Effects of Human Capital on the Economic Adjustment of North Korean Defectors

Byung-Yeon Kim and Seong Hee Kim

This study investigates the effects of combined human capital of North and South Korea on the economic adjustment of North Korean defectors. Household income and job stability are used as outcome variables. Informal economic activities in North Korea exert a significant and positive impact on economic adjustment in the South. Membership in the Workers' Party and time spent in the South positively affect household income. Overall, acquired human capital from North Korea appears more important than that obtained from the South. This finding has significant policy implications.

Keywords: North Korea, Informal economic activities, Human capital, Economic adjustment

JEL Classification: J22, J61, O17, P20

I. Introduction

As of March 2016, more than 29,000 North Korean defectors are settled in South Korea (Ministry of Unification 2016); this group comprises 0.06% of the country's population. The number will

Byung-Yeon Kim, Corresponding Author, Department of Economics, Seoul National University, Gwanak-ro 1, Gwanak-gu, Seoul 08826, Republic of Korea. (E-mail): kimby@snu.ac.kr, (Tel): +82-2-880-6370, (Fax): +82-2-880-4061; Seong Hee Kim, Department of Economics, Seoul National University, Gwanak-ro 1, Gwanak-gu, Seoul 08826, Republic of Korea. (E-mail): mapleday@snu.ac.kr, (Tel): ※ 개인정보 표시제한, (Fax):+82-2-880-4061, respectively.

Byung-Yeon Kim acknowledges financial support by the National Research Foundation of Korea Grant funded by the Korean Government (NRF-2013S1A5A2A0304 4 461).

[**Seoul Journal of Economics** 2016, Vol. 29, No. 4]

exponentially increase if South and North Korea decide to integrate or unify their economies.

According to the previous studies, North Korean defectors encounter difficulties when they resettle in South Korea (Jeon 2007; Yi *et al.* 2007; Yoon 2009). Despite government subsidies, unemployment rate and income considerably differ between South Korean citizens and North Korean defectors. In 2015, the unemployment rate of South Korean citizens was 3.6%, whereas that of North Korean defectors reached 4.8%; moreover, the average monthly wage of defectors was 1.55 million won, which was only 44% of the average monthly wage of South Koreans at 3.49 million won (Korea Hana Foundation 2016; Statistics Korea 2016). Additionally, the separation between these two groups and the differences in their economic and political experiences for 70 years may cause disparity in various aspects. A number of North Korean defectors experience mental or psychological trauma when settling in South Korea.

The successful resettlement of North Korean defectors in South Korea is important for the welfare and integration of the two countries. The capability of North Koreans to adapt successfully and quickly to South Korean society can significantly reduce reunification cost. Otherwise, reunification cost and social discord between North and South Koreans can increase dramatically. Social conflicts may also indicate a possibility of political instability of reunified Korea.

Important systematic studies on the adjustment of North Korean defectors in South Korea remain lacking. Even studies on the adaptation of immigrants have not reached a consensus on the key determinants of their outcomes (Yang 1994; Safi 2010). Factors, such as self-selection of immigrants and the characteristics of their origin and settlement countries, complicate the issue. Apart from these challenges, research on North Korean defectors faces severe deficiencies in terms of data, which is detrimental for conducting quantitative research. Researchers also often fail to obtain sufficient information on the variables of defector experiences in South and North Korea. For example, the surveys of Korea Hana Foundation, the official institution that assists North Korean defectors in South Korea, only cover issues on their experience in South Korean society.

The present study uses data of North Korean defectors obtained from a three-wave survey administered by a team of researchers from the Economics Department of Seoul National University. The

survey was conducted in August 2011, May 2014, and June 2015 with respective participants of 132, 161, and 191.[1] Seoul National University implemented the first wave, whereas Nielsen Korea conducted the last two. The sample of the first wave was constructed via snowball method through personal contacts. The sample population of the first wave is defectors aged 20 or older who left North Korea within a year before the survey. The samples for the second and third waves were stratified by age, sex, and year of entry in South Korea. These samples were randomly drawn from the population of North Korean defectors aged 20 or older who lived in South Korea. Gang survey methodology was applied for all three waves to facilitate interviews with defectors living in the Metropolitan Seoul Area, including Gyeonggi Province.

