forecasts behave very similarly to the Greenbook forecasts in terms of asymmetric loss.

generate original Greenbook forecast for further judgmental adjustment and feedback. Since the Greenbook may have a substantial influence in the process of policy making and possess such information, the Greenbook forecast is made available to public after a lag of five years. Although the FOMC meeting is more frequent than four times a year with a varying time schedule, the Greenbook forecasts are presented in quarterly frequency at the official website of FRB of Philadelphia. Therefore we use the quarterly Greenbook forecasts, which is also compatible with the SPF frequency. Greenbook forecasts contain several variables. In our analysis, only the forecasts of real output growth in GNP/GDP and inflation in the GNP/GDP price index, in quarter-over-quarter growth rate (annualized percentage points), are included. The forecasts were for GNP from 1965 to 1991 and for GDP from 1992 and on. Greenbook covers a variety of horizons up to 8 or 9 quarters, but longer horizon forecasts were not published at early years (at least not available for public). We consider horizons of $h = 1$ and 4, which are representative for short horizon and long horizon. Long horizon ($h > 4$) forecasts might be challenged with their rationality and do not have a big data set as short horizon forecasts do. For each horizon, the data period is different. One-quarter-ahead forecast is available from 1968Q3 to 2005Q4, while four-quarter-ahead is available from 1974Q2 to 2005Q4. The date here is the time point when the forecast was made. Largest data period for each horizon is used in order to take advantages of all the information.

In addition to the Greenbook forecasts, we also use the output growth forecast and inflation forecast f_{t+h} with horizons $h = 1, 4$ from the SPF forecast, one of the well-known survey forecast currently organized by the Federal Reserve Bank of Philadelphia. The SPF is the aggregation of many commercial forecasts, made by professional forecasters, largely coming from business com-panies or the Wall Street. However, the data period of the SPF forecast is different from that of the Greenbook forecasts. One-quarter-ahead forecast is available from 1968Q4 to 2012Q1 at the time of our writing this paper, while four-quarter-ahead forecast is available from 1974Q4 to 2012Q1.[4] Notably, the forecast for

4 However, the realized value is only available before and including 2011Q3, the last

real output growth actually started from 1981*Q*3, before which the forecast value were computed by the forecast of nominal GNP and GNP price deflator index. Since those forecasts for real output growth are still a forecast product, we include them in our dataset. While the starting time point of SPF forecast is nearly the same as that of Greenbook, the recent SPF forecasts are available without lag unlike the Greenbook forecasts. The behavior of SPF forecasts at the time when Greenbook forecasts are not accessible can provide an alternative source of information on the future. Moreover, since the SPF consists of forecasts of many profes-sional forecasters, there are a certain degree of dispersion between different individual forecasters, researched recently by Capistran and Timmermann (2008) and Patton and Timmermann (2010). Here in this paper, the median response of the forecast survey is used as a consensus of the SPF forecasts.

As for the realized value y_{t+h}, both "real-time data" and "revised data" are used in this paper. Real-time data is the name for the second revision of the statistical data, systematically proposed and discussed by Croushore and Stark (2001) which can be found on the real-time data website of Federal Reserve Bank of Philadelphia. The data of the current quarter's growth rate is computed by using the following quarter's vintage. The second revision data is a comparatively complete data with less statistical error compared to initial revision data. It is also more close to what the forecasters are forecasting, "since this series does not include the rebenchmarking and definitional changes that occur in the annual and quinquennial revisions"(Romer and Romer, 2000). So in recent years, in choosing realized values of a forecast target, many papers are using the real-time data, such as in Romer and Romer (2000), Rossi and Sekhposyan (2011), etc. On the other side, "revised data" means the data computed with the most recent vintage (2011*Q*4 vintage in this paper), which should well represent the economic status of past periods on the standpoint of today. By doing with both real-time data and revised data, not only can we check the robustness of certain results, but also we can revisit the differences between the two sets of data,

---

few forecasts of SPF are not used in our empirical study .the data periods should be: 1968*Q*4 to 2011*Q*2 (SPF 1-step-ahead) and 1974*Q*4 to 2010*Q*3 (SPF 4-step-ahead).

discussed by Croushore and Stark (2001) and other related literature. Data are obtained from the Federal Reserve Bank of Philadelphia for both indexes of real GNP/GDP and GNP/GDP price. By applying the transformation of $y_t = 400 \ln(x_t/x_{t-1})$ with x being either the real GNP/GDP or GNP/GDP price deflator index, we obtain the values of the output growth rate or the inflation rate compatible in format with the forecast values for both the real-time data and the revised data.

3. The EKT Method

The EKT method is based on the linear GMM framework. Here we briefly review the method. Let $f_{t+h} = \theta' W_t$ be the h-step-ahead linear forecast of y_{t+h} conditional on the information set $\mathcal{F}_t$ at time t, where θ is an unknown k-vector of parameters and W_t is a k-vector of variables that are $\mathcal{F}_t$ - measurable. A generalization to nonlinear forecast $f_{t+h} = (W_t)$ and nonlinear GMM is straightforward.

Asymmetric loss: EKT uses a flexible class of loss function

$$L(\alpha,\ p,\ \theta) = [\alpha + (1 - 2\alpha) \cdot 1(y_{t+h} - f_{t+h} < 0)] \cdot |y_{t+h} - f_{t+h}|^p \qquad (1)$$

where $\alpha \in (0,\ 1)$ p is a positive integer, $1(\cdot)$ is the indicator function which equals to 1 when its argument is true and 0 otherwise, and $\varepsilon_{t+h} = y_{t+h} - f_{t+h}$ is the forecast error. This loss function nests the squared error loss $L(0.5,\ 2,\ \theta)$, the absolute error loss $L(0.5,\ 1,\ \theta)$, the lin-lin loss $L(\alpha,\ 1,\ \theta)$, and the quad-quad loss $L(\alpha,\ 2,\ \theta)$. EKT chooses $p = 1$ or 2 in their empirical work, while in theory EKT does not rule out the choice of other values of p. The parameter α depicts the asymmetry. The quad-quad loss function with $p = 2$ nests the symmetric squared error loss with $\alpha = 0.5$, When $\alpha < 0.5$, forecasters tend to punish over-prediction more and create a bias towards under-prediction. When $\alpha > 0.5$, forecasters tend to punish under-prediction more and create a bias toward over-prediction.

GMM Identification: For given $(\alpha_0,\ p_0)$ the forecaster is rational w.r.t. a certain loss function if her forecast $f^*_{t+1} = \theta^{*\prime} W_t$ is optimal, i.e.,

$$\theta^* = \arg\min_{\theta \in \Theta} E\{L\ (\alpha_0, p_0, \theta\} \quad (2)$$

solves the following first order condition (FOC)

$$E\ (W_t \cdot [1(y_{t+h} - f^*_{t+h} < 0) - \alpha_0] \cdot |y_{t+h} - f^*_{t+h}|^{p0-1}) = 0. \quad (3)$$

Our goal is, however, not the estimation of θ^* We will be given the forecast $\hat{f}_{t+h} = \hat{\theta}_t' W_t$ from its producer (a forecaster such as FRB or SPF). From the user's standpoint, we wish to read the forecaster's attitude parameterized by α in her loss function, for a given fixed value of p. In order to back out α, the FOC should hold if and only if $\alpha = \alpha_0$. EKT shows that $\theta^*(\alpha_0)$ is a continuous differentiable one-to-one mapping from (0, 1) to Θ, such that a different asymmetric level yields a different forecast and a different forecast will reveal a different asymmetric level.

Backing out the asymmetric parameter: W_t is the information set that the forecaster knows at time t. k = dim(W_t) is typically very large, and not all of information in W_t is accessible to the users. For the purpose of backing out α, we only need m ($\geq$1) instruments $V_t \subset W_t$, satisfying the condition

$$A(\alpha_0) \equiv E(V_t \cdot [1(y_{t+h} - f^*_{t+h} < 0) - \alpha_0] \cdot |y_{t+h} - f^*_{t+h}|^{p0-1}) = 0. \quad (4)$$

We present the empirical results with the instruments $V_t = (1\ y_{t-1})'$ consisting of a constant and the lagged realized value (m = 2). It allows us to use only several observed information without knowing the entire information used by the forecaster, to back out the asymmetric parameter. Let B = $E(V_t \cdot |y_{t+h} - f^*_{t+h}|^{p0-1})$ And $C = E(V_t \cdot 1(y_{t+h} - f^*_{t+h} < 0) \cdot |y_{t+h} - f^*_{t+h}|^{p0-1})$. Write $A(\alpha) \equiv C - \alpha B$. Then the orthogonality condition (4) can be solved for α_0 from

$$\min_{\alpha} Q(\alpha) = A(\alpha)' \mathrm{S}^{-1} A(\alpha) = (C - \alpha B)' \mathrm{S}^{-1} (C - \alpha B), \quad (5)$$

where S is a positive definite $m \times m$ weighting matrix. Under some assumptions of EKT, the true value α_0 yields the unique minimum of the quadratic form. Notice that $Q(\alpha)$ is a quadratic equation in α. Taking derivative with respect to α, we obtain

$$\alpha_0 = \arg\min_{\alpha} Q(\alpha) = \frac{B'S^{-1}C}{B'S^{-1}B}. \tag{6}$$

This is estimated from

$$\hat{a}_{T,\tau} = \frac{\hat{B}'_{T,\tau}\,\hat{S}^{-1}_{T,\tau}\,\hat{C}_{T,\tau}}{B'_{T,\tau}\,\hat{S}^{-1}_{T,\tau}\,\hat{B}_{T,\tau}}, \tag{7}$$

Where

$$\hat{B}_{T,\tau} = \frac{1}{T}\sum_{t=\tau}^{T+\tau-1} V_t \cdot |y_{t+h} - \hat{f}_{t+h}|^{p0-1}, \tag{8}$$

$$\hat{C}_{T,\tau} = \frac{1}{T}\sum_{t=\tau}^{T+\tau-1} V_t \cdot 1(y_{t+h} - \hat{f}_{t+h} < 0) \cdot |y_{t+h} - \hat{f}_{t+h}|^{p0-1}, \tag{9}$$

and $\hat{S}_{T,\tau}$ is a consistent estimate of S. The estimation of $\hat{a}_{T,\tau}$ depends on the estimate of S, which in turn depends on α_0, and thus we iterate estimation of α and the Newey-West (1987) estimator of S

$$\hat{S}_{T,\tau}\ (\alpha) = \frac{1}{T}\sum_{t=\tau}^{T+\tau-1}\sum_{i=0}^{4} w_i a_t(\alpha)\, a_{t+i}\,(\alpha), \tag{10}$$

Where

$$a_t(\alpha) \equiv V_t \cdot [1(y_{t+h} - \hat{f}_{t+h} < 0) - \alpha] \cdot |y_{t+h} - \hat{f}_{t+h}|^{p0-1} \tag{11}$$

and $\omega_i = 1 - \frac{i}{5}$. We start the iteration with $\hat{S}_{T,\tau}\ (\alpha)\, I_m$ to compute the first $\hat{\alpha}_{T,\tau,1}$, then plug $\hat{\alpha}_{T,\tau,1}$ into $\hat{S}_{T,\tau}\ (\hat{\alpha}_{T,\tau,1})$ to get a new more

efficient weighting matrix $\hat{S}_{T,\tau}^{-1}$ $(\hat{\alpha}_{T,\tau,1})$. Then use this to compute a new estimator $\hat{\alpha}_{T,\tau,2}$. These steps are repeated until $\hat{\alpha}_{T,\tau,j}$ converges to $\hat{\alpha}_{T,\tau,j-1}$. EKT establishes the consistency and asymptotic normality for p_0= 1, 2,

$$T^{\frac{1}{2}}\left(\hat{\alpha}_{T,\tau} - \alpha_0\right) \xrightarrow{d} N(0, (B'S^{-1}B)^{-1}) \tag{12}$$

This result does not depend on the way of constructing forecasts $\hat{f}_{t+h}$.

Rolling windows: Instead of using the whole data of all periods to calculate one estimate of the asymmetric parameter, we apply the rolling window strategy to examine its possible time varying behavior and to analyze its asymmetry preference in different periods of time. The time $t = \tau$ is when a rolling estimation sample begins, time $t = T + \tau - 1$ is when the estimation sample ends, and thus T denotes the size of the rolling estimation sample. Let the index t be used to denote the time point when an h-step-ahead forecast $\hat{f}_{t+h}$ is made. To estimate α, we use the rolling windows of size T. Let $n + h$ be the total number of periods available. We use the first rolling sample $\{V_t, y_{t+h}, \hat{f}_{t+h}\}_{t=2}^{p=T+1}$ [5] to compute $\hat{\alpha}_{T,1}$ use the second rolling sample $\{V_t, y_{t+h}, \hat{f}_{t+h}\}_{t=3}^{p=T+2}$ to compute $\hat{\alpha}_{T,2}$, use the th rolling sample $\{V_t, y_{t+h}, \hat{f}_{t+h}\}_{t=\tau+1}^{p=T+\tau}$ to compute $\hat{\alpha}_{T,\tau}$, and the last rolling sample $\{V_t, y_{t+h}, \hat{f}_{t+h}\}_{t=n-T+1}^{t=n}$ to compute $\hat{\alpha}_{T,n-T}$. Hence, we obtain the total n - T number of the asymmetric loss parameter estimates $\hat{\alpha}_{T,\tau}$ where the first index T denotes the size of the rolling window and the second index τ = 1, …, n - T denotes the time when the rolling window *begins*. In presenting $\{\hat{\alpha}_{T,\tau}\}$ in Section 4, we use figures whose horizontal axis is τ = 1, …, n – T, with a fixed T = 40 (40 quarters in a 10 year window) and n being determined by the maximum length of the forecasts available in Greenbook and SPF. For example when τ = 1990Q1 in Figures 1-4,

5 Since at time t, only realized value and forecast value of time t - 1 is available, so the first rolling samply starts from the second earliest data, with the first data as instrumental variables.

$\hat{\alpha}_{T,\tau}$ is estimated using the rolling sample *beginning* from τ = 1990Q1 and ending at τ +T - 1 = 1999Q4. In applying the rolling window scheme, we move the period one quarter at a time and compute the corresponding estimate of the asymmetric parameter. We keep moving forward in the time axis until we reach the end of the data period.

Test for forecast rationality: We construct the J-statistic for rationality under the asymmetric loss,

$$J_{T,\tau}(\hat{\alpha}_{T,\tau}) = T \times \hat{Q}_{T,\tau}(\hat{\alpha}_{T,\tau}) = T \times \hat{A}_{T,\tau}(\hat{\alpha}_{T,\tau})' \hat{S}_{T,\tau}^{-1}(\hat{\alpha}_{T,\tau})\hat{A}_{T,\tau}(\hat{\alpha}_{T,\tau}), \tag{13}$$

where

$$\hat{A}_{T,\tau}(\hat{\alpha}_{T,\tau}) = \frac{1}{T}\sum_{t=\tau}^{T+\tau-1} a_t(\hat{\alpha}_{T,\tau}) = \hat{C}_{T,\tau} - \hat{\alpha}_{T,\tau}\hat{B}_{T,\tau}. \tag{14}$$

This J-test for over-identification checks whether the orthogonality condition (4) holds for $\alpha = \hat{\alpha}_{T,\tau}$, that is to check if the forecast rationality holds for $\alpha = \hat{\alpha}_{T,\tau}$. If the number of orthogonal conditions (the number of instruments) is larger than one m = dim(V_t) > 1, the $J_{T,\tau}(\hat{\alpha}_{T,\tau})$ statistic follows the asymptotic chi-square distribution with (m - 1) degrees of freedom, χ^2_{m-1}. A large value of the $J_{T,\tau}(\hat{\alpha}_{T,\tau})$ statistic would indicate the rejection of the forecast rationality condition (4) when $\alpha = \hat{\alpha}_{T,\tau}$.

Test for loss symmetry: A next step we can take when the forecast rationality is not rejected is to test for the loss symmetry. Conditioning that the $J_{T,\tau}(\hat{\alpha}_{T,\tau})$ statistic has not rejected the orthogonality condition (4), the $J_{T,\tau}(0.5)$ statistic with α = 0.5 can be used to test for the symmetry of the loss function. The rejection of this test would point to the rejection of the loss symmetry if the rationality has not been rejected by $J_{T,\tau}(\hat{\alpha}_{T,\tau})$. However, the conditional distribution of the restricted statistic $J_{T,\tau}(0.5)$ conditional on $J_{T,\tau}(\hat{\alpha}_{T,\tau})$ is hard to obtain. Hence, the statistic $J_{T,\tau}(0.5)$ is taken as a *joint* test statistic for forecast rationality

and loss symmetry. In this case, $J_{T,\tau}(0.5)$ asymptotically follows the chi-square distribution χ^2_m (with degrees of freedom equal to m as no parameter has been estimated). In the next section however, we will loosely interpret $J_{T,\tau}(0.5)$ mainly as a test for loss symmetry. The test of the loss symmetry may also be conducted by computing the 95% confidence interval of α_0 using the results of (12).

4. Empirical Analysis

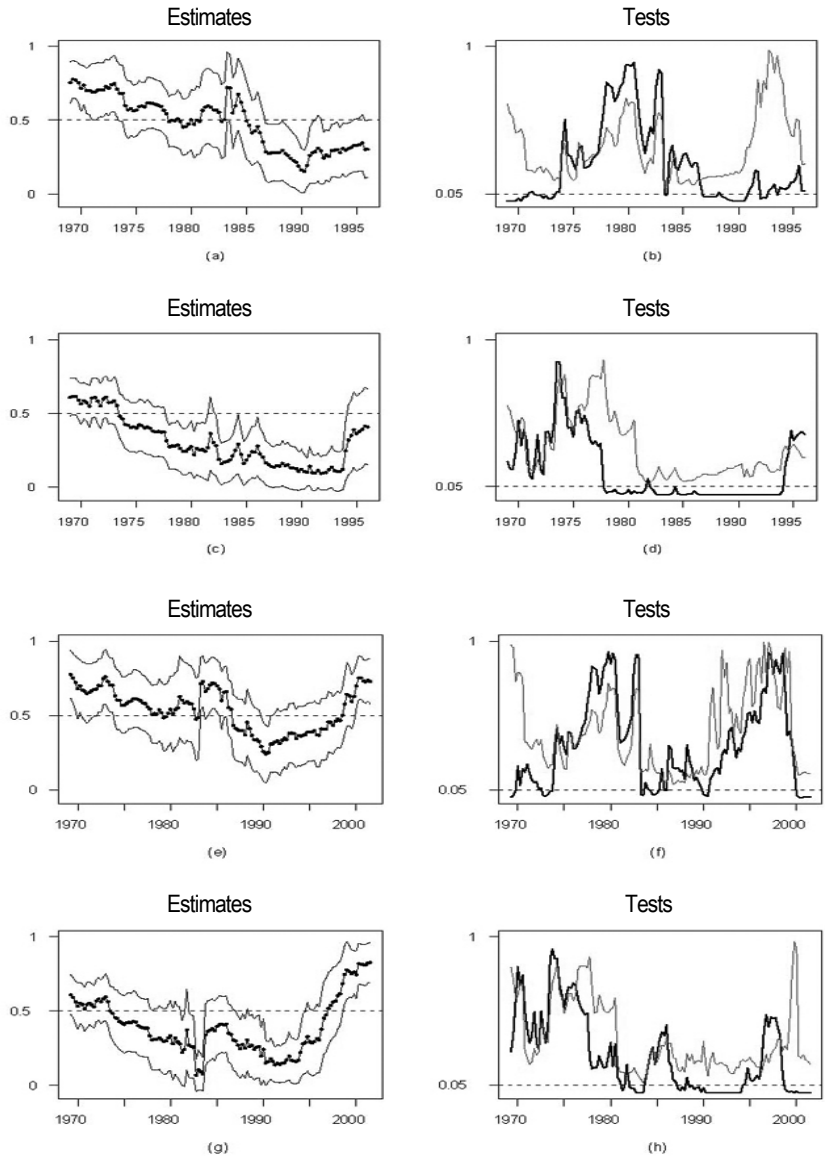
By applying the EKT method to the rolling windows of size T = 40, we obtain a series of the three statistics for each rolling window indexed by τ : (1) the asymmetric loss parameter estimate $\hat{\alpha}_{T,\tau}$, (2) the p-value of the statistic $J_{T,\tau}(\hat{\alpha}_{T,\tau})$ for forecast rationality, and (3) the p-value of the joint test statistic $J_{T,\tau}(0.5)$ for forecast rationality and loss symmetry.