These surveys are unique questionnaires that include a comprehensive number of variables that may affect the adjustment of North Korean defectors to South Korean society. Experiences while living in North Korea and after arriving in the South were specifically explored. Economic variables, such as income, status of labor market participation, and subjective perception variables are also included in the survey.

We contribute to existing literature in the following aspects. First, we focus on the role of human capital in North and South Korea in determining the economic adjustment of North Korean defectors. We analyze whether participation in the informal economy and status of membership in the Workers' Party affect economic adjustment in South Korea. These two factors are used as proxies of human capital. Workers' Party membership, which is restricted to certain individuals, provides privilege to obtain knowledge and information and exercise of power. Hence, members of the Workers' Party may gain higher human capital than those who are non-members. Another interesting determinant is participation in the informal economy of North Korea, which is an open opportunity for most North Koreans. Literature suggests that the widespread informal economic activities in North Korea reached an unprecedented level in any former socialist economy (Kim, and Song

[1] Although five surveys were actually conducted from 2011 to 2015 in total, we do not use the second (conducted in 2012) and the third (conducted in 2013) surveys because the sample of the former includes only North Korean refugees attending universities in Seoul, and that of the latter is the same individuals surveyed in 2011.

2008; Kim, and Yang 2012). These activities include market trading, cultivating private plots, cattle feeding, producing consumer goods, providing repair services, and smuggling. North Koreans accumulate human capital by studying market mechanism and learning business skills through these activities. We also employ a systematic and holistic approach in examining the diverse aspects of immigrant adjustment by controlling variables related to experiences in the two Koreas. We then attempt to mitigate the sample selection problem of North Korean defectors.

This study is organized as follows. In Section II, we review studies on immigrant adjustment in other countries, especially the adjustment of North Korean defectors in South Korean society. In Section III, variables related to adjustment in South Korean society are explained and descriptive statistics are provided. In Section IV, we present regression results with economic adjustment as the dependent variable and other determinants as independent variables. Section V conducts a robustness check of our main results. Section VI concludes and discusses the policy implications of the study.

II. Literature Review

The existing studies find that individual characteristics and experiences in resettlement countries and countries of origin affect the outcomes of immigrant adjustment (Yang 1994; Safi 2010). Only a few studies that conducted regression analyses have considered these variables. Many individual-level analyses on immigrant adjustment use data from the U.S. or Canada. For example, Yang (1994) uses the U.S. Public Use Microdata Sample in 1980 to analyze the determinants of the outcomes of immigrant adjustment at the individual-level; they find that English skills, marital status, and sex significantly influence adjustment outcomes. Duleep and Regets (1997) compare wage growth rates between immigrants and natives using data on Current Population Survey of the U.S., and find that time spent in settlement countries is an important determinant of immigrant adjustment. Hum and Simpson (2004) use the Canadian Survey of Labor and Income Dynamics to analyze changes in the wages of Canadian immigrants; they find that foreign-born immigrants cannot earn as much as Canadians, but the wages of their second generation do not significantly differ from those of native Canadians.

As the number of North Korean defectors in South Korea increased, literature on the determinants of their adjustment began to grow in number in the 2000's. Some studies focus on psychological and social adjustment, whereas others investigate the factors that affect economic adjustment (Han, and Chae 2003; Yoon 2007; Kang *et al.* 2009; Jeon *et al.* 2010; Yu *et al.* 2012; Kim *et al.* 2013). Sul and Song (2013) use satisfaction to measure psychological and social adjustment using data from a survey conducted in 2010. This study examines the effects of pride and economic achievements on psychological adjustment, and finds that pride and income are key determinants of life satisfaction of female defectors.

The main outcome variables for economic adjustment include employment status, income, and career development. Yu *et al.* (2012) focus on female North Korean defectors, who comprise the majority of defectors living in South Korea. The survey results based on 278 female adults in Seoul aged 25 to 60 years old indicate that South Korean education effectively improves the employment outcomes of 45-year-olds and younger, whereas certificates, job-training programs, and education obtained in North Korea do not. Duration of residence in the South and the accents of North Korean defectors are also important determinants of employment. Unlike the present study, however, existing works did not use a comprehensive set of human capital-related variables accumulated in North Korea.

III. Descriptive Statistics of Economic Adjustment of North Korean Refugees in South Korea

Diverse factors should be considered when evaluating the progress of immigrant adjustment. Immigrants who are physically and mentally fit, have sufficient income, and share values with citizens of the settlement country can be considered adjusted or naturalized. Immigrants who believe that they are not discriminated against and have dense social networks also have high adjustment levels.

Economic adjustment is the most crucial factor of adjustment because it directly affects the quality of life of immigrants. This factor is objective and relatively easy to measure with the variables employment status and income level. We use two measures as proxies for economic adjustment of North Korean defectors in South Korea, an indicator variable for job stability and household income level in South Korea.

Table 1
Employment Status by Survey Year

	Wave 1		Wave 2		Wave 3		Total	
	N	%	N	%	N	%	N	%
Unemployed	37	27.82	21	13.04	26	13.61	84	17.32
Temporary	20	15.04	35	21.74	78	40.84	133	27.42
Permanent	13	9.77	32	19.88	44	23.04	89	18.35
Not in labor force	63	47.37	73	45.34	43	22.51	179	36.91
Total	133	100	161	100	191	100	483	100

Sources: Our surveys

Our analyses are based on the survey data with 485 respondents collected throughout the three waves.

Table 1 presents the employment status of the defectors based on survey wave. The first wave has a higher proportion of unemployed defectors than in the latter waves. The proportion of temporary and permanent workers is also lower in the first wave than in the other two waves. Such difference may be caused by the discrepancy in the sampling method between the first and the two following waves, as mentioned in Section I. Since the stratified random sampling method was used in the last two waves, the respondents in these waves can closely represent the population of North Korean defectors. Those in the first wave may suffer from the selection bias due to the non-random sampling method. The percentages of unemployment are similar in the last two waves, but the proportion of temporarily employed respondents are higher for the third wave than in the second. The percentage of people in the second wave who are not part of the labor force is higher than that in the third wave.

Table 2 presents the household income of respondents in South Korea. Even after taking account the inflation rates in South Korea, which ranges 1-2% per annum, the respondents in the first wave have the lowest average household income. Conversely, the respondents in the second and third waves have comparable average income levels. The average income of North Korean defectors is lower than that of South Koreans', which is slightly higher than the monthly minimum wage.[2] When the number of household members is considered, the former's

[2] As of 2016, the minimum hourly wage in South Korea is 6,030 Won.

Table 2
Monthly Household Income in South Korea by Survey Year

	Wave 1		Wave 2		Wave 3		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Income	122.69	69.03	149.54	133.56	150.01	148.44	142.77	127.62

Note: The figures are in 10,000 South Korean Won.
Sources: Our surveys

per capita income would be lower than the minimum wage in South Korea.

The information we used to measure defector experiences in North Korea is more comprehensive than that in the previous studies, especially in terms of economic activities. The survey questionnaire includes multiple questions on whether the respondents relied on the formal or informal economic sector for income generation and the types of activities they engaged in. Table 3 reports the summary statistics of respondent characteristics.