Figures 1 and 2 present these results for output growth forecasts with h = 1 and h = 4, respectively, while Figures 3 and 4 do it for inflation forecasts. Each of Figures 1-4 has a 4×2 array of 8 panels of time series graphs over τ, in two columns and four rows. Column 1, (a), (c), (e), (g) in the left panels, reports "Estimates" $\hat{\alpha}_{T,\tau}$ with the 95% confidence bands at each τ computed using the asymptotic standard errors obtained from (12). Column 2, (b), (d), (f), (h) in the right panels, reports the p-values of two "Tests", $J_{T,\tau}(\hat{\alpha}_{T,\tau})$ and $J_{T,\tau}(0.5)$. The p-values of the statistic $J_{T,\tau}(\hat{\alpha}_{T,\tau})$ are in lighter (red) color and the p-values of the statistic $J_{T,\tau}(0.5)$ are in darker (black) color.

Each of Figures 1~4 has four rows. Row 1 uses the forecasts $\hat{f}_{t+h}$ from Greenbook and the realized data y_{t+h} from real-time vintages. Row 2 uses the forecasts $\hat{f}_{t+h}$ from Greenbook and the realized data y_{t+h} from the last revised data vintage. Row 3 uses the forecasts $\hat{f}_{t+h}$ from SPF and the realized data y_{t+h} from real-time vintages. Row 4 uses the forecasts $\hat{f}_{t+h}$ from SPF and the realized data y_{t+h} from revised data.

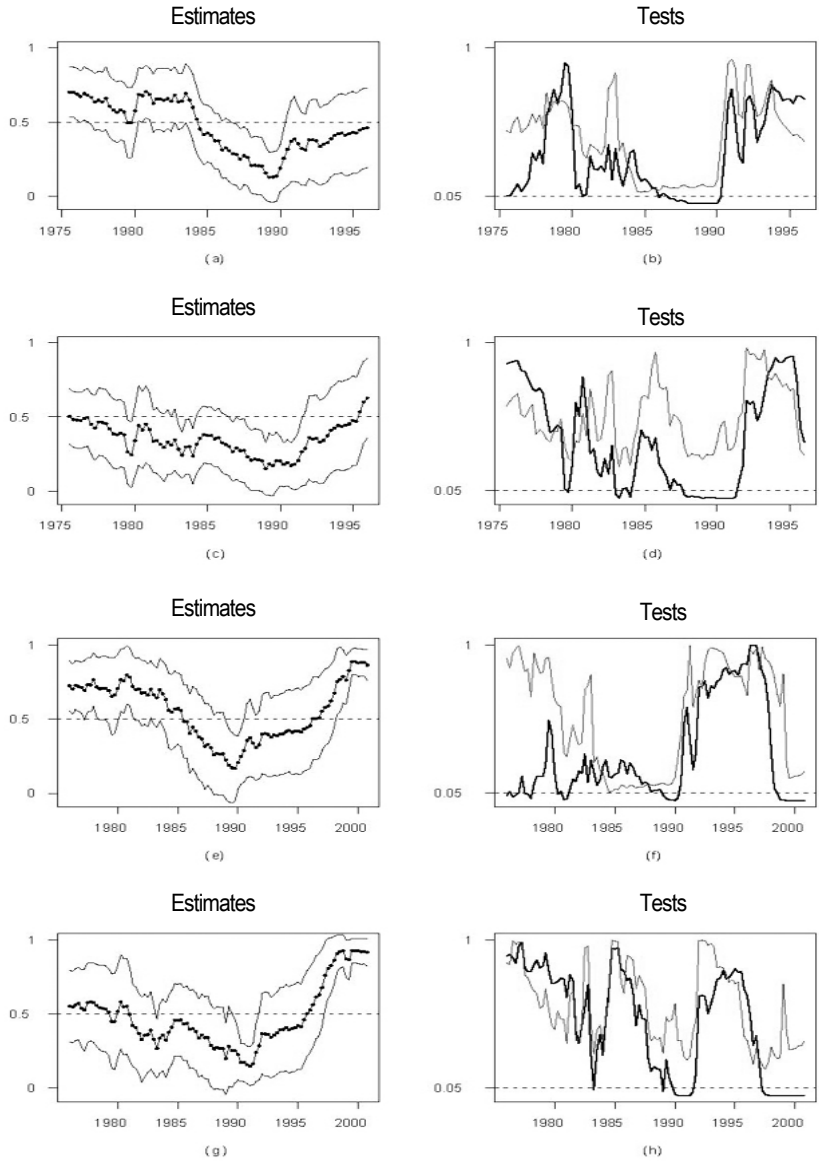
In all figures, the time stamp in the horizontal axis is τ, denoting the beginning of the 10 year rolling windows as discussed in the previous section. That means, for example, τ = 1985Q1 should be read that $\hat{\alpha}_{T,\tau}$, $J_{T,\tau}(\hat{\alpha}_{T,\tau})$, $J_{T,\tau}(0.5)$ are computed using the rolling sample $\{V_{t,}\ y_{t+h}, \hat{f}_{t+h}\}_{t=\tau}^{t=T+\tau-1}$ from 1985Q1 to 40 quarters (10 years) later until 1994Q4.

Figure 1 Output Growth Forecast (h = 1)



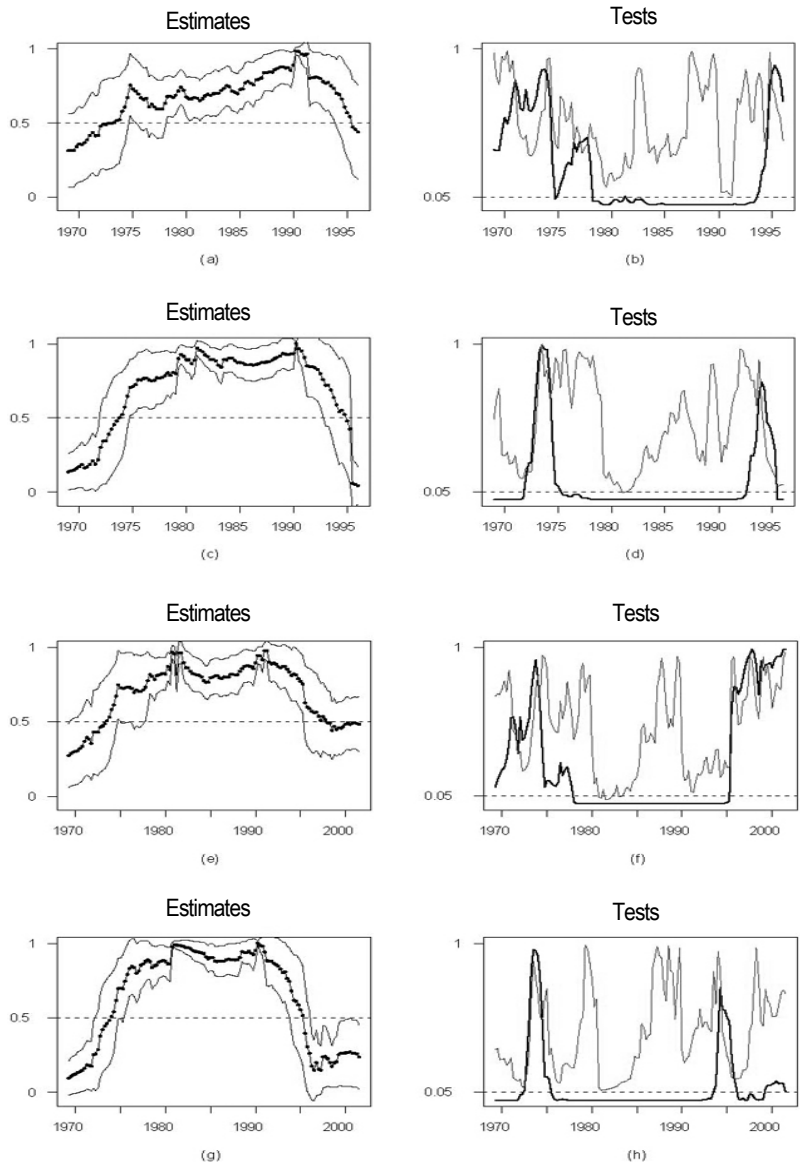
Note : Estimates and Tests with 1-step-ahead output forecast: (a) and (b) with Greenbook and real-time data, (c) and (d) with Greenbook and revised data, (e) and (f) with SPF and real-time data, (g) and (h) with SPF and revised data.

Figure 2 Output Growth Forecast (h = 4)



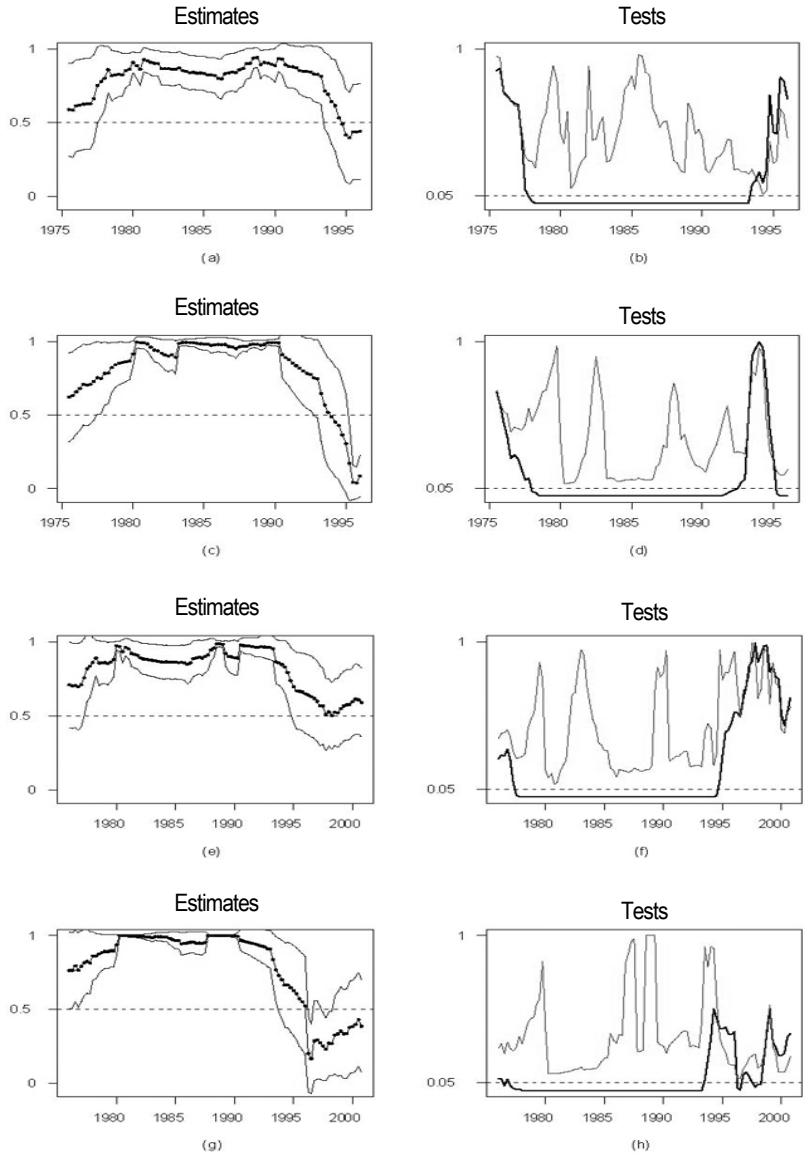
Note : Estimates and Tests with 4-step-ahead output forecast: (a) and (b) with Greenbook and real-time data, (c) and (d) with Greenbook and revised data, (e) and (f) with SPF and real-time data, (g) and (h) with SPF and revised data.

Figure 3 Inflation Forecast (h = 1)



Note : Estimates and Tests with 1-step-ahead inflation forecast: (a) and (b) with Greenbook and real-time data, (c) and (d) with Greenbook and revised data, (e) and (f) with SPF and real-time data, (g) and (h) with SPF and revised data.

Figure 4 Inflation Forecast ($h = 4$)



Note : Estimates and Tests with 4-step-ahead inflation forecast: (a) and (b) with Greenbook and real-time data, (c) and (d) with Greenbook and revised data, (e) and (f) with SPF and real-time data, (g) and (h) with SPF and revised data.

For the forecasts $\hat{f}_{t+h}$ both the Greenbook and the SPF forecasts (of output growth and inflation) are included. For the realized values of y_{t+h} both real-time data and revised data are used.

Only the results with 1-step-ahead (one-quarter-ahead) forecast and 4-step-ahead (one-year-ahead) forecast are presented.

4.1. Results

We first summarize our findings on the "Asymmetric Loss in the Greenbook and the Survey of Professional Forecasters" as follows.

1. The degree and direction of the asymmetry are time-varying over the rolling windows.
2. Rationality of forecasts of output growth and inflation is not rejected under asymmetric loss over nearly all rolling windows.
3. Real output growth is consistently under-predicted in 1990s and the inflation rate is consistently over-predicted in 1980s and 1990s.
4. Inflation forecast generally exhibits a greater asymmetric level in magnitude and frequency than output growth forecast.
5. Long horizon inflation forecasts generally exhibit greater asymmetric loss compared to short horizon inflation forecasts.
6. All of these results are similar in the Greenbook forecasts and the SPF forecasts.

Let us look at some details of these findings. Column 1 of all figures shows that the asymmetric parameter estimates $\hat{\alpha}_{T,\tau}$ are time-varying in degree and direction. The 95% confidence band reported in Column 1 often does not include α = 0.5 (dashed line), rejecting symmetry. While the values of $\hat{\alpha}_{T,\tau}$ are mostly below 0.5 (for output growth forecast) or mostly above 0.5 (for inflation forecasts), occasional crossings are also observed.

In Column 2, many small p-values of the loss symmetry test $J_{T,\tau}(0.5)$ in dark (black) line are detected, often falling below the conventional significance level 0.05 (dashed line), indicating rejection of the joint hypothesis of symmetry and rationality for many rolling windows indexed by τ.

On the contrary, the p-values of the rationality test $J_{T,\tau}(\hat{\alpha}_{T,\tau})$ in light (red) line, which are typically very large (no rejection of the forecast rationality), rarely go below 0.05 (rejection of rationality). Rationality of forecast is challenged in some rolling windows with low p-values but its rejection has almost never happened.[6] It shows that, according to the forecast rationality test allowing asymmetry, the rationality under asymmetric loss cannot be rejected (for both output growth forecast and inflation forecast, for both one quarter horizon and one year horizon, and for both real time data and revised data). The small p-values below 0.05, occurring frequently in the loss symmetry test while occurring rarely in the forecast rationality test with allowing asymmetry, confirm that the rejection of the joint test of symmetry and rationality is likely due to the rejection of the symmetry rather than the rejection of the rationality. This indicates that the forecasts of the Greenbook and the SPF are not rejected to be rational if these forecasters' loss functions are assumed to be asymmetric.

Besides, there is a substantial difference in the pattern of time-varying asymmetry between output growth forecast and inflation forecast. In Column 1 of Figures 1 and 2, when is around 1990Q1, the strong rejection of symmetry suggests an underlying asymmetric loss that punishes over-predicting than under-predicting during 1990s. The asymmetric level of output growth fore-cast is generally mild, often embracing the null hypothesis of symmetry, compared to that of inflation forecast. Inflation forecasts show a greater asymmetric level both in magnitude and frequency, consistently punishing under-predicting much more than over-predicting during 1980s and 1990s. Notably, in 1990s, the forecasters were consistently under-predicting output growth and over-predicting inflation, showing a cautious behavior in forecasting.

---

6 Further inspection of the figure indicates that the small p-values of the forecast rationality test are often accompanied with a dramatic change in the corresponding estimates, compared to the former adjacent rolling period. So those small p-values are most likely to be caused by the ill-behavior of instrument variable at that period, and not necessarily mean that the forecast rationality under asymmetric loss in those periods is rejected.

Only results with 1-step-ahead forecast and 4-step-ahead forecast are presented, representing short horizon and long horizon. According to figures with h = 1, 4, holding other conditions fixed, the estimates $\hat{\alpha}_{T,\tau}$ of output growth forecast seem not much to be affected by the choice of horizons. To contrast, in inflation forecast, there may be some, albeit not strong, evidence that long-horizon inflation forecasts generally exhibit a greater level of asymmetric loss than short-horizon inflation forecasts. This evidence is reconfirmed in the inflation nowcast (h = 0) of both Greenbook and SPF (not reported for space), in which the asymmetric level is much milder in magnitude and frequency compared to inflation forecast of other horizons (h > 0).

Although the data period is different between Greenbook and SPF, the time when the first forecast was made is approximately the same. The main difference in terms of data length is that the SPF has the forecasts available up to the latest quarter, while Greenbook's recent forecast is not available because of the 5-year-lag of publication. It is surprising to find that there are many similarities between the asymmetric loss parameter estimates $\hat{\alpha}_{T,\tau}$ (in Column 1) of Greenbook and those of SPF. The result is robust in all pairs of Greenbook and SPF forecasts. Due to the similarity between the Greenbook and the SPF forecasts, the value of the recent data of SPF forecasts since 2006 should not be neglected. The estimates $\hat{\alpha}_{T,\tau}$ for output growth forecast of SPF after τ = 1995 are generally going up above 0.5, and rejecting the null hypothesis of the loss symmetry. On the other hand, the $\hat{\alpha}_{T,\tau}$ estimates of inflation forecasts are mildly going up from below 0.5, and for most of the recent periods, the loss symmetry is not rejected for inflation forecasts.

4.2. Robustness Checks

Our results are robust to the choice of p. The loss exponent parameter p is set to be 1 or 2. The loss (1) with p=2 nests the symmetric squared error loss. The results for p=1 are similar and available from the authors.

Our results are robust to the choice of V_t. We have considered three sets of the instrument variables V_t as in EKT. (i) V_t =1 consisting of a constant (m=1), (ii) $V_t = (1\ y_{t-1})'$ consisting of a constant and the lagged

realized value (m=2) and (iii) V_t =(1 y_{t-1} $\hat{\varepsilon}_{t-1}$)$'$ consisting of a constant, the lagged realized value, and lagged forecast error (m=3). The results are very similar and robust to the instrumental variable choice. That may be evidence that those instruments are not weak, as Capistran (2008) argues, "the estimates do not change much when different instruments are used, which can be considered evidence of strong identification. If this is true it also implies that the tests for symmetry and rationality have good power." Reported is the results only for the second instrument set.