The average age of the respondents is 38. The composition of age and sex (variables that were considered for sample stratification) reflects the population of North Korean defectors. For example, female respondents comprised 67% of total respondents, which is comparable to the 70% of North Korean defectors in 2015. Approximately 61% of the respondents originated from Hamkyung Province, which is lower than that of the defector population (72%). Approximately 63% of respondents adhere to a religion, 29% are married, and 30% attended North Korea's tertiary education, which includes two-year college and higher-level institutions. Our sample has a higher average education level than the whole population in which 20% are educated in colleges or universities (Kim 2009).

The percentage of Workers' Party members in the sample is similar to the percentage in the total population, which is estimated at 16%.[3] Based on our examination of their informal economic activities, we

[3] In the 1980s, the number of Workers' Party members was estimated to be 2 to 3.2 million. Based on this estimate, assuming the number of Workers' Party members is 3 million, we calculate the ratio by dividing the number by the population aged 15 or more.

TABLE 3
SUMMARY STATISTICS OF DEMOGRAPHIC CHARACTERISTICS

		N	Mean/%	Std. Dev.
Age		485	38.17	11.90
Gender (%)	Female	325	67.01	-
	Male	160	32.99	-
Religion (%)	Protestant	273	56.4	-
	Catholic or Buddhist	30	6.2	-
	No Religion	181	37.4	-
Marital Status (%)	Not married	345	71.13	-
	Married	140	28.87	-
Origin (%)	From Hamkyung Province	338	60.69	-
	From Other Provinces	147	30.31	-
North Korea-related variables				
Education (%)	Secondary or lower	340	70.1	-
	College/University or higher	145	29.9	-
Political Status (%)	Military Experience	88	18.14	-
	Workers' Party Membership	71	14.64	-
Informal Economic Activities	None (%)	239	49.28	-
	Home Production, Farming, Repair (%)	60	12.37	-
	Selling (%)	150	30.93	-
	Smuggling and Other (%)	36	7.42	-
	Duration (years)	247	5.13	4.90
Real Annual Income* (2010 DPRK Won)	Informal economy	237	255,769	630,108
	Total income	438	257,301	693,869
	Share of informal income (%)	438	39.6	44.6
South Korea-related variables				
Arrival Year	2004 and before	99	16.12	-
	2005–2009	139	33.47	-
	2010–2014	245	50.41	-
Residence & Income**	Years lived	484	5.40	4.16
	Household Monthly Total	455	142.77	127.62
	Monthly Per capita	455	70.28	74.50
Employment Status (%)	Unemployed	84	15.14	-
	Temporary or Contract-based	133	27.42	-
	Permanent, Self-employed, or Employer	89	18.35	-
Education level (%)	Secondary or below***	367	75.67	-
	College or Graduate School	83	17.11	-
	Online University Course	35	7.22	-

Notes: * Due to high inflation in North Korea, we used the CPI index (Appendix) to generate real annual income. The statistics reported take means of only income values bigger than zero.
** Household income is the gross income from all sources, such as salary/wage, government subsidies, support from family or private organizations, interest income, and income from property.
*** "Secondary education or below" includes general equivalency diplomas (GEDs).
Sources: Our surveys

conclude that North Korea has a huge informal sector. The average duration of respondents in informal sector activities is 5.1 years. Although only 237 respondents reported positive informal income, their mean informal income is comparable to the mean of all respondents' total income in North Korea. The mean of the informal income share of each respondent is 39.6%, and rises up to 74.1% if respondents without income from the informal sector are excluded. The smaller share of informal income than conventional statistics is attributed to the sample in the last two survey waves. These waves have high proportions of respondents who defected when informal economic activities in North Korea were not prevalent.

Education level in South Korea can most likely benefit economic adjustment because it increases human capital. However, this finding may be irrelevant to individuals who reluctantly receive education because of government subsidies. Approximately 17% of the respondents either experienced or completed universities, and 7% experienced online courses offered by universities.