Our results are also robust to the choice of T, the size of rolling windows. The rolling window of size T=40 quarters may be a value not too long to erase the differences between different time periods and also not too short to undermine the power of the two tests and the asymptotic results. With a small rolling window like T=20, the power of the rationality test might be severely undermined, while with large rolling window like T=80, the potential time variation in $\hat{\alpha}_{T,\tau}$ can be smoothed out. The results in the figures presented are with T = 40 (quarters). The results with T=20, 80 are qualitatively the same (not reported for space).

Different vintage methods are applied to compute the realized value of output growth and inflation. Although during the periods when symmetry is rejected, using the revised data seem to give us a greater asymmetric level, both in magnitude and frequency than using real-time data, especially in output growth forecast, the above results are generally robust with the choice of data vintages.

5. Conclusions

We have presented the empirical findings that, in both Greenbook and SPF forecasts, the degree and direction of the asymmetry in their loss functions vary over time while their rationality is not rejected over nearly all rolling windows. To conclude we ask ourselves the following questions. (1) Why was the loss function of the Fed's Greenbook inflation forecasts asymmetric during 1980s and 1990s? (2) Why was the loss function of the Fed's Greenbook output growth forecasts

asymmetric during 1990s? (3) Why were the loss functions of the Greenbook and the SPF similar?

For the first question, we recall the different degree of asymmetry between output growth forecast and inflation forecast. The long-horizon inflation forecasts appear to reveal even greater asymmetry. These differences may stem from the views about monetary policy, which seems to be related to the Fed Chairman. In Romer and Romer (2004), they argue that "the well-tempered monetary policies of the 1950s and of the 1980s and 1990s stemmed from a conviction that inflation has high costs and few benefits, together with realistic views about the sustainable level of unemployment and the determinants of inflationl. Since the appointment of Volcker in 1979, low inflation is of critical importance and, as Romer and Romer (2004) write, "high inflation, in this view, disrupts the economy and depresses long-run growth." This view is inherited by Greenspan and thus covers the whole 1980s and 1990s. According to this view, during the 1980s and 1990s, under-predicting inflation, which leads to expansive policies, may push up inflation rate, while over-predicting inflation is much less costly since it will lead to a policy to lower inflation. Hence, during those days, the Fed is likely to have an asymmetric loss to punish under-predicting more than over-predicting. On the contrary, Fed's realistic views about the sustainable level of unemployment and output growth led them to be generally impartial to under-predicting and over-predicting, making their loss function less asymmetric for output growth forecasts. Also, due to the fact that "inflation responds to monetary policy only after a lag" (Capistran 2008), the preference of punishing under-predicting more than over-predicting should be more apparent in long-horizon inflation forecast.

For the second question, the output growth forecast asymmetry can also be interpreted by the Fed's mission in pursuit of maximum employment, under which over-predicting output growth would be more costly (which leads to an untimely deflationary policy and thus the decline of growth rate) than under-predicting (which refers to an untimely expansive policy, comparatively more acceptable) (cf. Patton and Timmermann, 2007b). It suggests that Fed's view about monetary policy has changed to be more balanced, which pursues both maximum

employment and low inflation at the same time, while before, lowering inflation was of chief importance. This idea is confirmed by Romer and Romer (2004), in which they cited Greenspan's affirmation in 2000 that "there is still uncertainty about whether the current level of labor resource utilization can be maintained without generating increased cost and price pressures".

For the third question, while Fed's asymmetric behavior in their Greenbook forecasts may be well justified since its forecast objective is linked to monetary policy, the same explanation cannot justify the similar behavior in the SPF forecasts. One explanation is that SPF try to be in line with Greenbook. Since the SPF forecasts are made largely by a group of people from business circle and the Wall Street, they may have their own forecast objectives, which lead them to be in line with the Fed's asymmetry preference. Imagine one forecaster in SPF from the Wall Street, who needs to base his portfolio on the future inflation forecast. Since Volcker or Greenspan expressed the idea that to lower inflation is the most important goal in monetary policy, choosing to be in line with Fed's asymmetry preference will allow them to set up their portfolio which will be benefited from Fed's monetary policy, while going against the Fed's asymmetry preference may result in a debacle in financial market due to an "opposite" policy.

Finally, having noted the similarity of the asymmetry in loss functions of the Greenbook and the SPF, the information contained in SPF may be extremely valuable when Greenbook forecasts have not yet published. Because Greenbook forecasts become available after 5 years later, the forecasters in the SPF may judge the Fed's asymmetry preference by subtle inferences on the Fed Chairman's speeches. However, this explanation may be challenged by the finding of Capistran and Timmermann (2008), in which they find that individual forecasters in the SPF tend to have different asymmetry preferences, some systematically over-predicting inflation and others systematically under-predicting it. Nevertheless, the consensus of SPF may "choose" to be in line with Fed's asymmetry preference, even with large dispersion among them. Further inspection on the similar behaviors between Greenbook and SPF lead us to the thought that recent SPF forecasts may contain useful information when Greenbook forecasts have yet to

become available after the 5 year lag publication. If SPF learns from Fed Chairmen's speeches to be in line with Greenbook in asymmetry preference, the recent SPF forecasts will be valuable in showing the asymmetry pattern in unpublished Greenbook, thus telling Fed's view about monetary policy and recent economy. Specifically, SPF forecasts in the rolling windows beginning with $\tau > 1996Q1$ contain forecasts for the periods after $2005Q4$ for which Greenbook forecasts are not currently available. For this periods after 2006, the SPF output growth forecasts are consistently over-predicting, while the SPF inflation forecasts seem to stop the trend of going down and even show a mild rise embracing symmetry. Will the Fed's Greenbook forecasts show the similar behavior in these recent years after 2006, when they become available? It remains to be seen, whether SPF can foretell the Greenbook.

References

Capistran, C. (2008), "Bias in Federal Reserve Inflation Forecasts: Is the Federal Reserve Irrational or Just Cautious?", *Journal of Monetary Economics* 55(8): 1415-1427.

Capistran, C. and A. Timmermann, (2008), "Disagreement and biases in inflation expectations", *Journal of Money, Credit and Banking* 41(2-3): 365-396.

Croushore, D., (2010), "An Evaluation of Inflation Forecasts from Surveys Using Real-Time Data", *B.E. Journal of Macroeconomics*, Contributions 10, Article 10.

Croushore, D. and T. Stark, (2001), "A Real-Time Data Set for Macroeconomists", *Journal of Econometrics* 105: 111-130.

D'Agostino, A. and K. Whelan, (2008), "Federal Reserve Information During the Great Moderation", *Journal of European Economic Association* 6(2/3): 609-620.

Diebold, F. X. and Lopez, J., (1996), "Forecast Evaluation and Combination", in *Handbook of Statistics*, eds. G. S. Maddala and C. R. Rao, Amsterdam: North-Holland, pp. 241-268.

Elliott, G., I. Komunjer, and A. Timmermann, (2005), "Estimation and Testing of Forecast Rationality Under Flexible Loss", *Review of Economic Studies* 72(4): 1107-1125.

Elliott, G., I. Komunjer, and A. Timmermann, (2008), "Biases in Macroeconomic Forecasts: Irrationality or Asymmetric Loss", *Journal of European Economic Association* 6(1): 122-157.

Elliott, G. and A. Timmermann, (2008), "Economic Forecasting", *Journal of Economic Literature* 46: 3-56.

Frankel, J. A., (2011), .Over-optimism in Forecasts by Official Budget Agencies and Its Implications., NBER Working Paper No. 17239.

Granger, C. W. J. and P. Newbold, (1986), *Forecasting Economic Time Series*, 2nd ed., New York: Academic Press.

Komunjer, I. and T. Owyang M, (2012), "Multivariate Forecast Evaluation and Rationality Testing", *The Review of Economics and Statistics, forthcoming.*

Mincer, J. and V. Zarnowitz, (1969), "The Evaluation of Economic Forecasts," in

Economic Forecasts and Expectations, ed. J. Mincer, New York: National Bureau of Economic Research, pp. 81-111.

Newey, W. K. and K. D. West, (1987), "A Simple, Positive Semi-De.nite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix", *Econometrica* 55: 703-708.

Patton, A. J. and A. Timmermann, (2007a), "Properties of Optimal Forecasts under Asymmetric Loss and Nonlinearity", *Journal of Econometrics* 140(2): 884-918.

Patton, A. J. and A. Timmermann, (2007b), "Testing Forecast Optimality under Unknown Loss", *Journal of American Statistical Association* 102(480): 1172-1184.

Patton, A. J. and A. Timmermann, (2010), .Why do Forecasters Disagree? Lessons from the Term Structure of Cross-Sectional Dispersion., *Journal of Monetary Economics* 57(7): 803-820.

Patton, A. J. and A. Timmermann, (2012), "Forecast Rationality Tests Based on Multi-Horizon Bounds", *Journal of Business and Economic Statistics*, forthcoming.

Romer, C. D., and D. H. Romer, (2000), "Federal Reserve Information and the Behavior of Interest Rates", *American Economic Review* 90: 429-457.

Romer, C. D., and D. H. Romer, (2004), "Choosing the Federal Reserve Chair: Lessons from History", *Journal of Economic Perspectives*, vol. 18(1), Winter, pages 129-162,

Rossi, B., (2012), "Comment on: Forecast Rationality Tests Based on Multi-Horizon Bounds", *Journal of Business and Economic Statistics*, forthcoming.

Rossi, B. and T. Sekhposyan, (2011a), "Understanding Models.Forecasting Performance", *Journal of Econometrics*, 164(1): 158-172.

Rossi, B. and T. Sekhposyan, (2011b), "Forecast Optimality Tests in the Presence of Instabilities", ERID Working Paper No. 109, Duke University.

Sims, C. A., (2002), "The Role of Models and Probabilities in the Monetary Policy Process", *Brookings Papers on Economic Activity* 2: 1-62.

Stock, J. and M. Watson, (2007), "Why Has U.S. Inflation Become Harder to Forecast?", *Journal of Monetary, Banking and Credit* 39(1): 3-33.

Varian, H. R., (1975), "A Bayesian Approach to Real Estate Assessment., in *Studies in Bayesian Econometrics and Statistics in Honor of Leonard J. Savage*, eds. S. E. Fienberg and A. Zellner, Amsterdam: North-Holland, pp. 195-208.

CHAPTER 12

Uncertainty, Fear, and Liquidity

by
*Kee H. Chung**
(State University of New York (SUNY) at Buffalo)
*Chairat Chuwonganan**
(Kansas State University, Manhattan)

Abstract

In this study we show that uncertainty and fear (measured by VIX) exert a market-wide impact on liquidity which gives rise to co-movements in individual asset liquidity. Uncertainty and fear exert a larger impact on liquidity when public traders play a greater role and/or market makers play a smaller role in liquidity provision. High volatility in asset prices and large fluctuations in liquidity in recent years (e.g., the Flash Crash in 2010) may be due, at least in part, to the reduced role of market makers and the increased role of high-frequency traders. Overall, our results are consistent with the supply-side theory of liquidity commonality.

* Corresponding Author: Kee H. Chung, Louis M. Jacobs Professor of Finance, Department of Finance and Managerial Economics, School of Management, State University of New York (SUNY) at Buffalo, Buffalo, NY 14260. Tel.: 716-645-3262; Fax: 716-645-3823; E-mail: keechung@buffalo.edu. The authors thank Stephan Dieckmann, Jaehoon Hahn, Daehee Jeong, Hyoung-Goo Kang, In Joon Kim, Jung-Wook Kim, Woojin Kim, Kuan-Hui Lee, Sang Bin Lee, Cristian Tiu, Jin Yoo, colleagues at SUNY-Buffalo and Kansas State University, and seminar participants at Hanyang University, Seoul National University, Yonsei University, and the 2012 KDI Journal of Economic Policy Conference for valuable discussion, comments, and suggestions. The usual disclaimer applies.

1. Introduction

In this study we provide evidence regarding the effect of uncertainty and fear on stock market liquidity by analyzing the time-series relation between an index of stock market volatility and various measures of stock market liquidity. Our study sheds light on whether and how market sentiment exerts an impact on liquidity and its possible ramifications for asset prices, risk premiums, and investment/trading strategies. Our results should also prove useful to regulatory authorities interested in improving market structure.

Prior research finds a commonality in liquidity. Chordia, Roll, and Subrahmanyam (2000), Hasbrouck and Seppi (2001), and Huberman and Halka (2001) show that the liquidity of individual stocks co-varies with both the liquidity of the market as a whole and the liquidity of stocks in the same industry. Other studies show that liquidity-related risks are priced. For instance, Acharya and Pedersen (2005) show that the risk premium is related to commonality in liquidity with the market liquidity, return sensitivity to market liquidity,[1] and liquidity sensitivity to market returns.[2] Korajczyk and Sadka (2008) show that only the across-measure global systematic liquidity factor commands a risk premium. Sadka (2010) shows that hedge-fund returns are significantly related to the co-variation of fund returns with unexpected changes in aggregate liquidity. Lee (2011) analyzes liquidity risks using international data and shows that the pricing of liquidity risk varies across countries according to geographic, economic, and political environments.

Prior studies offer both the demand- and supply-side theories of liquidity commonality.[3] The demand-side theory suggests that liquidity

---

1 Pastor and Stambaugh (2003) is the first to report this finding.

2 Specifically, Acharya, and Pedersen (2005) show that the risk premium of stock i is related to cov(L_i, L_m), cov(R_i, L_m), and cov(L_i, R_m), where cov(x, y) denotes covariance between x and y, L denotes liquidity, R denotes return, and m denotes the market.

3 Most factors are likely to affect both the demand for and supply of liquidity, and liquidity commonality would arise from interactions of liquidity demanders and suppliers. Hence, verdict on these theories will depend on their *relative* importance.

commonality arises from the behavior of investors and traders. For example, Kamara, Lou, and Sadka (2008) show that an increase in institutional ownership led to an increase in both liquidity commonality and cross-sectional variation in liquidity commonality. Koch, Ruenzi, and Starks (2010) show that liquidity commonality arises from correlated trading of mutual funds.[4] Karolyi, Lee, and Van Dijk (2012) show that liquidity commonality is greater during times of high market volatility and in countries with greater presence of international investors and more correlated trading activity, and interpret the results as evidence for the demand-side theory.

The supply-side theory suggests that liquidity commonality arises from liquidity providers' information sharing and capital constraints. For example, Coughenour and Saad (2004) hold that liquidity co-variation arises because specialists within each firm make common adjustments in liquidity provision based on their shared capital and information. Chordia, Sarkar, and Subrahmanyam (2005) find evidence that monetary policy gives rise to liquidity commonality in the stock market.[5] Hameed, Kang, and Viswanathan (2010) show that liquidity commonality on the NYSE increases during market decline when funding liquidity is tight.

In this study we provide additional evidence for the supply-side theory of liquidity commonality. In particular, we show that an important source of liquidity commonality is overall market uncertainty using the Chicago Board Options Exchange Market Volatility Index (VIX).[6] This index, often referred to as the fear index or the fear gauge,

---

4 Koch, Ruenzi, and Starks (2010) conjecture that co-movements in liquidity could arise among stocks if they are held by a group of investors that tend to trade in the same direction and at the same time. The authors find that stocks with higher mutual fund ownership exhibit larger co-movements in liquidity.

5 Chordia, Sarkar, and Subrahmanyam (2005) also conjecture that common factors drive liquidity and volatility in stock and bond markets based on their finding that innovations to stock and bond market liquidity and volatility are highly correlated.

6 Chordia, Roll, and Subrahmanyam (2000) note that "The risk of maintaining inventory depends also on volatility, which could have a market component." However, they do not expand on the conjecture.

is a measure of the implied volatility of S&P 500 index options.[7] To the extent that systematic liquidity variation is a priced factor, understanding the causes of liquidity co-variation should help investors and traders to better deal with such risk. Empirical evidence regarding the sources of liquidity commonality could also help financial economists to better understand risk premiums and asset prices. In addition, our study sheds some light on whether the regulatory change that relaxed the affirmative obligation of NASDAQ dealers is responsible, at least in part, for the recent fluctuations in market liquidity, including Flash Crash on May 6, 2010.

The present study contributes to a growing literature that uses VIX as a measure of market sentiment and market uncertainty. Bao, Pan, and Wang (2008) show that monthly changes in the aggregate bond market liquidity are strongly related to changes in VIX. Pan and Singleton (2008) and Longstaff, Pan, Pedersen, and Singleton (2010) find a strong correlation between sovereign credit spreads and VIX. Graham and Harvey (2010) show that equity risk premium closely tracks VIX over time and increases sharply during financial crises. Adrian and Shin (2010) argue that risk-management constraints reduce the risk appetite of financial intermediaries in times of high VIX. Nagel (2011) finds that the expected return from liquidity provision is time-varying and increases with VIX. Bekaert, Hoerova, and Lo Duca (2011) find a high correlation between VIX and monetary policy.

Market microstructure theory (see, e.g., Ho and Stoll, 1981 and Glosten and Milgrom, 1985) predicts that liquidity providers widen the bid-ask spread (i.e., an inverse measure of liquidity) when inventory holding or adverse selection risks are high. Consistent with this prediction, prior research shows that the bid-ask spread of a stock increases with its own risk, typically measured by the standard deviation of quote midpoint returns and/or the standard error calculated from the market model (i.e., unsystematic risk).[8] In the present study, we provide empirical evidence that the liquidity of an individual asset is related not

---

7 VIX is the ticker symbol for the Chicago Board Options Exchange Volatility Index, which shows the market's expectation of 30-day volatility. It is constructed using the implied volatilities of a wide range of S&P 500 index options.

8 See, for example, Benston and Hagerman (1974) and Stoll (2000).

only to its own risk, but also to overall market uncertainly reflected in VIX.

How uncertainty and fear exert an impact on liquidity is likely to depend on market structure. We conjecture that uncertainty and fear exert a larger impact on liquidity when public traders play a greater role in liquidity provision, when the minimum price variation (i.e., tick size) is smaller, and when market makers play a smaller role in liquidity provision. We test these conjectures using the following three regulatory changes (natural experiments) in market structure: (1) the implementation of the new order handling rules (OHR) on NASDAQ in 1997; (2) the reduction of tick size from $1/8 to $1/16 in 1997 and from $1/16 to $0.01 (decimalization) in 2001; and (3) the amendment of NASDAQ Rule 4613 (c) in 2007 that dealer quotes must be reasonably related to the prevailing market.

We show that uncertainty and fear play an important role in liquidity commonality after controlling for aggregate market liquidity, industry-wide liquidity, and well-known determinants of individual stock liquidity, such as return volatility, trading volume, and price. For instance, we show that a 10% increase in VIX leads to a 3.9% (2.6%) increase in the effective spread and a 2.7% (2.1%) decrease in the quoted depth of NASDAQ (NYSE) stocks. Furthermore, our empirical estimates of elasticity suggest that VIX plays an even more important role in liquidity commonality than market liquidity, industry-wide liquidity, or risk of individual assets.

Our results are consistent with the prediction of Brunnermeier and Pedersen (2009) that market liquidity decreases with VIX because higher volatility reduces market makers' liquidity-provision capacity through capital constraints. The results also support the view of Nagel (2011) that liquidity evaporates during financial crisis because liquidity providers require greater returns during such time. Our results are also consistent with anecdotal evidence that liquidity providers adjust their positions uniformly across stocks according to market sentiment reflected in VIX before they make adjustments based on individual asset risks. We provide other alternative explanations.

Consistent with our conjecture, we show that the effects of VIX on liquidity have changed over time across different market structures.