The respondents' average length of residence in South Korea is 5.4 years, and their average monthly household income is 1.43 million won, which is close to the average earnings of employed defectors at 1.41 million won (North Korean Refugees Foundation, 2013). Over half of the respondents are part of the labor force, with 27% temporary or contract-based employees and 18% employers, self-employed, or permanently employed.

IV. Determinants of Economic Adjustments

A. Determinants of Job Status

The economic adjustment of respondents in South Korean society is used as the dependent variable in the following regression analyses. We use two measures for the extent of economic adjustment, namely, stability of employment and income in South Korea. The former variable takes the value 1 if the respondent is permanently employed, an employer, or self-employed, and 0 otherwise. These values enable us to use logistic estimation method. The latter variable is the log of defectors' monthly household income in South Korea.

We use the following explanatory variables concerning human capital. For human capital obtained in North Korea, variables related to

the official education level, Workers' Party member status and informal economic activities are used. The official education level is a natural candidate for a proxy for human capital. However, the role of official education level cannot precisely facilitate human capital in North Korea. Admission to certain schools and universities is restricted to those who have good social and family background or *Sungbun;* furthermore, the quality of education is poor (Hunter 1999; Oh, and Hassig 2009).

Membership in the Workers' Party may be used as proxy for ability, which is not fully reflected in the education level. Membership in the Workers' Party in North Korea requires certain qualification, such as *Sungbun*, loyalty, and reputation. These factors are associated with human capital. Additionally, certain information and knowledge can be restricted to Party members. Members may also have opportunities to exercise leadership within the organizations thereby allowing them to accumulate human capital.

Informal economic activities in North Korea can also be considered as a mechanism that increases human capital. Unlike official educational level and Workers' Party membership, these activities are accessible to most of the population. Furthermore, participating in a profit-motivated informal economy enables North Koreans to understand market mechanism and develop their skills and businesses. They may also take initiative in their economic life instead of working in official workplaces and receiving food ration, which are directed and implemented by authorities. Hence, human capital from informal economic activities has a positive impact on economic adjustment in a capitalist country like South Korea. Considering the various channels through which informal economic activities affect human capital, we use the types and duration of such activities and the share of informal income in total income as proxies for human capital.

Concerning human capital accumulated in South Korea, education and residence duration in South Korea can be considered as proxies. North Korean defectors are required to complete compulsory education by South Korean law, if applicable. Defectors are also able to attend colleges and universities with the government's financial support. The length of their stay South Korea can be correlated with a deeper understanding of the country's institutions and culture. This factor may also facilitate acquisition of skills, know-how, and knowledge, which cannot be achieved through official education.

First, we examine the factors that influence the job performance of

North Korean defectors in South Korea. Table 4 reports the logistic regression results. In Columns (1) and (2), we use variables related only to North Korea. The regressions reported in Columns (3) and (4) also use South Korea-related ones. Given the concerns on multicollinearity between total income and the share of informal income in total income, Columns (1) and (3) use only the former, but the latter is added in the remaining columns.

Column (1) shows regression results using North Korean variables as controls. The dependent variable indicates the job stability of respondent.[4] Age-related variables are significant demographic variables. The probability of being a permanent worker/employer or self-employed is highest at 44 years old based on the calculations using the results in Column (4).

The coefficient on Workers' Party member status is positive but insignificant in all regressions. This finding implies that the membership fails to foster human capital that translates to employment stability. Moreover, education level in North Korea is not associated with job stability in South Korea; this finding is consistent with Yu *et al.* (2012). This finding can be understood from the fact that educational quality in North Korea mainly focuses on ideology indoctrination and admission to universities is based on loyalty and social background (Hunter 1999; Oh, and Hassig 2009).