Specifically, we show that the uncertainty elasticity of liquidity (UEL: % change in liquidity given a 1% change in VIX) has increased dramatically around regulatory changes in the U.S. markets that increased the role of public traders in liquidity provision, reduced the minimum allowable price variation, and weakened the affirmative obligation of NASDAQ dealers. These results support the idea that direct reflection of investor sentiments in prices and quotes without the filtering by market makers may increase the volatility of market liquidity. Although some of these regulatory changes have shown to increase pricing efficiency and reduce trading costs,[9] they might also have an unintended consequence of increasing liquidity volatility, leading to an increase in liquidity risk premiums in asset returns.

The rest of the paper is organized as follows. Section 2 describes our data sources and variable measurement methods. Section 3 conducts regression analysis to examine the relation between VIX and various liquidity measures after controlling for the effects of other determinants of liquidity, including market liquidity, industry-wide liquidity, and risk of individual assets. Section 4 analyses the effects of three major regulatory changes in the U.S. markets on the relation between VIX and measures of liquidity and discuss some regulatory implications of our findings. Section 5 concludes the paper with a brief summary and suggestions for future research.

2. Data Sources and Variable Description

Our study sample includes NYSE and NASDAQ stocks. We obtain trade and quote data from the NYSE's Trade and Quote (TAQ) database. We retrieve trading volume and number of shares outstanding from the Center for Research in Security Prices (CRSP) database. We use the TAQ data to construct national bid and offer (NBBO) quotes. We exclude the following quotes and trades to minimize data error: quotes if

9 For instance, Chordia, Roll, and Subrahmanyam (2008) show that the reduction in tick size in the U.S. stock markets led to an increase in market efficiency and a decrease in the bid-ask spread.

either the ask or bid price is non-positive; quotes if either the ask or bid size is non-positive; quotes if the bid-ask spread is greater than $5 or non-positive; before-the-open and after-the-close trades and quotes; trades if the price or volume is non-positive; bid quote, Bid_t, if $|(Bid_t - Bid_{t-1})/Bid_{t-1}| > 0.5$; ask quote, Ask_t, if $|(Ask_t - Ask_{t-1})/ Ask_{t-1}| > 0.5$; and trade price, p_t, if $|(p_t - p_{t-1}) /p_{t-1}| > 0.5$.

We measure the quoted and effective spreads, depth, price impact, and market quality index using following formulas:

$$\text{Quoted spread}_{i,t} = (Ask_{i,t} - Bid_{i,t}) / M_{i,t}; \quad (1)$$

$$\text{Effective spread}_{i,t} = 2D_{i,t}(P_{i,t} - M_{i,t}) / M_{i,t}; \quad (2)$$

$$\text{Depth}_{i,t} = M_{i,t}(\text{Bid size}_{i,t} + \text{Ask size}_{i,t}) / 2; \quad (3)$$

$$\text{Price impact}_{i,t} = D_{i,t}(M_{i,t+5} - M_{i,t}) / M_{i,t}; \quad (4)$$

$$\text{Market quality index}_{i,t} = \tfrac{1}{2} (\text{Bid size}_{i,t} + \text{Ask size}_{i,t}) / [(Ask_{i,t} - Bid_{i,t}) / M_{i,t},]; \quad (5)$$

where $Ask_{i,t}$ is the national best ask price of stock i at time t, $Bid_{i,t}$ is the national best bid price of stock i at time t, $M_{i,t}$ is the quote midpoint ($(Ask_{i,t} + Bid_{i,t})/2$) of stock i at time t, $M_{i,t+5}$ is the quote midpoint at time t + 5 minutes of stock i, $P_{i,t}$ is the transaction price of stock i at time t, Bid $size_{i,t}$ is the quoted size at the bid of stock i at time t, Ask $size_{i,t}$ is the quoted size at the ask of stock i at time t, and $D_{i,t}$ is an indicator variable which equals +1 for customer buy orders and -1 for customer sell orders.[10] We estimate $D_{i,t}$ using the algorithm in Lee and Ready (1991) and Bessembinder (2003) with no allowance for trade-reporting lag. We use the time-weighted quoted spread and trade-weighted effective spread in our study. We measure return volatility by the standard deviation of quote midpoint returns. We measure trading volume by the dollar trading volume.

We obtain daily observations of the Chicago Board Options

10 The quoted depth in the TAQ database does not truly reflect the total available liquidity for NASDAQ stocks. We include the quoted depth and market quality index in our analysis for completeness.

Exchange Market Volatility Index (VIX) for our study period from http://finance.yahoo.com/q/hp?s=^VIX+Historical+Prices. VIX is quoted in percentage points and it measures the expected (annualized) movement in the S&P 500 index over the next 30-day period. For example, if VIX is 15, it means that the index option markets expect the S&P 500 index to move up or down by less than or equal to 15%/√12 = 4.33% over the next 30-day period with a 68% likelihood (one standard deviation). Although VIX is a measure of the implied volatility of S&P 500 index options, we, as in other studies, use it as an empirical proxy for the market-wide uncertainty.

Table 1 shows descriptive statistics (i.e., mean, standard deviation, and select percentile values) for our study sample of NASDAQ and NYSE stocks. Figure 1 shows the time-series of four liquidity measures (quoted spread, price impact of trades, quoted depth, market quality index) and VIX from January 3, 2007 through December 31, 2009.[11] Panels A and B show conspicuous positive co-movements between the quoted bid-ask spread and VIX and between the price impact of trades and VIX, respectively. Panel C shows that the depth and VIX move in opposite directions to each other and Panel D shows that the market quality index (MQI) and VIX move in opposite directions to each other. Overall, these results indicate that VIX and our liquidity measures are highly correlated over time.

11 We omit the effective spread figure as it is almost identical to the quoted spread figure.

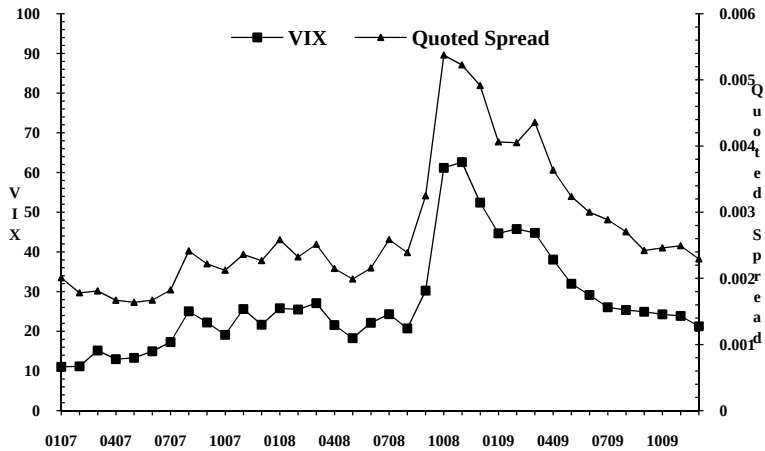
Table 1 Descriptive Statistics

This table shows the descriptive statistics of the variables used in the study. We measure the quoted and effective spreads, depth, price impact, and market quality index using following formulas: Quoted $spread_{i,t} = (Ask_{i,t} - Bid_{i,t}) / M_{i,t}$; Effective $spread_{i,t} = 2D_{i,t}(P_{i,t} - M_{i,t}) / M_{i,t}$; $Depth_{i,t} = M_{i,t}(Bid\ size_{i,t} + Ask\ size_{i,t}) / 2$; Price $impact_{i,t} = D_{i,t}(M_{i,t+5} - M_{i,t}) / M_{i,t}$; Market quality $index_{i,t} = ½ (Bid\ size_{i,t} + Ask\ size_{i,t}) / [(Ask_{i,t} - Bid_{i,t}) / M_{i,t}]$; where $Ask_{i,t}$ is the national best ask price of stock i at time t, $Bid_{i,t}$ is the national best bid price of stock i at time t, $M_{i,t}$ is the quote midpoint $((Ask_{i,t} + Bid_{i,t})/2)$ of stock i at time t, $M_{i,t+5}$ is the quote midpoint at time t + 5 minutes of stock i, $P_{i,t}$ is the transaction price of stock i at time t, Bid $size_{i,t}$ is the quoted size at the bid of stock i at time t, Ask $size_{i,t}$ is the quoted size at the ask of stock i at time t, and $D_{i,t}$ is an indicator variable which equals +1 for customer buy orders and -1 for customer sell orders. We use the time-weighted quoted spread and trade-weighted effective spread in our study. We measure return volatility by the standard deviation of daily quote midpoint returns and trading volume by is the dollar trading volume. We obtain daily observations of the Chicago Board Options Exchange Market Volatility Index (VIX) for our study period from http://finance.yahoo.com/q/hp?s=^VIX+Historical+Prices. VIX is quoted in percentage points and it measures the expected (annualized) movement in the S&P 500 index over the next 30-day period.

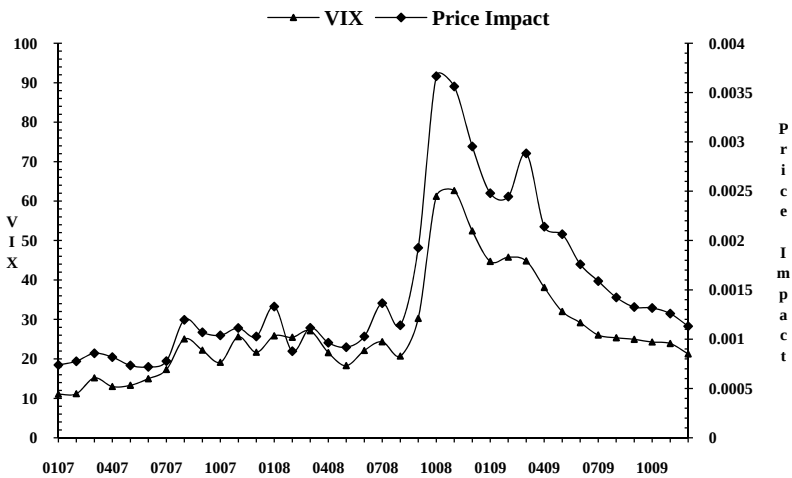
Variable	Mean	Standard	Percentile				
			5	24	50	75	95
Panel A: Descriptive statistics for NASDAQ stocks							
Quoted spread	0.0141	0.0162	0.0008	0.0024	0.0067	0.0213	0.0486
Effective spread	0.0111	0.0116	0.0008	0.0022	0.0061	0.0170	0.0350
Price impact	0.0069	0.0073	0.0006	0.0017	0.0039	0.0097	0.0229
Depth ($ thousand)	15.46	26.60	3.04	5.31	8.68	14.78	45.20
Market quality index	0.4027	0.8095	0.0189	0.0640	0.1576	0.3508	1.6769
Price	14.09	13.43	1.44	4.55	10.01	19.07	40.40
Volume ($ million)	10.25	46.05	0.03	0.16	0.95	4.98	42.66
Volatility	0.0503	0.0675	0.0182	0.0289	0.0381	0.0529	0.1023
VIX	27.24	13.18	12.07	19.58	23.95	30.24	55.78
Panel B: Descriptive statistics for NYSE stocks							
Quoted spread	0.0028	0.0032	0.0005	0.0010	0.0018	0.0035	0.0079
Effective spread	0.0024	0.0026	0.0005	0.0008	0.0015	0.0030	0.0069
Price impact	0.0015	0.0014	0.0003	0.0006	0.0011	0.0019	0.0038
Depth ($ thousand)	28.78	27.57	7.81	14.22	21.47	32.32	73.54
Market quality index	0.8111	1.0641	0.1228	0.2618	0.4584	0.8885	2.7584
Price	26.12	18.64	5.63	12.57	20.42	35.90	63.34
Volume ($ million)	47.59	146.39	0.21	1.45	9.02	37.01	188.94
Volatility	0.0392	0.0985	0.0125	0.0212	0.0297	0.0398	0.0668
VIX	27.24	13.18	12.07	19.58	23.95	30.24	55.78

Figure 1 Quoted Spread, Price Impact, Depth, Market Quality Index, and VIX for NYSE Stocks from January 2007 to December 2009

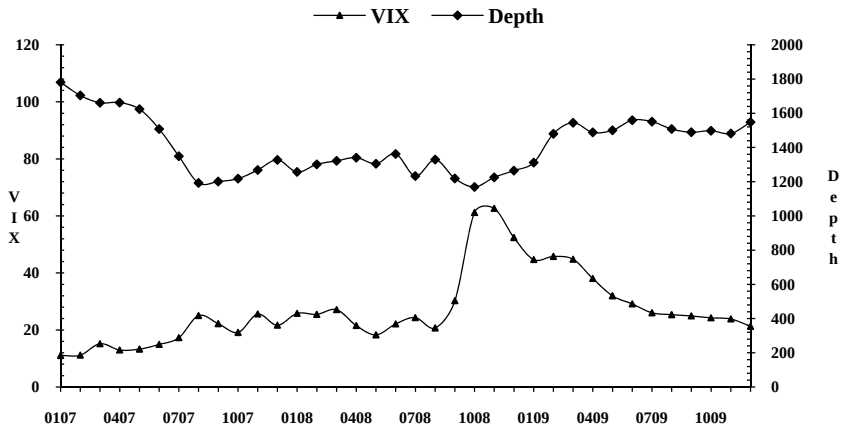
Panel A: Quoted Spread and VIX



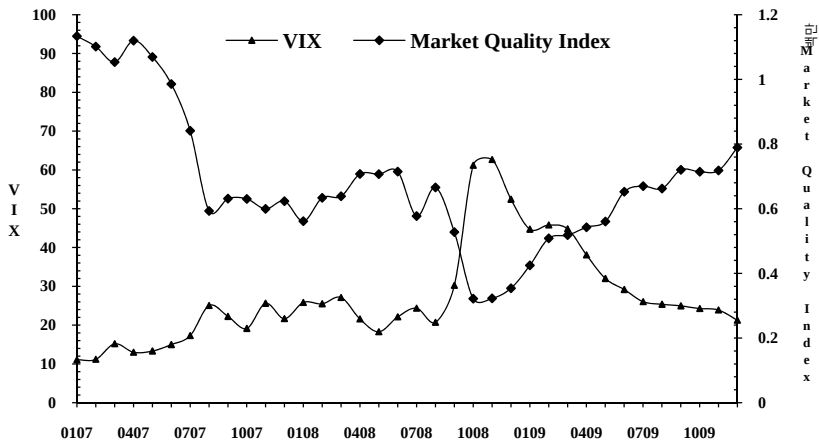
Panel B: Price Impact and VIX



Panel C: Depth and VIX



Panel D: Market Quality Index and VIX



3. Regression Results for the Effect of VIX on Various Liquidity Measures

In this section, we analyze the effect of VIX on liquidity and how the relation between VIX and liquidity varies with stock attributes.

3.1. Effect of VIX on Liquidity

We estimate the following regression models for each stock using daily time-series data from January 3, 2007 through December 31, 2009 to examine the relation between VIX and various measures of liquidity after controlling for other determinants of liquidity:[12]

$$\begin{aligned}\log(LM_{i,t}) = {} & \alpha_{i0} + \alpha_{i1}\log(VIX_t) + \alpha_{i2}\log(PRICE_{i,t}) + \alpha_{i3}\log(VOL_{i,t}) \\ & + \alpha_{i4}\log(VOLA_{i,t}) + \alpha_{i5}\log(MKTLM_t) + \alpha_{i6}\log(MKTLM_{t-1}) \\ & + \alpha_{i7}\log(MKTLM_{t+1}) + \alpha_{i8}\log(INDLM_t) + \alpha_{i9}\log(INDLM_{t-1}) \\ & + \alpha_{i10}\log(INDLM_{t+1}) + \alpha_{i11}MKTRET_t + \alpha_{i12}MKTRET_{t-1} \\ & + \alpha_{i13}MKTRET_{t+1} + \alpha_{i14}TUESDAY + \alpha_{i15}WEDNESDAY \\ & + \alpha_{i16}THURSDAY + \alpha_{i17}FRIDAY + \varepsilon_{1i,t}; \qquad (6)\end{aligned}$$

$$\begin{aligned}DLM_{i,t} = {} & \beta_{i0} + \beta_{i1}DVIX_t + \beta_{i2}DPRICE_{i,t} + \beta_{i3}DVOL_{i,t} + \beta_{i4}DVOLA_{i,t} \\ & + \beta_{i5}DMKTLM_t + \beta_{i6}DMKTLM_{t-1} + \beta_{i7}DMKTLM_{t+1} \\ & + \beta_{i8}DINDLM_t + \beta_{i9}DINDLM_{t-1} + \beta_{i10}DINDLM_{t+1} \\ & + \beta_{i11}DMKTRET_t + \beta_{i12}DMKTRET_{t-1} + \beta_{i13}DMKTRET_{t+1} \\ & + \beta_{i14}TUESDAY + \beta_{i15}WEDNESDAY + \beta_{i16}THURSDAY \\ & + \beta_{i17}FRIDAY + \varepsilon_{2i,t}; \qquad (7)\end{aligned}$$

where, in regression model (6), $LM_{i,t}$ is one of the five liquidity measures (i.e., quoted spread, effective spread, price impact, depth, market quality index) of stock i on day t; VIX_t is the CBOE VIX index on day t; $PRICE_{i,t}$ is the price of stock i on day t; $VOL_{i,t}$ is the dollar trading volume of stock i on day t; $VOLA_{i,t}$ is the standard deviation of quote midpoint returns of stock i on day t; $MKTLM_{t-1}$, $MKTLM_t$, and

12 Our models are based on those used in Chordia, Roll, and Subrahmanyam (2000, 2001) and Coughenour and Saad (2004). We obtain qualitatively similar results and draw identical inferences when we include additional control variables, e.g., a dummy variable for each month. We chose to report the results from a parsimonious model specification.

$MKTLM_{t+1}$ are the market liquidity measures (e.g., the average quoted percentage spread across all stocks) on days t-1, t, and t+1; $INDLM_{t-1}$, $INDLM_t$, and $INDLM_{t+1}$ are the industry-wide liquidity measures (e.g., the average quoted percentage spread across all stocks in the same industry) on days t-1, t, and t+1; $MKTRET_{t-1}$, $MKTRET_t$, and $MKTRET_{t+1}$ are the market return on days t-1, t, and t+1; TUESDAY, WEDNESDAY, THURSDAY, and FRIDAY are dummy variables for Tuesday, Wednesday, Thursday, and Friday; and $\varepsilon_{1i,t}$ is the error term. Note that each estimated coefficient in regression model (6) represents % change in each liquidity measure given a 1% change (i.e., elasticity) in each independent variable.

We include $PRICE_{i,t}$, $VOL_{i,t}$, and $VOLA_{i,t}$ in the model because these variables are known to have significant effects on the liquidity of individual stocks.[13] Following Chordia, Roll, and Subrahmanyam (2000) and Chordia, Sarkar, and Subrahmanyam (2005), we include market returns (i.e., $MKTRET_{t-1}$, $MKTRET_t$, and $MKTRET_{t+1}$) and dummy variables for day of the week in the model.

It is important to note that we would not need to include the market- and industry-wide liquidity variables [i.e., $\log(MKTLM_t)$, $\log(MKTLM_{t-1})$, $\log(MKTLM_{t+1})$, $\log(INDLM_t)$, $\log(INDLM_{t-1})$, and $\log(INDLM_{t+1})$] in regression model (6) if VIX were the *only* source of liquidity commonality because these variables would merely capture the aggregate (i.e., market- and industry-wide) effects of VIX on liquidity.[14] We include them in the model to control for the effects of other variables that may also cause liquidity commonality. For instance, changes in the federal funds rate or money supply may affect the liquidity of individual stocks, giving rise to another source of liquidity commonality. In such a case, regression coefficients on the market- and industry-wide liquidity

13 See Benston and Hagerman (1974) and Stoll (2000).

14 If VIX_t were the only source of liquidity commonality, $MKTLM_t$ would be a linear function of VIX_t. Consequently, two slope coefficients (α_{i1} and ψ_{i1}) in the following regression models would be a linear function of each other: $\log(LM_{i,t}) = \alpha_{i0} + \alpha_{i1}\log(VIX_t) + \varepsilon_{1i,t}$ and $\log(LM_{i,t}) = \psi_{i0} + \psi_{i1}\log(MKTLM_t) + \varepsilon_{2i,t}$. Obviously, in this case, one should include either $\log(VIX_t)$ or $\log(MKTLM_t)$ in a regression model. If there were other sources of liquidity commonality than VIX_t, a proper regression model of liquidity commonality would include both VIX_t and $MKTLM_t$, where $MKTLM_t$ reflects the aggregate liquidity effect of "other sources."

variables would capture the co-movements between the liquidity of individual stocks and the market- and industry-wide liquidity that are attributable to changes in the federal funds rate or money supply.

In regression model (7), prefix D denotes the percentage change of the variable from the previous day [e.g., $DLM_{i,t} = (LM_{i,t} - LM_{i,t-1}) / LM_{i,t-1}$]. We estimate this alternative regression model to assess the sensitivity of our results with respect to different estimation methods.[15] We estimate regression models (6) and (7) for each stock and then calculate the mean values of the regression coefficients. Our sample consists of 3,496 NASDAQ stocks and 2,754 NYSE stocks.

Table 2 shows the regression results. Panel A shows the results of regression model (6) for NASDAQ stocks and NYSE stocks. We report the results for NASDAQ and NYSE stocks separately because the effect of VIX on liquidity could be different between the two groups due to their different market structures. The first four columns show the mean estimated coefficients for VIX (α_{i1}), stock return volatility (α_{i4}), contemporaneous market liquidity (α_{i5}), and contemporaneous industry liquidity (α_{i8}), together with their respective t-statistics. The t-statistic is calculated under the assumption that the estimation errors in α's are independent across stocks. We provide evidence regarding this assumption later in the paper. The next three columns show the mean difference between α_{i1} and α_{i4}, the mean difference between α_{i1} and α_{i5}, and the mean difference between α_{i1} and α_{i8}, together with their respective t-statistics.

The results show that the mean coefficients on VIX are positive and significant in the quoted and effective spread regression models, and negative and significant in the price impact, depth, and market quality index regression models for both NASDAQ and NYSE stocks. Similarly, we find that the mean coefficients on VOLA (i.e., stock return volatility) are also positive and significant in the quoted and effective spread regression models, and negative and significant in the price impact, depth, and market quality index regression models.

More important, the mean difference between α_{i1} and α_{i4} are positive

15 Regressions using changes in the variables are less likely to suffer from econometric problems (e.g., nonstationarity) than those using the level variables.

and significant in the quoted and effective spread regression models, and negative and significant in the price impact, depth, and market quality index regression models. These results indicate that VIX has an incremental explanatory power on temporal liquidity variation over that of individual asset return volatility and that the effect of VIX on liquidity is actually greater than the effect of individual asset risk on liquidity. Apparently liquidity providers react more strongly to general market uncertainty than to individual asset risk and this behavior generates a commonality in liquidity.[16]

Consistent with the finding of prior studies, columns (3) and (4) show that individual asset liquidity is significantly related to both overall market liquidity and industry-wide liquidity. More interestingly again, the mean difference between α_{i1} and α_{i5} are positive and significant in the quoted and effective spread regression models, and negative and significant in the price impact, depth, and market quality index regression models. Likewise, the mean difference between α_{i1} and α_{i8} are positive and significant in the quoted and effective spread regression models, and negative and significant in the price impact, depth, and market quality index regression models. These results indicate the effect of VIX on individual asset liquidity is actually greater than the effect of market liquidity and industry-wide liquidity on individual asset liquidity. Apparently general market uncertainty is a stronger generator of liquidity commonality than either the market or industry-level liquidity itself.

Our results are consistent with the implication of a theoretical model of Brunnermeier and Pedersen (2009) that market liquidity decreases with VIX because higher volatility tightens funding constraints of market makers and thereby reduces their liquidity-provision capacity. The results are also consistent with the view of Nagel (2011) that liquidity may disappear during periods of financial market turmoil because liquidity providers demand a higher expected return from

16 It is unlikely that the relation between VIX and our liquidity measures is driven by reverse causality because most of our sample stocks do not belong to the S&P 500 index. It is hard to imagine that liquidity of a stock that does not belong to the S&P 500 index can exert an impact on VIX, which is constructed using the implied volatilities of a wide range of S&P 500 index options.

Table 2 The Effect of VIX on Various Liquidity Measures

We estimate the following regression models using daily data from January 3, 2007 through December 31, 2009 to examine the relation between VIX and various measures of liquidity after controlling for other determinants of liquidity:

$$\begin{aligned}\log(LM_{i,t}) = {} & \alpha_{i0} + \alpha_{i1}\log(VIX_t) + \alpha_{i2}\log(PRICE_{i,t}) + \alpha_{i3}\log(VOL_{i,t}) + \alpha_{i4}\log(VOLA_{i,t}) + \alpha_{i5}\log(MKTLM_t) \\ & + \alpha_{i6}\log(MKTLM_{t-1}) + \alpha_{i7}\log(MKTLM_{t+1}) + \alpha_{i8}\log(INDLM_t) + \alpha_{i9}\log(INDLM_{t-1}) + \alpha_{i10}\log(INDLM_{t+1}) \\ & + \alpha_{i11}\,MKTRET_t + \alpha_{i12}\,MKTRET_{t-1} + \alpha_{i13}\,MKTRET_{t+1} + \alpha_{i14}TUESDAY + \alpha_{i15}WEDNESDAY \\ & + \alpha_{i16}THURSDAY + \alpha_{i17}FRIDAY + \varepsilon_{1i,t}; \qquad \text{(a)}\end{aligned}$$

$$\begin{aligned}DLM_{i,t} = {} & \beta_{i0} + \beta_{i1}DVIX_t + \beta_{i2}DPRICE_{i,t} + \beta_{i3}DVOL_{i,t} + \beta_{i4}DVOLA_{i,t} + \beta_{i5}DMKTLM_t + \beta_{i6}DMKTLM_{t-1} \\ & + \beta_{i7}DMKTLM_{t+1} + \beta_{i8}DINDLM_t + \beta_{i9}DINDLM_{t-1} + \beta_{i10}DINDLM_{t+1} + \beta_{i11}\,DMKTRET_t \\ & + \beta_{i12}DMKTRET_{t-1} + \beta_{i13}DMKTRET_{t+1} + \beta_{i14}TUESDAY + \beta_{i15}WEDNESDAY + \beta_{i16}THURSDAY \\ & + \beta_{i17}FRIDAY + \varepsilon_{2i,t}; \qquad \text{(b)}\end{aligned}$$

where $LM_{i,t}$ is one of the five liquidity measures (i.e., quoted spread, effective spread, price impact, depth, market quality index) of stock i on day t; VIX_t is the CBOE VIX index on day t; $PRICE_{i,t}$ is the price of stock i on day t; $VOL_{i,t}$ is the dollar trading volume of stock i on day t; $VOLA_{i,t}$ is the standard deviation of quote midpoint returns of stock i on day t; $MKTLM_{t-1}$, $MKTLM_t$, and $MKTLM_{t+1}$ are the market liquidity measures (e.g., the average quoted percentage spread across all stocks) on days t-1, t, and t+1; $INDLM_{t-1}$, $INDLM_t$, and $INDLM_{t+1}$ are the industry-wide liquidity measures (e.g., the average quoted percentage spread across all stocks in the same industry) on days t-1, t, and t+1; $MKTRET_{t-1}$, $MKTRET_t$, and $MKTRET_{t+1}$ are the market return on days t-1, t, and t+1; TUESDAY, WEDNESDAY, THURSDAY, and FRIDAY are dummy variables for Tuesday, Wednesday, Thursday, and Friday; and $\varepsilon_{1i,t}$ is the error term. D denotes the percentage change of the variable from the previous day [e.g., $DLM_{i,t} = (LM_{i,t} - LM_{i,t-1}) / LM_{i,t-1}$]. Numbers in parentheses are t-statistics. Panel A shows the results from regression model (a) and Panel B shows the results from regression model (b). Panel C shows our test results of cross-equation dependence in estimation error.

Table 2 (Continued)

Panel A: Regression Coefficients from Model (a)

Dependent variable	VIX (α_{i1}) (1)	Volatility (α_{i4}) (2)	Market liquidity (α_{i5}) (3)	Industry liquidity (α_{i8}) (4)	$\alpha_{i1} - \alpha_{i4}$ (1) – (2)	$\alpha_{i1} - \alpha_{i5}$ (1) – (3)	$\alpha_{i1} - \alpha_{i8}$ (1) – (4)
Results for NASDAQ stocks							
Quoted spread	0.3757** (72.29)	0.2237** (33.28)	0.3173** (16.90)	0.2855** (12.12)	0.1520** (17.04)	0.0584** (6.55)	0.0902** (7.62)
Effective spread	0.3929** (64.99)	0.2445** (35.44)	0.2796** (11.58)	0.2949** (16.79)	0.1484** (14.73)	0.1133** (5.42)	0.0980** (6.41)
Price impact	0.3194** (42.40)	0.2086** (18.76)	0.1867** (14.43)	0.1959** (13.47)	0.1108** (7.15)	0.1327** (6.93)	0.1235** (5.66)
Depth ($)	-0.2707** (-43.93)	-0.0818** (-15.68)	0.1959** (5.94)	0.1837** (8.96)	-0.1889** (-18.25)	-0.4666* (-16.58)	-0.4544** (-21.40)
Market quality inde	-0.3058** (-32.36)	-0.2061** (-19.86)	0.2059** (7.62)	0.1913** (5.25)	-0.0997** (-5.84)	-0.5117** (-17.03)	-0.4971** (-18.45)
Results for NYSE stocks							
Quoted spread	0.2702** (54.31)	0.1862** (30.67)	0.2161** (14.06)	0.2499** (18.12)	0.0840** (15.25)	0.0541** (5.30)	0.0203** (3.36)
Effective spread	0.2628** (46.79)	0.2087** (32.35)	0.2063** (12.93)	0.2217** (14.27)	0.0541** (8.42)	0.0565** (5.41)	0.0411** (4.42)
Price impact	0.2046** (27.94)	0.1655** (11.75)	0.1614** (10.63)	0.1865** (14.92)	0.0391** (5.64)	0.0432** (4.07)	0.0181** (2.95)
Depth ($)	-0.2145** (-32.99)	-0.0504** (-14.81)	0.1786** (9.01)	0.1831** (12.47)	-0.1641** (-22.48)	-0.3931** (-19.96)	-0.3976** (-24.54)
Market quality index	-0.2427** (-23.30)	-0.1513** (-18.48)	0.2114** (10.01)	0.2242** (14.91)	-0.0914** (-6.91)	-0.4541** (-20.40)	-0.4669** (-25.66)

Note : ** significant at 1% level.

liquidity provision during such time.

There are several other possible interpretations of our results. For example, liquidity providers may be susceptible to market sentiment, causing large swings in liquidity in reaction to changes in uncertainty and investor sentiment reflected in VIX. Liquidity providers may adjust their positions uniformly across stocks according to readily available VIX before they make security-specific adjustments based on security-specific risks.[17] Also, VIX may capture additional (inventory and adverse selection) risks/costs faced by liquidity providers that are not captured by individual asset risk and other control variables. In addition, liquidity providers may become more risk averse when VIX is higher. Overall, our results are consistent with the supply-side theory of liquidity commonality.

Panel B shows the results of regression model (7). The first four columns show the mean estimated coefficients for VIX (β_{i1}), stock return volatility (β_{i4}), contemporaneous market liquidity (β_{i5}), and contemporaneous industry liquidity (β_{i8}), together with their respective t-statistics. The next three columns show the mean difference between β_{i1} and β_{i4}, the mean difference between β_{i1} and β_{i5}, and the mean difference between β_{i1} and β_{i8}, together with their respective t-statistics. On the whole, the results from regression model (7) are qualitatively identical to those from regression model (6). Hence we conclude that our results are robust and not sensitive to different estimation methods.

The reliability of the t-statistics in Table 2 depends on independence of the residuals across stocks. We test the independence of the residuals from regression models (6) and (7) using the method in Chordia et al. (2000) and Coughenour and Saad (2004). We first sort 3,496 NASDAQ stocks alphabetically using their ticker symbols and assign each stock a serial number i (i = 1,…., 3,496). We then estimate the following regression models: $\varepsilon_{1i+1,t} = \theta_0 + \theta_1\varepsilon_{1i,t} + \mu_{1i,t}$ and $\varepsilon_{2i+1,t} = \delta_0 + \delta_1\varepsilon_{2i,t} + \mu_{2i,t}$ (i = 1,…., 3,495); where $\varepsilon_{1i,t}$ ($\varepsilon_{1i+1,t}$), $\varepsilon_{2i,t}$ ($\varepsilon_{2i+1,t}$) are residuals for stock i (i+1) from regression models (6) and (7), respectively, and $\mu_{1i,t}$ and $\mu_{2i,t}$ are disturbance terms. We also calculate the correlation coefficient between $\varepsilon_{1i+1,t}$ and $\varepsilon_{1i,t}$ and between $\varepsilon_{2i+1,t}$ and $\varepsilon_{2i,t}$.

---

17 Anecdotal evidence from conversations with industry people seems to suggest that this is indeed the practice followed by many portfolio managers.

Table 2 The Effect of VIX on Various Liquidity Measures

Panel B: Regression Coefficients from Model (b)

Dependent variable	DVIX (β_{i1}) (1)	Volatility(β_{i4}) (2)	Market liquidity (β_{i5}) (3)	Industry liquidity (β_{i8}) (4)	β_{i1} - β_{i4} (1) – (2)	β_{i1} - β_{i5} (1) – (3)	β_{i1} - β_{i8} (1) – (4)
Results for NASDAQ stocks							
Quoted spread	0.3390** (47.11)	0.1164** (17.04)	0.2877** (8.81)	0.2910** (12.78)	0.2226** (20.84)	0.0513** (5.46)	0.0480** (4.98)
Effective spread	0.3052** (38.01)	0.1384** (11.94)	0.1723 (5.22)	0.2498** (7.59)	0.1668** (12.46)	0.1329** (6.74)	0.0554** (4.52)
Price impact	0.2587** (15.62)	0.1247** (4.67)	0.1715** (4.62)	0.2185** (4.06)	0.1340** (6.31)	0.0872** (4.20)	0.0402** (3.09)
Depth ($)	-0.2434** (-32.67)	-0.0204** (-3.72)	0.1109** (3.01)	0.1645** (6.05)	-0.2230** (12.29)	-0.3543** (-10.07)	-0.4079** (-13.26)
Market quality index	-0.2693** (-19.97)	-0.0934** (-6.87)	0.1432** (5.06)	0.2041** (4.89)	-0.1759** (7.34)	-0.4125** (-7.01)	-0.4734** (-8.84)
Results for NYSE stocks							
Quoted spread	0.2457** (31.53)	0.1369** (19.22)	0.2181** (8.28)	0.2272** (12.21)	0.1088** (11.16)	0.0276** (3.76)	0.0185** (2.91)
Effective spread	0.2255** (29.52)	0.1454** (21.10)	0.1703** (7.88)	0.1918** (10.90)	0.0801** (9.85)	0.0552** (4.81)	0.0338** (3.54)
Price impact	0.1608** (10.45)	0.1053** (5.26)	0.1191** (3.44)	0.1273** (4.50)	0.0555** (4.15)	0.0417** (3.39)	0.0335** (3.07)
Depth ($)	-0.1601** (-25.34)	-0.0150** (-4.45)	0.1255** (5.32)	0.1515** (8.23)	-0.1451** (-16.53)	-0.2856** (-12.08)	-0.3116** (-15.74)
Market quality index	-0.1544** (-14.88)	-0.0550** (-8.62)	0.1301** (4.59)	0.1209** (4.99)	-0.0994** (-6.02)	-0.2845** (-9.10)	-0.2753** (-7.51)

Note : ** significant at 1% level.

Table 2 (Continued)

Panel C: Tests of cross-equation dependence in estimation Error

	Results from regression model (a)				Results from regression model (b)		
	Average correlation	Average t-statistic	|t| > 1.96 (%)		Average correlation	Average t-statistic	|t| > 1.96 (%)
Results for NASDAQ stocks							
Quoted spread	0.0105	0.32	13.19		0.0091	0.41	12.53
Effective spread	0.0093	0.27	11.47		0.0084	0.23	12.05
Price impact	0.0061	0.16	7.25		-0.0014	-0.02	3.20
Depth	0.0098	0.25	10.14		0.0060	0.14	7.05
Market quality index	0.0095	0.23	10.37		0.0064	0.15	7.45
Results for NYSE stocks							
Quoted spread	0.0129	0.35	14.08		0.0101	0.17	12.29
Effective spread	0.0132	0.22	13.05		0.0125	0.26	11.92
Price impact	0.0093	0.18	7.01		-0.0003	0.005	2.95
Depth	0.0105	0.27	11.38		0.0081	0.19	9.20
Market quality index	0.0124	0.20	10.67		0.0056	0.13	8.42

Note : ** significant at the 1% level.

Panel C in Table 2 shows the average correlation coefficients, the average t-statistics of the regression coefficients θ_1 and δ_1, and the proportions of absolute t-statistics of θ_1 and δ_1 greater than the critical significant level of five percent ($|t| > 1.96$). The results show that the mean values of regression coefficients θ_1 and δ_1 are not significantly different from zero, indicating the independence of the residuals across stocks. We find similar results for the NYSE sample. Based on these results, we conclude that our t-statistics are reasonable metrics for assessing the statistical significance of the mean regression coefficients.

3.2. Correlation Between Estimated Coefficients

Panel A in Table 3 shows the correlation matrix of the estimated coefficients (α_{i1} through α_{i13}) in regression model (6) and Panel B shows the correlation matrix of the estimated coefficients (β_{i1} through β_{i13}) in regression model (7) when we measure liquidity with the quoted spread.[18] The lower left triangle shows the correlation matrix for NASDAQ stocks (in bold) and the upper right triangle shows the correlation matrix for NYSE stocks.

The results show that UELs are negatively related to the sensitivity of asset liquidity to both market-wide and industry-wide liquidity. That is, stocks that exhibit lower liquidity commonality with market-wide and/or industry-wide liquidity tend to have higher liquidity sensitivity to uncertainty and fear. UELs are positively related to the sensitivity of asset liquidity to the current and lagged values of market returns, indicating that stocks that exhibit higher liquidity commonality with market returns also have higher liquidity sensitivity to uncertainty. We find high negative correlations (ranging from -0.70 to -0.89) between the sensitivity of individual asset liquidity to contemporaneous (lagged) market-wide liquidity and the sensitivity of individual asset liquidity to contemporaneous (lagged) industry-wide liquidity. Hence stocks that have higher liquidity co-variation with market-wide liquidity tend to exhibit lower liquidity co-variation with industry-wide liquidity.

---

18 We obtain qualitatively similar results when we use other liquidity measures.

Table 3 Correlation Matrix of the Estimated Coefficients in Regression Models (6) and (7)

Panel A shows the correlation matrix of the estimated coefficients (α_{i1} through α_{i13}) in regression model (6) and Panel B shows the correlation matrix of the estimated coefficients (β_{i1} through β_{i13}) in regression model (7). The lower left triangle shows the correlation matrix for NASDAQ stocks in bold and the upper right triangle shows the correlation matrix for NYSE stocks.