Conversely, the variables related to informal economic activities in North Korea significantly determine job status in South Korea. In all regressions, the odds of job stability increase proportionally with years of participation in informal economy. The share of informal income is positively associated with job stability in Columns (2) and (4). The results suggest that participation fosters human capital that contributes to economic adjustment in a market economy. This finding can be attributed to the fact that North Korea's informal economy operates as a small market economy. Thus, accumulated knowledge, skills and entrepreneurship help the defectors find stable employment

[4] Our results are also robust to different indicators of economic adjustment, such as employment among the respondents with active labor market participation status. When the dependent variable is an indicator variable of employment (taking the value 1 if employed or is an employer, regardless of job form, and 0 otherwise), the magnitude of the coefficients of duration of informal economic activities and share of informal income is in fact slightly bigger.

TABLE 4
JOB STATUS AND HUMAN CAPITAL

	(1)	(2)	(3)	(4)
Age	0.219**	0.210**	0.183*	0.177*
	(2.407)	(2.316)	(1.954)	(1.877)
Age squared	-0.003**	-0.002**	-0.002**	-0.002*
	(-2.354)	(-2.248)	(-1.990)	(-1.908)
Male	0.506	0.539	0.359	0.383
	(1.521)	(1.592)	(0.993)	(1.049)
Married	0.343	0.372	0.419	0.445
	(1.228)	(1.316)	(1.452)	(1.523)
Hamkyung Province	-0.202	-0.200	-0.298	-0.306
	(-0.687)	(-0.673)	(-0.973)	(-0.979)
Secondary education in NK	-0.403	-0.293	-0.434	-0.337
	(-1.430)	(-1.040)	(-1.465)	(-1.142)
Served in military	0.037	0.012	0.004	-0.016
	(0.086)	(0.028)	(0.008)	(-0.033)
Workers' Party membership	0.207	0.244	0.342	0.363
	(0.471)	(0.549)	(0.754)	(0.788)
Informal: Home production, farming, repair	-0.367	-0.425	-0.314	-0.373
	(-0.806)	(-0.935)	(-0.669)	(-0.799)
Informal: Selling	-0.298	-0.417	-0.198	-0.311
	(-0.825)	(-1.125)	(-0.529)	(-0.813)
Informal: Smuggling & other	-0.233	-0.248	-0.000	-0.010
	(-0.432)	(-0.460)	(-0.001)	(-0.017)
Duration of informal activities (years)	0.086**	0.082**	0.099***	0.095**
	(2.353)	(2.149)	(2.593)	(2.380)
Real total income (log)	0.115**	0.121**	0.100**	0.098*
	(2.368)	(2.168)	(2.005)	(1.695)
Share of informal income		0.012***		0.013***
		(3.792)		(3.947)
Years lived in South Korea			0.055	0.060
			(1.285)	(1.362)
Edu SK: College or graduate school			0.294	0.288
			(0.888)	(0.859)
Edu SK: Online Univ. Course			0.390	0.287
			(0.818)	(0.582)
Religion: Protestant			0.590	0.587
			(0.843)	(0.841)

TABLE 4
(CONTINUED)

	(1)	(2)	(3)	(4)
Religion: none			0.197	0.154
			(0.273)	(0.214)
Survey = 2	1.486***	1.556***	1.162**	1.209**
	(3.314)	(3.504)	(2.160)	(2.256)
Survey = 3	1.755***	1.787***	1.431***	1.420***
	(4.042)	(3.991)	(2.737)	(2.605)
Observations	457	438	455	436
Pseudo-R2	0.104	0.115	0.122	0.134

Notes: Robust z-statistics in parentheses. Logistic regression results are reported. The dependent variable takes the value 1 if the respondent is a permanent worker, an employer, or self-employed, and 0 if temporarily employed, unemployed, or not in the labor force. Secondary education in North Korea is a dummy variable that includes lower-than-secondary levels of education. Hamkyung Province is the indicator variable for whether the respondent is from the Hamkyung Province. The reference group of informal sector activities is "no informal sector activity." Real total income is per capita income in real terms based on North Korean Won in 2010. Share of informal income is generated by dividing the real informal income by the real total income in North Korea. The omitted category of South Korean education dummies is "secondary education or lower." The reference group of the religion dummies is "Buddhists and Catholics." The numbers of the survey dummies denote waves. *** p<0.01, ** p<0.05, * p<0.1

in South Korea's large market economy. Human capital accumulated through this informal sector strongly affects employment outcome. The results in Column (4) with other variables at the fixed level show that a change in the duration of informal economic activities by a standard deviation (4.9 years) increases the odds of acquiring a stable job by approximately 40%. This magnitude appears substantial, which implies that human capital acquired in North Korea plays an important role in economic outcomes after arrival in South Korea.