	VIX_t	$PRICE_{i,t}$	$VOL_{i,t}$	$VOLA_{i,t}$	$MKTLM_t$	$MKTLM_{t-1}$	$MKTLM_{t+1}$	$INDLM_t$	$INDLM_{t-1}$	$INDLM_{t+1}$	$MKTRET_t$	$MKTRET_{t-1}$	$MKTRET_{t+1}$
Panel A: Correlations of α_1 through α_{13} from regression model (6) using the quoted spread as the dependent variable													
VIX_t	**1.00**	0.0139	-0.1524**	0.0406*	-0.0438*	-0.1704**	-0.1009**	-0.0634**	-0.0192	-0.0318	0.2743**	0.1803**	0.1046**
$PRICE_{i,t}$	**0.0031**	**1.00**	-0.0231	0.0091	-0.0148	-0.0844**	-0.0001	0.0348*	0.1143**	0.0457*	-0.0257	-0.0210	0.1709**
$VOL_{i,t}$	**-0.1437****	**-0.1090****	**1.00**	-0.3104**	-0.1259**	-0.0390*	-0.0739**	0.1470**	0.0742**	0.0359	0.0322	0.0582**	0.0352
$VOLA_{i,t}$	**0.0091**	**0.0820****	**-0.3472****	**1.00**	0.1411**	0.0385*	0.0059**	0.1905**	0.1105**	-0.0642**	0.0059	0.0642**	0.0055
$MKTLM_t$	**-0.1593****	**-0.0037**	**-0.1455****	**0.0606 ****	**1.00**	-0.0253	-0.0043	-0.8054**	-0.1462**	-0.1118**	-0.0320	-0.0065	-0.1064**
$MKTLM_{t-1}$	**-0.1286****	**-0.0406***	**-0.0972****	**-0.0854****	**-0.2368****	**1.00**	0.0729**	-0.0577**	-0.8617**	-0.0620**	-0.1351**	-0.1227**	-0.0657**
$MKTLM_{t+1}$	**-0.1098****	**0.0183**	**-0.0146**	**0.0764****	**-0.2213****	**-0.0904****	**1.00**	0.0723**	0.1012**	-0.8490**	0.1272**	0.0627**	0.1207**
$INDLM_t$	**-0.0459***	**0.0500****	**0.0816****	**0.1283****	**-0.6957****	**-0.0461****	**0.3234****	**1.00**	0.0758**	0.1196**	-0.0116	0.0733**	-0.0047
$INDLM_{t-1}$	**-0.0018**	**0.0538****	**0.0199**	**0.1461****	**-0.0883****	**-0.8335****	**0.1693****	**0.0668****	**1.00**	0.0765**	-0.0337	0.0316	0.0750**
$INDLM_{t+1}$	**-0.0141**	**0.0027**	**0.0087**	**-0.2215****	**-0.1183****	**-0.1447****	**-0.8687****	**-0.4253****	**-0.2609****	**1.00**	-0.0027	-0.0367*	-0.0012
$MKTRET_t$	**0.1873****	**0.0188**	**0.0143**	**0.1964****	**-0.0788****	**-0.2230****	**0.3474****	**0.3405****	**0.3146****	**-0.4925****	**1.00**	0.3562**	0.1728**
$MKTRET_{t-1}$	**0.1468****	**-0.0072**	**0.0781****	**0.1254****	**-0.0439****	**-0.1787****	**0.2804****	**0.2097****	**0.2370****	**-0.3778****	**0.6307****	**1.00**	0.0837**
$MKTRET_{t+1}$	**-0.0649****	**0.0163**	**0.0317**	**-0.0591****	**-0.1457****	**0.1013****	**0.0783****	**0.0252**	**-0.1174****	**0.0566****	**0.0457****	**0.0862****	**1.00**

Table 3 (Continued)

	VIX_t	$PRICE_{i,t}$	$VOL_{i,t}$	$VOLA_{i,t}$	$MKTLM_t$	$MKTLM_{t-1}$	$MKTLM_{t+1}$	$INDLM_t$	$INDLM_{t-1}$	$INDLM_{t+1}$	$MKTRET_t$	$MKTRET_{t-1}$	$MKTRET_{t+1}$
Panel B: Correlations of β_1 through β_{13} from regression model (7) using the quoted spread as the dependent variable													
$DVIX_t$	**1.00**	0.0220	-0.0623**	0.0691**	-0.0994**	-0.0410*	-0.1167**	-0.0237	-0.0405*	-0.0211	0.0140	0.0366*	-0.0211
$DPRICE_{i,t}$	**0.0237**	**1.00**	-0.0271	-0.0353	-0.0234	-0.0780**	0.0130	0.0500**	0.0902**	0.0520**	0.0362	0.0292	-0.0724**
$DVOL_{i,t}$	**-0.0190**	**-0.0212**	**1.00**	-0.2600**	-0.0507*	-0.0282	0.0514**	0.0568**	-0.0098	-0.0241	-0.0277	0.0911**	-0.0183
$DVOLA_{i,t}$	**0.0162**	**0.0125**	**-0.2838****	**1.00**	-0.0008	0.0139	0.0195	-0.0855**	0.0372*	-0.0779**	0.1305**	-0.1056**	-0.0400*
$DMKTLM_t$	**-0.1778****	**-0.0393***	**-0.1185****	**0.0811****	**1.00**	0.2948**	0.1325**	-0.7907**	-0.2411**	-0.1884**	-0.0944**	-0.0495**	0.1426**
$DMKTLM_{t-1}$	**-0.0848****	**-0.0521***	**-0.0109**	**-0.0163**	**0.6072****	**1.00**	0.1289**	-0.3056**	-0.8936**	-0.1240**	-0.0019	-0.0231	-0.0967**
$DMKTLM_{t+1}$	**-0.0516****	**0.0278**	**0.0293**	**0.0534***	**0.2543****	**0.3256****	**1.00**	-0.1881**	-0.1055**	-0.8698**	-0.0526**	-0.0190	-0.1279**
$DINDLM_t$	**-0.0084**	**0.0614****	**0.0497****	**0.0210**	**-0.6971****	**-0.4792****	**-0.3232****	**1.00**	0.3287**	0.2423**	0.0646**	0.0433*	-0.0340
$DINDLM_{t-1}$	**-0.0418***	**0.0491***	**-0.0156**	**0.0289**	**-0.5154****	**-0.8894****	**-0.3846****	**0.4945****	**1.00**	0.1097**	0.0938**	-0.0873**	0.0956**
$DINDLM_{t+1}$	**-0.0514****	**0.0209**	**-0.0204**	**-0.0649****	**-0.2268****	**-0.2751****	**-0.8623****	**0.3512****	**0.3489****	**1.00**	0.0224	0.0556**	0.1206**
$DMKTRET_t$	**0.0395***	**0.0641****	**-0.0086**	**0.0197**	**-0.0503****	**-0.0474***	**-0.0069**	**0.0444****	**0.0367***	**0.0184**	**1.00**	-0.3711**	-0.1943**
$DMKTRET_{t-1}$	**0.0551****	**0.2142****	**0.0030**	**-0.0168**	**-0.0441***	**0.0452****	**-0.0062**	**0.0072**	**-0.0512****	**0.0152**	**-0.1332****	**1.00**	-0.0432**
$DMKTRET_{t+1}$	**-0.0969****	**-0.0810****	**0.0180**	**-0.0270**	**0.0114**	**-0.0232**	**-0.0416***	**-0.0092**	**0.0131**	**0.0569***	**-0.0531****	**-0.0568****	**1.00**

Note: ** significant at the 1% level.
* significant at the 5% level.

3.3. Stock Attributes, Market Structure, and the Uncertainty Elasticity of Liquidity (UEL)

In this section, we examine how the uncertainty elasticity of liquidity (UEL) is related to stock attributes and market structure using the following regression model for the combined sample of NYSE and NASDAQ stocks:[19]

$$UEL_i = \pi_0 + \pi_1 NASDAQ + \pi_2 PRICE_i + \pi_3 VOL_i + \pi_3 MVE_i + \pi_5 VOLA_i + \pi_6 NAF_i + \pi_6 INST_i + \pi_7 MVTOBV_i + \varepsilon_i \quad (8)$$

where UEL_i is either the estimate (in log) of α_1 for stock i from regression model (6) or the estimate (in log) of β_1 for stock i from regression model (7); NASDAQ is an indicator variable which equals one for NASDAQ stocks and zero for NYSE stocks; $PRICE_i$ is the share price of stock i; VOL_i is the dollar trading volume of stock i; MVE_i is the market capitalization of stock i;[20] $VOLA_i$ is the stock i's return volatility; NAF_i is the number of analysts following stock i; $INST_i$ is the percentage of stock i's shares held by institutional investors; $MVTOBV_i$ is the market-to-book value of equity ratio for stock i; and ε_i is the error term. We obtain quarterly 13F institutional holdings data from Thomson Financial and analyst coverage data from the Institutional Brokers' Estimate System (I/B/E/S).[21]

Panel A in Table 4 shows the results of regression model (8) when UEL is estimated from regression model (6) and Panel B shows the results when UEL is estimated from regression model (7). The results show that the regression coefficients on the NASDAQ dummy variable are positive and significant when liquidity is measured by the quoted spread, effective spread, or price impact, and negative and significant when liquidity is measured by the depth or market quality index in both

19 We obtain qualitatively similar results when we estimate the model for NASDAQ and NYSE stocks separately.

20 Market capitalization is the product of price and number of shares outstanding.

21 We assume zero analyst following for firms not included in the I/B/E/S database.

Table 4 Effects of Stock Attributes on the Uncertainty Elasticity of Liquidity

This table reports the results of the following regression model using combined sample of NYSE and NASDAQ stocks:

$$UEL_i = \pi_0 + \pi_1 NASDAQ + \pi_2 PRICE_i + \pi_3 VOL_i + \pi_3 MVE_i + \pi_5 VOLA_i + \pi_6 NAF_i + \pi_6 INST_i + \pi_7 MVTOBV_i + \varepsilon_i$$

where UEL_i is the uncertainty elasticity of liquidity for stock i; NASDAQ is an indicator variable which equals one for NASDAQ stocks and zero for NYSE stocks; $PRICE_i$ is the share price of stock i; VOL_i is the dollar trading volume of stock i; MVE_i is the market capitalization of stock i; $VOLA_i$ is the stock i's return volatility; NAF_i is the number of analysts following stock i; $INST_i$ is the percentage of institutional holding of stock i; $MVTOBV_i$ is stock's i ratio of market value of equity to book value of equity; and ε_i is the error term. Panel A shows the results when UEL is the estimate of α_1 in regression model (6) and Panel B shows the results when UEL is the estimate of β_1 in regression model (7). Numbers in parentheses are t-statistics.

Table 4 (Continued)

	Panel A: Results based on the estimate of α_1 in regression model (6)					Panel B: Results based on the estimate of β_1 in regression model (7)				
	Quoted spread	Effective spread	Price impact	Depth	Market Quality index	Quoted spread	Effective spread	Price impact	Depth	Market Quality index
Intercept	0.7511**	1.0408**	0.9756**	-0.2922**	-0.1382**	0.7357**	0.8093**	0.4942**	-0.3796**	-0.2266**
	(6.85)	(7.83)	(3.92)	(-2.86)	(-2.79)	(4.86)	(3.52)	(3.38)	(-2.74)	(-2.96)
NASDAQ	0.1021**	0.1282**	0.1124	-0.0545**	-0.0613**	0.0919**	0.0773**	0.0963**	-0.0795**	-0.1130**
	(15.65)	(12.37)	(8.15)	(-5.30)	(-6.77)	(8.48)	(7.63)	(4.84)	(-5.69)	(-5.23)
PRICE	0.0690**	0.0510**	0.0491**	-0.0338**	-0.0431**	0.0751**	0.0683**	0.0362**	-0.0398**	-0.0505**
	(11.51)	(7.88)	(3.60)	(-2.81)	(-3.22)	(11.90)	(5.75)	(3.51)	(-2.74)	(-2.90)
VOL	0.0344**	0.0452**	0.0582**	-0.0250**	-0.0209**	0.0297**	0.0258**	0.0357**	-0.0202**	-0.0217**
	(7.17)	(7.78)	(5.34)	(-3.31)	(-2.84)	(4.84)	(4.55)	(2.77)	(-3.59)	(-3.09)
MVE	-0.0374**	-0.0457**	-0.0344**	0.0264**	0.0354**	-0.0533**	-0.0547**	-0.0245**	0.0225**	0.0292**
	(-5.72)	(-5.76)	(-3.31)	(2.89)	(2.72)	(-5.89)	(-4.74)	(-3.45)	(2.78)	(2.69)
VOLA	0.2269**	0.2572**	0.1671**	-0.2170**	-0.1316**	0.2218**	0.2026**	0.1590**	-0.1940**	-0.1524**
	(4.29)	(4.63)	(3.44)	(-3.04)	(-2.89)	(4.45)	(3.20)	(3.28)	(-2.92)	(-2.94)
NAF	-0.0051**	-0.0046**	-0.0034**	0.0043**	0.0039**	-0.0046**	-0.0044**	-0.0023**	0.0039**	0.0051**
	(-4.80)	(-3.60)	(-3.25)	(2.97)	(2.91)	(-3.87)	(-3.98)	(-2.85)	(3.72)	(2.76)
INST	-0.0206**	-0.0203**	-0.0179**	0.0203**	0.0222**	-0.0240**	-0.0187**	-0.0187**	0.0249**	0.0243**
	(-4.14)	(-3.53)	(-2.94)	(2.86)	(2.82)	(-3.39)	(-3.28)	(-3.05)	(2.78)	(2.70)
MVTOBV	0.0213**	0.0243**	0.0182**	-0.0157**	-0.0173**	0.0238**	0.0227**	0.0149**	-0.0183**	-0.0211**
	(3.86)	(3.65)	(2.86)	(-2.75)	(-2.80)	(4.07)	(4.17)	(2.72)	(-2.67)	(-2.93)
Adj. R^2	0.07	0.06	0.03	0.03	0.02	0.05	0.04	0.03	0.02	0.02

Note : ** significant at the 1% level.

regression model (6) and regression model (7). These results are consistent with the results in Table 2 that UEL is generally larger (in absolute value) on NASDAQ and indicate that market uncertainty and fear exert a greater impact on liquidity for NASDAQ stocks than for NYSE stocks.

The results show that UEL is positively and significantly related to share price, trading volume, and return volatility, and negatively and significantly related to firm size (market value of equity) when liquidity is measured by the quoted spread, effective spread, or price impact. These results suggest that uncertainty and fear exert a greater impact on the liquidity of stocks with higher price, larger trading volume, greater return volatility, or smaller market capitalizations. The larger UEL of higher priced stocks may be explained partly by the fact that the tick size is less likely to be a binding constraint on spreads and trade-induced price changes. The larger UEL of high-volume or high-volatility stocks may be due to the fact that these stocks are more likely to have information-based trading, prompting greater reactions from liquidity providers. That uncertainty and fear exert a smaller impact on the liquidity of larger companies may be explained by the fact that these companies have lower information-based trading (because generally more information is available about them) and thus liquidity providers in these stocks may be less sensitive to changes in market sentiment.

When liquidity is measured by the dollar depth or market quality index, the signs of the estimated coefficients on share price, trading volume, firm size, and return volatility in regression model (8) are opposite of those when liquidity is measured by the spreads and price impact: UEL is positively and significantly related to firm size, and negatively and significantly related to share price, trading volume, and return volatility. This is an expected result because the UEL estimates when liquidity is measured by the dollar depth or market quality index are likely to have opposite signs of the UEL estimates when liquidity is measured by the spread or price impact.

Uncertainty and fear exert a smaller impact on the UEL of stocks with higher analyst following and/or institutional ownership. One possible interpretation of this result is that liquidity providers in these stocks are less sensitive to changes in market sentiment because more

information is available through analysts' information collection and dissemination as well as institutional monitoring.[22] We find that uncertainty and fear exert a larger impact on the UEL of firms with higher market-to-book ratios. To the extent that firms with higher market-to-book ratios have larger intangible assets (e.g., higher proportions of these firms' market values are accounted for by future growth options), our results support the notion that changes in market sentiment lead to larger swings in liquidity when firm value is highly subject to future managerial actions.

4. Market Structure and the Uncertainty Elasticity of Liquidity

In this section, we analyze how market structure affects the uncertainty elasticity of liquidity using data surrounding three major changes in market structure in the U.S. securities markets.

4.1. Order Handling Rules

The Securities and Exchange Commission (SEC) began to enact major changes in the order handling rules (OHR) in the U.S. securities markets on January 20, 1997. Although all U.S. securities markets were subject to the new rules, the NASDAQ Stock Market was the primary target of the new rules. Prior to the new rules, the NASDAQ Stock Market had operated as a pure dealer market, where public traders are unable to compete with market makers with limit orders.[23] The new limit order handling rule enabled public traders to directly compete with market makers in the price discovery process by requiring the latter to display public limit orders in the BBO (i.e., best bid and offer) when

22 Kamara, Lou, and Sadka (2008) show that the sensitivity of the stock's liquidity to aggregate liquidity shocks increases with institutional ownership. Our results are not directly comparable to their results because we measure liquidity commonality that arises from market uncertainty.

23 Public limit orders were considered bids and offers to NASDAQ dealers (but not to other public traders) before the implementation of the new OHR.

they are better than quotes posted by market makers. The new quote rule also gave the public access to quotes posted by market makers in Electronic Communication Networks (ECN). Under the new rule, if a dealer places a limit order into Instinet or another ECN, the price and quantity are incorporated in the ECN quote displayed on NASDAQ if it represents the best bid or offer in ECN.

Prior research shows that the new order handling rules help reduce trading costs by promoting competition among public traders and market makers.[24] In the present study, we analyze a potential unintended consequence of the new rules. A more direct participation of public traders in liquidity provision may imply a more direct reflection of market sentiment in liquidity. Consequently, we conjecture an increase in UEL after the implementation of the new order handling rules.

To examine the impact of the new OHR on UEL, we estimate regression models (6) and (7) using data for NASDAQ securities in the periods before and after the implementation of the new OHR. The first phase-in of the OHR stocks was on January 20, 1997 and the last phase-in was on October 13, 1997. Another major event that occurred on NASDAQ during this time period was the tick-size reduction from $1/8 to $1/16 on June 2, 1997. To examine the impact of the new OHR without the confounding effect of the tick-size change, we use the first three phase-ins of the OHR stocks (50 securities for each phase-in) on January 20, February 10, and February 24, 1997 for our OHR sample. These NASDAQ stocks were subject to the new order handling rules but were not subject to the tick-size change. The pre-period is 65 days from October 16, 1996 to January 17, 1997 and the post-period is 65 days from February 25, 1997 to May 28, 1997. The post-period ends before the tick-size reduction on June 2, 1997. In addition, our OHR sample consists only of stocks that were selling at prices of $10 or greater because the new order handling rules applied only to those securities. Our sample consists of 119 NASDAQ stocks.

24 See Barclay, Christie, Harris, Kandel, and Schultz (1999).

Table 5 Effects of the New Order Handling Rules (OHR) on the Uncertainty Elasticity of Liquidity (UEL)

The first two columns of Panel A show the mean UEL (i.e., the estimate of α_1) from regression model (6) in the pre- and post-OHR periods, and the third column shows the difference in the mean UEL between the two periods. Likewise, the first two columns of Panel B show the mean UEL (i.e., the estimate of β_1) from regression model (7) in the pre- and post-OHR periods, and the third column shows the difference in the mean UEL between the two periods. The fourth and fifth columns in both panels show the estimates of π_1 and λ_0 in the following regression models:

$$UEL_i = \pi_0 + \pi_1 POST + \pi_2 PRICE_i + \pi_3 VOL_i + \pi_4 MVE_i + \pi_5 VOLA_i + \varepsilon_{1i}; \text{ and} \quad (a)$$

$$UEL_i^{post} - UEL_i^{pre} = \lambda_0 + \Sigma\lambda_k (X_{ki}^{post} - X_{ki}^{pre}) + \varepsilon_{2i}; \quad (b)$$

where POST is an indicator variable which equals one for the post-OHR period and zero otherwise; $PRICE_i$ is the share price of stock i; VOL_i is the dollar trading volume of stock i; MVE_i is the market capitalization of stock i; $VOLA_i$ is the stock i's return volatility; the superscripts 'post' and 'pre' denote, respectively, the post- and pre-periods; and X_k (k = 1 through 4) represents one of the four stock attributes (i.e., share price, dollar trading volume, market capitalization, and return volatility). Numbers in parentheses are t-statistics.

	Pre	Post	Δ (Post – Pre)	π_1	λ_0
Panel A: Results based on the estimate of α_1 in regression model (6)					
Quoted spread	0.0478	0.2200	0.1722** (3.90)	0.1718** (4.00)	0.1765** (3.68)
Effective spread	0.0519	0.2290	0.1771** (4.73)	0.1752** (4.85)	0.1721** (3.87)
Price impact	0.0357	0.1621	0.1264** (2.85)	0.1193** (2.63)	0.1196** (2.71)
Depth	-0.0431	-0.1361	-0.0930** (-3.27)	-0.0913** (-2.92)	-0.0884* (-2.47)
Market quality index	-0.0535	-0.1557	-0.1022** (-3.96)	-0.1006** (-3.15)	-0.1044** (-2.81)
Panel B: Results based on the estimate of β_1 in regression model (7)					
Quoted spread	0.0489	0.1888	0.1399** (3.28)	0.1350** (3.77)	0.1357** (3.68)
Effective spread	0.0492	0.1767	0.1275** (3.07)	0.1261** (3.47)	0.1247** (3.19)
Price impact	0.0331	0.1313	0.0982* (2.43)	0.0951* (2.46)	0.0977* (2.50)
Depth	-0.0416	-0.1186	-0.0770* (-2.37)	-0.0767** (-2.72)	-0.0756* (-2.25)
Market quality index	-0.0278	-0.1208	-0.0929** (-3.53)	-0.0899** (-3.07)	-0.0858** (-2.62)

Note: * significant at the 5% level.
** significant at the 1% level.

The first two columns of Panel A in Table 5 show the mean UEL from regression model (6) in the pre- and post-OHR periods, respectively, and the third column shows the difference in the mean UEL between the two periods (together with the t-statistic). Likewise, the first two columns of Panel B show the mean UEL from regression model (7) in the pre- and post-OHR periods, respectively, and the third column shows the difference in the mean UEL between the two periods. The results show that the mean UELs in the post-OHR period are all significantly larger (in absolute value) than those in the pre-OHR period across all five liquidity measures, indicating that the implementation of the new OHR magnified the effect of market uncertainty and investor fear on liquidity.

To assess the robustness of our results, we estimate the following regression models:

$$UEL_i = \pi_0 + \pi_1 POST + \pi_2 PRICE_i + \pi_3 VOL_i + \pi_4 MVE_i + \pi_5 VOLA_i + \varepsilon_{1i}; \text{ and} \quad (9)$$

$$UEL_i^{post} - UEL_i^{pre} = \lambda_0 + \Sigma\lambda_k (X_{ki}^{post} - X_{ki}^{pre}) + \varepsilon_{2i}; \quad (10)$$

where POST is an indicator variable which equals one for the post-OHR period and zero otherwise; the superscripts ‘post’ and ‘pre’ denote, respectively, the post- and pre-periods; X_k (k = 1 through 4) represents one of the four stock attributes (i.e., share price, dollar trading volume, market capitalization, and return volatility); and all other variables are the same as defined in regression model (8). The coefficient (π_1) for POST in regression model (9) and the intercept (λ_0) in regression model (10) measure the impact of the new OHR on UEL after controlling for concurrent changes in stock attributes.

The results (see the fourth and fifth columns of Panel A and Panel B in Table 5) show that the estimated coefficients (π_1) on POST and the estimated intercepts (λ_0) are positive and significant when liquidity (i.e., LM in regression models (6) and (7)) is measured by the quoted spread, effective spread, or price impact, and negative and significant when liquidity is measured by the depth or market quality index. These results indicate that uncertainty and fear have a great impact on liquidity after the implementation of the new order handling rules. The estimates of π_1

and λ_0 are all very close to corresponding values of Δ (Post – Pre), indicating that the changes in UEL are largely attributable to the new OHR rather than concurrent changes in stock attributes. Overall, empirical results support our conjecture that a more direct participation of public traders in liquidity services implies a more direct reflection of investor fear and market sentiment in liquidity, which magnifies the effect of market uncertainty and investor fear on liquidity.

4.2. The minimum Price Variation (tick size)

The SEC has reduced the minimum price variation (tick size) in the U.S. markets in an effort to reduce trading costs, increase the informational efficiency of price, and make U.S. markets more competitive in the global markets. Chordia, Roll, and Subrahmanyam (2008) show that price movements in the U.S. markets have become increasingly closer to random walks as the market friction imposed by the minimum allowable price variation has become smaller. The authors also show that smaller tick sizes have led to smaller spreads and lower trading costs. Although these results underscore the positive ramifications of smaller tick sizes, we consider a potential 'unintended' negative consequence of smaller tick sizes. Specifically, we conjecture that smaller tick sizes may increase the speed at which liquidity providers react to market fear and sentiment, resulting in large swings in liquidity.

4.2.1. The Tick Size Change from $1/8 to $1/16

The tick size in the NASDAQ Stock Market was reduced from $1/8 to $1/16 on June 2, 1997. To measure the pure effect of the tick size change on liquidity elasticity that was not contaminated by the effect of the new OHR, we use only those NASDAQ stocks that were subject to the new OHR after the tick size change post-period (i.e., NASDAQ stocks that were subject to the new OHR after September 3, 1997). The pre-period is 65 days from February 27, 1997 to May 30, 1997 and the post-period is 65 days from June 3, 1997 to September 3, 1997. The tick size on the NYSE was reduced from $1/8 to $1/16 on June 24, 1997.

Table 6 Effects of the Tick-size Reduction in 1997 on the Uuncertainty Elasticity of Liquidity (UEL)

The first two columns of Panel A show the mean UEL (i.e., the estimate of α_1) from regression model (6) in the pre- and post-event periods, and the third column shows the difference in the mean UEL between the two periods for NASDAQ stocks. Likewise, the first two columns of Panel B show the mean UEL (i.e., the estimate of β_1) from regression model (7) in the pre- and post-event periods, and the third column shows the difference in the mean UEL between the two periods for NASDAQ stocks. The fourth and fifth columns in both panels show the estimates of π_1 and λ_0 in the following regression models for NASDAQ stocks:

$$UEL_i = \pi_0 + \pi_1 POST + \pi_2 PRICE_i + \pi_3 VOL_i + \pi_4 MVE_i + \pi_5 VOLA_i + \varepsilon_{1i}; \text{ and} \quad \text{(a)}$$

$$UEL_i^{post} - UEL_i^{pre} = \lambda_0 + \Sigma\lambda_k (X_{ki}^{post} - X_{ki}^{pre}) + \varepsilon_{2i}; \quad \text{(b)}$$

where POST is an indicator variable which equals one for the post-event period and zero otherwise; $PRICE_i$ is the share price of stock i; VOL_i is the dollar trading volume of stock i; MVE_i is the market capitalization of stock i; $VOLA_i$ is the stock i's return volatility; the superscripts 'post' and 'pre' denote, respectively, the post- and pre-periods; and X_k (k = 1 through 4) represents one of the four stock attributes (i.e., share price, dollar trading volume, market capitalization, and return volatility). Columns 6 through 10 in both panels show the corresponding results for NYSE stocks. Numbers in parentheses are t-statistics.

Table 6 (Continued)

	NASDAQ stocks					NYSE stocks				
	Pre	Post	Δ (Post – Pre)	π_1	λ_0	Pre	Post	Δ (Post – Pre)	π_1	λ_0
Panel A: Results based on the estimate of α_1 in regression model (6)										
Quoted spread	0.0430	0.1037	0.0607** (3.11)	0.0587** (2.84)	0.0548** (2.92)	0.0560	0.0889	0.0329** (3.43)	0.0300** (2.96)	0.0356** (3.94)
Effective spread	0.0487	0.0993	0.0506** (2.90)	0.0492** (2.72)	0.0515** (3.37)	0.0520	0.0877	0.0357** (3.66)	0.0344** (3.19)	0.0329** (4.86)
Price impact	0.0323	0.0891	0.0568* (2.24)	0.0419* (2.44)	0.0429** (2.75)	0.0464	0.0740	0.0276* (2.18)	0.0246* (2.27)	0.0257* (2.19)
Depth	-0.0429	-0.0763	-0.0334* (-2.19)	-0.0278* (-2.28)	-0.0283* (-2.46)	-0.0652	-0.0834	-0.0182* (2.42)	-0.0180* (-2.19)	-0.0136* (-2.34)
Market quality index	-0.0556	-0.0974	-0.0418** (-3.29)	-0.0387* (-2.32)	-0.0374** (-2.48)	-0.0518	-0.0791	-0.0273** (-2.77)	-0.0248** (-2.81)	-0.0287** (-2.75)
Panel B: Results based on the estimate of β_1 in regression model (7)										
Quoted spread	0.0501	0.0963	0.0462** (2.85)	0.0485** (3.30)	0.0437** (3.11)	0.0583	0.0834	0.0251** (2.92)	0.0227** (2.70)	0.0241** (3.23)
Effective spread	0.0552	0.1035	0.0423** (2.76)	0.0406** (2.87)	0.0396** (3.04)	0.0539	0.0781	0.0242** (2.78)	0.0195** (2.65)	0.0199** (2.40)
Price impact	0.0363	0.0714	0.0351* (2.11)	0.0306* (2.21)	0.0343* (3.18)	0.0396	0.0622	0.0226* (2.22)	0.0214* (2.06)	0.0233* (2.17)
Depth	-0.0386	-0.0787	-0.0401* (-2.42)	-0.0373* (-2.08)	-0.0389* (-2.45)	-0.0594	-0.0795	-0.0201* (-2.13)	-0.0194* (-2.28)	-0.0213** (-2.04)
Market quality index	-0.0345	-0.0942	-0.0597** (-2.88)	-0.0552* (-2.40)	-0.0548** (-2.62)	-0.0521	-0.0778	-0.0257** (-2.89)	-0.0251* (-2.33)	-0.0252** (-2.15)

Note: * significant at the 5% level.
** significant at the 1% level.

Hence, for the NYSE sample, the pre-period is 100 days from January 30, 1997 to June 23, 1997 and the post-period is 100 days from June 25, 1997 to November 13, 1997. We use the 100-day pre- and post-period for the NYSE sample because it was not constrained by the confounding effect of the new order handling rules.

Panel A in Table 6 shows the results using UELs estimated from regression model (6) and Panel B shows the results using UELs estimated from regression model (7). In each panel, we show the results for NASDAQ and NYSE stocks separately. For both NASDAQ and NYSE stocks, mean UELs after the tick size reduction are significantly greater in absolute value than those before the tick-size reduction, regardless of estimation methods. Furthermore, when we estimate regression models (9) and (10) using data before and after the tick size reduction, we find that the estimated coefficients (π_1) on POST in regression model (9) and the estimated intercepts (λ_0) in regression model (10) are positive and significant when we measure liquidity by the quoted spread, effective spread, or price impact, and negative and significant when we measure liquidity by the depth or market quality index. Overall, these results suggest that market uncertainty and investor fear exert a larger impact on liquidity after the tick size reduction.

4.2.2. Decimalization

The NASDAQ stock market began its decimal trading with 14 securities on March 12, 2001, followed by 197 stocks on March 26, 2001, and completed the decimalization for all remaining stocks on April 9, 2001. For NASDAQ sample stocks, we use 100 days before March 12, 2001 (October 16, 2000 to March 9, 2001) as the pre-decimal period and 100 days after April 9, 2001 (April 10, 2001 to August 30, 2001) as the post-decimal period. The NYSE started the decimal trading with 7 stocks on August 29, 2000, followed by 57 additional stocks on September 25, 2000, and 94 more securities on December 4, 2000. The NYSE completed its decimalization implementation for all stocks on January 29, 2001. The pre-decimal period for our NYSE sample stocks is 100 days before August 28, 2000 (May 18, 2000 to August 25, 2000) and the post-decimal period for the NYSE stocks is 100 days after

Table 7 Effects of Decimalization in 2001 on the Uncertainty Elasticity of Liquidity (UEL)

The first two columns of Panel A show the mean UEL (i.e., the estimate of α_1) from regression model (6) in the pre- and post-decimalization periods, and the third column shows the difference in the mean UEL between the two periods for NASDAQ stocks. Likewise, the first two columns of Panel B show the mean UEL (i.e., the estimate of β_1) from regression model (7) in the pre- and post-decimalization periods, and the third column shows the difference in the mean UEL between the two periods for NASDAQ stocks. The fourth and fifth columns in both panels show the estimates of π_1 and λ_0 in the following regression models for NASDAQ stocks:

$$UEL_i = \pi_0 + \pi_1 POST + \pi_2 PRICE_i + \pi_3 VOL_i + \pi_4 MVE_i + \pi_5 VOLA_i + \varepsilon_{1i}; \text{ and} \quad \text{(a)}$$

$$UEL_i^{post} - UEL_i^{pre} = \lambda_0 + \Sigma\lambda_k (X_{ki}^{post} - X_{ki}^{pre}) + \varepsilon_{2i}; \quad \text{(b)}$$

where POST is an indicator variable which equals one for the post-decimalization period and zero otherwise; $PRICE_i$ is the share price of stock i; VOL_i is the dollar trading volume of stock i; MVE_i is the market capitalization of stock i; $VOLA_i$ is the stock i's return volatility; the superscripts 'post' and 'pre' denote, respectively, the post- and pre-periods; and X_k (k = 1 through 4) represents one of the four stock attributes (i.e., share price, dollar trading volume, market capitalization, and return volatility). Columns 6 through 10 in both panels show the corresponding results for NYSE stocks. Numbers in parentheses are t-statistics.

Table 7 (Continued)

	NASDAQ stocks					NYSE stocks				
	Pre	Post	Δ (Post – Pre)	π_1	λ_0	Pre	Post	Δ (Post – Pre)	π_1	λ_0
Panel A: Results based on the estimate of α_1 in regression model (6)										
Quoted spread	0.2117	0.2624	0.0507** (4.74)	0.0487** (3.48)	0.0492** (3.65)	0.0917	0.1344	0.0427** (4.28)	0.0418** (2.97)	0.0412** (3.54)
Effective spread	0.2175	0.2708	0.0533** (4.25)	0.0502** (3.68)	0.0515** (3.82)	0.0989	0.1408	0.0419** (4.37)	0.0406** (3.36)	0.0443** (4.44)
Price impact	0.1619	0.1997	0.0378** (3.64)	0.0335** (2.76)	0.0328** (2.87)	0.0767	0.1068	0.0301** (3.37)	0.0279** (2.83)	0.0261** (2.70)
Depth	-0.1326	-0.1654	-0.0329** (-3.57)	-0.0311** (-2.80)	-0.0319** (-2.71)	-0.0933	-0.1218	-0.0285** (-3.41)	-0.0267** (-2.84)	-0.0264** (-2.79)
Market quality index	-0.1563	-0.2034	-0.0471** (-3.64)	-0.0428** (-2.99)	-0.0455** (-2.91)	-0.0868	-0.1174	-0.0306** (-3.53)	-0.0276** (-2.77)	-0.0286** (-2.82)
Panel B: Results based on the estimate of β_1 in regression model (7)										
Quoted spread	0.1915	0.2360	0.0446** (4.35)	0.0393** (3.49)	0.0384** (3.11)	0.0875	0.1218	0.0343** (3.53)	0.0323** (3.59)	0.0336** (3.86)
Effective spread	0.1874	0.2310	0.0435** (3.98)	0.0421** (4.62)	0.0399** (4.52)	0.0824	0.1160	0.0336** (3.26)	0.0302** (4.27)	0.0290** (4.42)
Price impact	0.1338	0.1658	0.0320** (2.84)	0.0286** (3.37)	0.0263** (2.86)	0.0671	0.0929	0.0258** (2.75)	0.0229** (2.67)	0.0225** (2.76)
Depth	-0.1201	-0.1467	-0.0266** (-2.73)	-0.0259** (-2.92)	-0.0230** (-2.78)	-0.0822	-0.1073	-0.0251** (-2.80)	-0.0268** (-2.93)	-0.0283** (-2.89)
Market quality index	-0.1223	-0.1555	-0.0332** (-3.23)	-0.0340** (-3.16)	-0.0363** (-3.07)	-0.0668	-0.0986	-0.0318** (-3.14)	-0.0310** (-3.16)	-0.0307** (-3.24)

Note: ** significant at the 1% level.

January 29, 2001 (January 30, 2001 to June 21, 2001). Our study sample consists of 3,884 NASDAQ stocks and 1,830 NYSE stocks.

When we reproduce Table 6 using the data before and after decimalization, we find that the results (see Table 7) are qualitatively identical to those in Table 6. On the whole, these results support the idea that market uncertainty and investor fear exert a greater impact on stock market liquidity when the minimum allowable price variation is smaller because liquidity providers change their quotes and orders more easily according to market sentiments.

4.3. Amendment of NASDAQ Rule 4613 (c)

In October 2007, NASDAQ filed a proposed rule change to the SEC to eliminate the requirement (i.e., NASDAQ Rule 4613 (c)) that the NASDAQ market makers' quotes must be "reasonably related to the prevailing market." NASDAQ argued that such requirement is not necessary in highly competitive and automated trading environments. The SEC granted the request for the rule change and the new rule became effective on November 7, 2007. Some market observers believe that the maintenance of the stricter requirement on NASDAQ market makers might have helped to prevent the "Flash Crash" of May 6, 2010.

As computerized trading firms increasingly dominate market making on most exchanges, regulators have asked whether these firms provide liquidity when it is really needed. For instance, SEC Chairman Mary Schapiro urged the agency to find ways to keep them from abandoning the market at the first sign of trouble. Similarly, market observers and lawmakers have questioned whether the high-frequency-trading firms contributed to the Flash Crash by stepping away when they were needed most. For instance, Senator Charles E. Schumer wrote in a letter to Schapiro: "High-frequency traders pulled out during the free fall, leaving a dearth of liquidity and exacerbating market volatility."

Prior to the rule amendment, NASDAQ dealers had the obligation to make sure that their quotes reflect the prevailing market when public traders do not provide sufficient liquidity (i.e., limit order prices are not representative of the prevailing market). After the rule amendment, dealers no longer have such an affirmative obligation. Although some

believe that the high-frequency trading (HFT) has filled any liquidity void, many believe that it is unwise to depend on high-frequency traders for liquidity provision because they have no duty to provide liquidity and much of HFT represents opportunistic liquidity provision.[25] For example, during the Flash Crash, several major HFT firms (e.g., Tradebot Systems and Tradeworx) shut down their systems completely to protect themselves, which led to evaporation of liquidity when it was needed most.

These two attributes of HFT–its opportunistic nature and its ability to shut down at any time–differ fundamentally from the nature of the dealer's liquidity provision. Upon closely inspecting the data surrounding the Flash Crash, Easley, Prado, and O'Hara (2011) conclude that the Flash Crash may indeed be viewed as a liquidity event arising from "structural features of the new high frequency world of trading" in which liquidity provision is dominated by computerized market makers who do not have an affirmative obligation to provide liquidity at all time.

In this section, we analyze the effect of the Rule 4613 (c) amendment on market liquidity. We conjecture that the relaxation of NASDAQ dealers' affirmative obligation might have adversely affected market liquidity by tempering their role as providers of market surveillance. It is quite possible that some market orders may execute at prices that are *not* reasonably related to the prevailing market if market makers' quotes are not representative of the market, increasing market volatility and reducing liquidity.

We estimate regression models (6) and (7) for NASDAQ stocks using data before and after the rule change event. Because the rule change applied only to the NASDAQ Stock Market, we use NYSE stocks as a control sample and estimate both regression models. We use

---

25 High-frequency traders often generate profits by trading alongside larger players rather than by taking the opposite side of the trade. Hendershott, Jones, and Menkveld (2011) find that algorithmic trading generally improves liquidity and enhances the informativeness of quotes. Hence, the role of high-frequency traders in liquidity provision may differ depending on market circumstances. Perhaps they are good liquidity providers in normal markets, but poor liquidity providers during financial turmoil.

Table 8 Effects of the Amendment of NASDAQ Rule 4613 (c) on the Uncertainty Elasticity of Liquidity (UEL)

The first two columns of Panel A show the mean UEL (i.e., the estimate of α_1) from regression model (6) in the pre- and post-event periods, and the third column shows the difference in the mean UEL between the two periods for NASDAQ stocks. Likewise, the first two columns of Panel B show the mean UEL (i.e., the estimate of β_1) from regression model (7) in the pre- and post-event periods, and the third column shows the difference in the mean UEL between the two periods for NASDAQ stocks. Columns 4 through 6 in both panels show the corresponding results for the control sample of NYSE stocks. Last column in both panels show the difference in Δ (Post – Pre) between NASDAQ and NYSE stocks. Numbers in parentheses are t-statistics.

	NASDAQ			NYSE			NASDAQ - NYSE
	Pre	Post	Δ (Post – Pre)	Pre	Post	Δ (Post – Pre)	$\Delta_{NASDAQ} - \Delta_{NYSE}$
Panel A: Results based on the estimate of α_1 in regression model (6)							
Quoted spread	0.2306	0.3459	0.1153** (13.08)	0.1397	0.1930	0.0533** (6.69)	0.0620** (5.02)
Effective spread	0.2365	0.3588	0.1223** (12.52)	0.1439	0.2064	0.0625** (7.18)	0.0598** (6.78)
Price impact	0.1874	0.2926	0.1052** (9.35)	0.1039	0.1454	0.0415** (6.93)	0.0637** (4.69)
Depth	-0.1483	-0.2360	-0.0877**(-10.79)	-0.1150	-0.1635	-0.0485**(-7.23)	-0.0392** (-5.63)
Market uality index	-0.1721	-0.2723	-0.1002**(-11.67)	-0.1284	-0.1832	-0.0548**(-5.88)	-0.0454** (-4.74)
Panel B: Results based on the estimate of β_1 in regression model (7)							
Quoted spread	0.2087	0.3161	0.1074** (11.16)	0.1193	0.1622	0.0429** (5.52)	0.0645** (5.21)
Effective spread	0.2017	0.3185	0.1168** (10.41)	0.1261	0.1760	0.0499** (5.90)	0.0669** (5.57)
Price impact	0.1376	0.2334	0.0958** (8.21)	0.0862	0.1176	0.0314** (4.05)	0.0644** (4.39)
Depth	-0.1311	-0.2202	-0.0891** (-9.14)	-0.0993	-0.1321	-0.0328** (-4.71)	-0.05*63** (-3.89)
Market quality index	-0.1468	-0.2308	-0.0840** (-9.10)	-0.1016	-0.1472	-0.0456** (-4.82)	-0.0384** (-4.46)

Note: ** significant at the 1% level.

100 days from June 18, 2007 to November 6, 2007 as the pre-event period and 100 days from November 8, 2007 to April 3, 2008 as the post-event period. Our sample consists of 2,956 NASDAQ stocks and 2,402 NYSE stocks.

Panel A in Table 8 shows the results using UELs estimated from regression model (6) and Panel B shows the results using UELs estimated from regression model (7). The first three columns in both panels show that for NASDAQ stocks, the mean UELs in the post-event period are significantly greater in absolute value than the corresponding figures in the pre-event period. The next three columns show similar results for NYSE stocks. Hence it appears that there were some market-wide events that led to an increase in UELs on both NASDAQ and the NYSE.[26] The last column in Table 8 shows that the changes in the mean UELs between the pre- and post-event periods for NASDAQ stocks are significantly greater in absolute value than the corresponding figures for the NYSE control sample.

To determine whether the results in Table 8 are driven by concurrent changes in stock attributes, we estimate regression models (9) and (10) using only the NASDAQ sample. The results (see Table 9) show that the estimates of π_1 and λ_0 are positive and significant when we measure liquidity by the quoted spread, effective spread, or price impact, and negative and significant when we measure liquidity by the depth or market quality index. As a further robustness check, we also estimate the following regression model using the combined sample of NASDAQ and NYSE stocks:

---

26 The prices of mortgage-related products declined significantly in 2007 and, as a result, major credit rating agencies (e.g., Moody's, Standard & Poor's, and Fitch) downgraded a number of mortgage tranches in June and July of 2007, leading to a significant increase in risk premiums in the bond market. To the extent that liquidity depends upon the financial condition of liquidity suppliers, this event could have first order effects on market liquidity. Other market events include the repeal of the uptick rule on July 6, 2007, the implementation of Regulation NMS on July 9, 2007 for a pilot sample of 250 NMS stocks, and the phased-in implementation of the remaining NMS stocks from August 20, 2007 through October 8, 2007. These events might have also changed the effect of uncertainty and fear on liquidity.

Table 9 Regression Results for the Effects of the Amendment of NASDAQ Rule 4613 (c) on the Uncertainty Elasticity of Liquidity (UEL)

Panel A shows the results based on the estimate of α_1 (UEL) in regression model (6) and Panel B shows the results based on the estimate of β_1 (UEL) in regression model (7). The first and second columns in both panels show the estimates of π_1 and λ_0 in the following regression models for NASDAQ stocks:

$$UEL_i = \pi_0 + \pi_1 POST + \pi_2 PRICE_i + \pi_3 VOL_i + \pi_4 MVE_i + \pi_5 VOLA_i + \varepsilon_{1i}; \text{ and} \quad (a)$$

$$UEL_i^{post} - UEL_i^{pre} = \lambda_0 + \Sigma\lambda_k (X_{ki}^{post} - X_{ki}^{pre}) + \varepsilon_{2i}; \quad (b)$$

where POST is an indicator variable which equals one for the post-event period and zero otherwise; $PRICE_i$ is the share price of stock i; VOL_i is the dollar trading volume of stock i; MVE_i is the market capitalization of stock i; $VOLA_i$ is the stock i's return volatility; the superscripts 'post' and 'pre' denote, respectively, the post- and pre-periods; and X_k (k = 1 through 4) represents one of the four stock attributes (i.e., share price, dollar trading volume, market capitalization, and return volatility). The third and fourth columns show the estimates of ω_1 and ω_2 in the following regression model for the combined sample of NASDAQ and NYSE stocks:

$$UEL_i = \omega_0 + \omega_1 POST*NASDAQ_i + \omega_2 NASDAQ_i + \omega_3 PRICE_i + \omega_4 VOL_i + \omega_5 MVE_i + \omega_6 VOLA_i + \varepsilon_{3i}; \ (c)$$

where NASDAQ is an indicator variable which equals one for NASDAQ stocks and zero for NYSE stocks. Numbers in parentheses are t-statistics.

	π_1	λ_0	ω_1	ω_2
Panel A: Results based on the estimate of α_1 in regression model (6)				
Quoted spread	0.1126** (13.14)	0.1146** (7.89)	0.1133** (5.60)	0.1193** (5.07)
Effective spread	0.1188** (8.76)	0.1173** (7.55)	0.1184** (6.48)	0.1185** (5.64)
Price impact	0.0986** (10.64)	0.0959** (6.85)	0.1001** (4.70)	0.1135** (4.61)
Depth	-0.0829** (-7.39)	-0.0818** (-5.44)	-0.0850** (-5.89)	-0.0574** (-4.33)
Market quality index	-0.0990** (-6.59)	-0.1026** (-6.48)	-0.1007** (-6.94)	-0.0647** (-3.76)
Panel B: Results based on the estimate of β_1 in regression model (7)				
Quoted spread	0.1039** (7.95)	0.1005** (6.93)	0.1038** (7.41)	0.1225** (6.28)
Effective spread	0.1127** (6.86)	0.1113** (7.23)	0.1099** (5.50)	0.1080** (4.73)
Price impact	0.0892** (5.55)	0.0914** (5.04)	0.0911** (4.11)	0.0807** (3.81)
Depth	-0.0854** (-4.86)	-0.0822** (-5.96)	-0.0846** (-5.48)	-0.0546** (-3.41)
Market quality index	-0.0807** (-4.98)	-0.0767** (-4.52)	-0.0786** (-4.26)	-0.0632** (-3.93)

Note: ** significant at the 1% level.

$$UEL_i = \omega_0 + \omega_1 POST*NASDAQ_i + \omega_2 NASDAQ_i + \omega_3 PRICE_i + \omega_4 VOL_i + \omega_5 MVE_i + \omega_6 VOLA_i + \varepsilon_{3i}; \quad (11)$$

where NASDAQ is an indicator variable which equals one for NASDAQ stocks and zero for NYSE stocks. All other variables are the same as previously defined. We report the estimates of ω_1 and ω_2 in the last two columns of Table 9. The results show that the estimates of ω_1 and ω_2 are positive and significant when we measure liquidity by the quoted spread, effective spread, or price impact, and negative and significant when we measure liquidity by the depth or market quality index.

These results indicate that uncertainty and fear have a greater impact on liquidity on NASDAQ than on the NYSE, and more so after the SEC eliminated the requirement that NASDAQ dealer quotes must be reasonably related to the prevailing market.

Finally, note that the estimates of π_1, λ_0, and ω_1 are all very close to corresponding values of Δ (Post – Pre) in Table 8, indicating that changes in UEL between the pre- and post-event periods are largely attributable to the relaxation of NASDAQ dealers' affirmative obligation rather than by concurrent changes in stock attributes. Overall, these results are consistent with our conjecture that the relaxation of NASDAQ dealers' affirmative obligation adversely affected market liquidity by tempering their role as providers of market surveillance, resulting in greater swings in liquidity in reaction to changes in market uncertainty and investor sentiment.

5. Summary and Concluding Remarks

Prior research shows that liquidity of individual assets tends to move together and looks for probable causes of such co-movements. The supply-side theory of liquidity co-movements posits that liquidity co-variation arises because liquidity providers share common capital and information and therefore tend to react similarly to outside shocks. The demand-side theory suggests that liquidity commonality arises from the trading behavior of liquidity demanders. In the present study, we shed

additional light on the cause of liquidity commonality by analyzing the relation between market sentiment and liquidity. We show that uncertainty and fear exert a market-wide impact on liquidity which, in turn, gives rise to co-movements in individual asset liquidity. On the whole, our results favor the supply-side theory of liquidity commonality over the demand-side theory.

An important practical implication of our finding for traders is that they can better manage trading costs with appropriate timing. For instance, they could reduce execution costs by avoiding trading during periods of high market volatility. They may also develop optimal trading and portfolio rebalancing strategies on the basis of the cross-sectional difference in the uncertainty elasticity of liquidity (UEL), e.g., trading low UEL stocks during periods of high market volatility and trading high UEL stocks during periods of low market volatility.

We also find evidence that uncertainty and fear exert a greater impact on liquidity when public traders play more roles and market makers play less roles in liquidity provision. Based on this result, we conjecture that higher volatility in asset prices and larger fluctuations in liquidity in recent years may be due, at least in part, to the reduced role of market makers and the increased role of high-frequency traders who do not have the affirmative obligation of the traditional market makers. These findings should prove useful to market regulators who are interested in devising a more robust market structure.

We find it intriguing that the liquidity of an individual asset is related not only to its own risk but also more strongly to the level of uncertainty in the market as a whole. One possible interpretation of this result is that our individual asset risk measure (return volatility) is an incomplete measure of risk and VIX captures a part of risk that is not captured by return volatility. To the extent that the adverse selection and inventory holding costs increase with risk, and VIX captures the portion of risk not captured by return volatility, the liquidity of assets is likely to be related to VIX.

Alternatively, liquidity providers may be susceptible to market sentiment and thus at least part of the relation between VIX and liquidity may be driven by liquidity providers' reactions to market sentiment. As pointed out earlier, liquidity providers may adjust their

positions uniformly across stocks according to readily available VIX before they make security-specific adjustments based on security-specific risks. An interesting area for future research is to find out whether liquidity providers' reaction to market uncertainty reflects their rational, optimizing behaviors or irrational overreactions to market sentiment. For example, an interesting case to examine is how the liquidity of individual assets changes when VIX and individual asset risks move in opposite directions.

Having established strong evidence of the uncertainty-induced liquidity commonality, another fruitful area of future research would be to find out whether stock returns are related to UEL. Prior research shows that the return premium is related to commonality in liquidity with the market liquidity, return sensitivity to market liquidity, and liquidity sensitivity to market returns. To the extent that the market-volatility induced liquidity risk cannot be diversified away, such systematic liquidity risk would also be built into the required return of investors. It would be interesting to find out whether stocks with greater UELs actually command higher return premiums after controlling for other liquidity-related risk factors documented in prior research. Indeed our results show that the uncertainty elasticity of liquidity is greater than the liquidity commonality with the market liquidity, suggesting that the risk premium associated with the former may be even greater than the risk premium associated with the latter.

References

Acharya, Viral V., Pedersen, Lasse Heje, 2005. Asset pricing with liquidity risk. *Journal of Financial Economics* 77, 375-410.

Adrian, T., Shin, H. S., 2010. Liquidity and leverage, *Journal of Financial Intermediation* 19, 418-437.

Bao, Jack, Pan, Jun, Wang, Jiang, 2008. Liquidity of corporate bonds. Available at SSRN: http://ssrn.com/abstract=1106852 or http://dx.doi.org/10.2139/ssrn.1106852

Barclay, M., Christie, W., Harris, J., Kandel, E., Schultz, P., 1999. The effects of market reform on the trading costs and depths of Nasdaq stocks. *Journal of Finance* 54, 1-34.

Bekaert, G., Hoerova, M., Lo Duca, M., 2011. Risk, uncertainty and monetary policy. Available at SSRN: http://ssrn.com/abstract=1561171 or http://dx.doi.org/10.2139/ssrn.1561171

Bekaert, G., Harvey, C. R., Lundblad, C., 2007. Liquidity and expected returns: Lessons from emerging markets. *Review of Financial Studies* 20, 1783-1831.

Benston, G., Hagerman, R., 1974. Determinants of bid-asked spreads in the over-the-counter market. *Journal of Financial Economics* 1, 353-364.

Bessembinder, H., 2003. Issues in assessing trade execution costs. *Journal of Financial Markets* 6, 233–257.

Brunnermeier, Markus K., Pedersen, Lasse H., 2009. Market liquidity and funding liquidity. *Review of Financial Studies* 22, 2201-2238.

Chordia, T., Roll, R., Subrahmanyam, A., 2000. Commonality in liquidity, Journal of Financial Economics 56, 3-28.

Chordia, T., Roll, R., Subrahmanyam, A., 2001. Market liquidity and trading activity, *Journal of Finance* 56, 501-530.

Chordia, T., Roll, R., Subrahmanyam, A., 2008. Liquidity and market efficiency. *Journal of Financial Economics* 87, 249-268.

Chordia, T., Sarkar, A., Subrahmanyam, A., 2005. An empirical analysis of stock and bond market liquidity. *Review of Financial Studies* 18, 85-129.

Coughenour J., Saad, M., 2004. Common market makers and commonality in liquidity,

Journal of Financial Economics 73, 37-69.

Easley, D., Prado. M. L., O'Hara, M., 2011. The Microstructure of the 'flash crash': Flow toxicity, liquidity crashes and the probability of informed trading. *Journal of Portfolio Management* 37, 118–128.

Graham, John R., Harvey, C. R., 2010. The equity risk premium in 2010. Available at SSRN: http://ssrn.com/abstract=1654026 or http://dx.doi.org/10.2139/ssrn.1654026

Glosten, L., Milgrom, P., 1985. Bid, ask and transaction prices in a specialist market with heterogeneously informed traders. *Journal of Financial Economics* 14, 71-100.

Hameed, A., Kang, W., Viswanathan, S., 2010. Stock market declines and liquidity. *Journal of Finance* 65, 257–293.

Harris, L., 1994. Minimum price variations, discrete bid-ask spreads, and quotation sizes. Review of Financial Studies 7, 149-178.

Hasbrouck, J., Seppi, D. J., 2001. Common factors in prices, order flows and liquidity. *Journal of Financial Economics* 59, 383–411.

Hendershott, T., Jones, C., Menkveld, A., 2011. Does algorithmic trading improve liquidity*? Journal of Finance* 66, 1–33.

Ho, T., Stoll, H.R., 1981. Optimal dealer pricing under transactions and return uncertainty. *Journal of Financial Economics* 9, 47–73.

Huberman, G., Halka, D., 2001. Systematic liquidity. Journal of Financial Research 24, 161-178.

Lee, C. M. C., Ready, M. J. 1991. Inferring trade direction from intraday data. *Journal of Finance* 46, 733–746.

Kamara, A., Lou, X., Sadka, R., 2008. The divergence of liquidity commonality in the cross-section of stocks. *Journal of Financial Economics* 89, 444–466.

Karolyi, G. A., Lee, K-H., Van Dijk, M. A., 2012. Understanding commonality in liquidity around the world. *Journal of Financial Economics*, forthcoming.

Koch, A., Ruenzi, S., Starks, L., 2010. Commonality in liquidity: A demand-side explanation. Working paper, University of Texas at Austin.

Korajczyk, R. A., Sadka, R., 2008. Pricing the commonality across alternative measures of liquidity. *Journal of Financial Economics* 87, 45–72.

Lee, K-H., 2011. The world price of liquidity risk. *Journal of Financial Economics* 99, 136-161.

Longstaff, F., Pan, J., Pedersen, L., Singleton, K,. 2010. How sovereign is sovereign credit risk? *American Economic Journal: Macroeconomics* 3, 75–103.

Nagel, Stefan, 2011. Evaporating liquidity. Working paper, Stanford University.

Pan, J., Singleton, K., 2008. Default and recovery implicit in the term structure of

sovereign CDS spreads. *Journal of Finance* 63, 2345-2384.

Pastor, L., Stambaugh, R. F., 2003. Liquidity risk and expected stock returns. *Journal of Political Economy* 111, 642-685.

Sadka, R., 2010. Liquidity risk and the cross-section of hedge-fund returns. *Journal of Financial Economics* 98, 54-71.

Stoll, H., 2000. Friction. *Journal of Finance* 55, 1479-1514.