We add independent variables related to South Korean life in Columns (3) and (4). Years spent in South Korea and experience in higher education positively affect the employment outcome, but these coefficients are not statistically significant. Human capital accumulated in South Korea has limited influence on economic outcome, which implies ineffectiveness of government policies for the successful

adjustment of defectors. This finding contradicts the role of informal economic experience from North Korea in the job status of defectors in South Korea.

We control for survey waves to control for the potential impact of sampling methods. The respondents of the later surveys perform significantly better than the participants in the first wave because the latter settled in South Korea for less than a year before the survey.

B. Determinants of Economic Performance in South Korea

The log of household income in South Korea is used in these analyses as another proxy for economic adjustment. Table 5 reports the Ordinary Least Squares (OLS) results when the dependent variable is the log of monthly household income in South Korea. As in Table 4, the results of the first two columns are based only on North Korea-related variables and those of the last two are based on both North and South Korea-related variables.

Columns (1) and (2) show that membership in the Workers' Party positively influences household income levels in South Korea. The statistical significance of membership status in Workers' Party remains even when we add controls on South Korean life in Column (3). The significant correlation of membership with household income, but not with job stability, may be attributed to the fact that respondents who possess exclusive knowledge of North Korea are likely to be compensated for participating in surveys and consulting services in South Korea.

Years of participation in informal economic activities or income are not statistically significant. However, the significant coefficients of job status variables, namely, "permanent, employer and the self-employed," in all columns indicate that the duration of participation in informal economic activities indirectly affects household income through job status. The share of informal income in total income is statistically significant in Column (2). In Columns (3) and (4), informal income from home production, farming, repair, and smuggling also significantly affect household income when the control variables related to experiences in South Korea are added. The magnitude of effects on income is also substantial. Participation in these activities increases household income by 18% to 23%. This finding indicates a positive influence on household income in South Korea by increasing the

TABLE 5
HOUSEHOLD INCOME AND HUMAN CAPITAL

	(1)	(2)	(3)	(4)
Age	0.002	0.000	-0.018	-0.021
	(0.125)	(0.013)	(-0.968)	(-1.105)
Age squared	-0.000	-0.000	0.000	0.000
	(-0.660)	(-0.525)	(0.397)	(0.542)
Male	0.037	0.008	-0.058	-0.084
	(0.456)	(0.102)	(-0.745)	(-1.062)
Married	0.451***	0.444***	0.428***	0.416***
	(5.365)	(5.150)	(5.410)	(5.156)
Hamkyung Province	-0.049	-0.036	-0.069	-0.058
	(-0.668)	(-0.489)	(-0.979)	(-0.821)
Secondary education in NK	-0.095	-0.089	-0.082	-0.079
	(-1.167)	(-1.066)	(-1.044)	(-0.983)
Served in military	-0.084	-0.062	-0.052	-0.031
	(-0.759)	(-0.552)	(-0.485)	(-0.288)
Workers' Party membership	0.230**	0.245**	0.185*	0.203*
	(2.088)	(2.205)	(1.799)	(1.960)
Informal: Home production, farming, repair	0.154	0.155	0.185*	0.182*
	(1.416)	(1.422)	(1.826)	(1.790)
Informal: Selling	-0.003	-0.004	0.068	0.065
	(-0.031)	(-0.048)	(0.815)	(0.759)
Informal: Smuggling and other	0.107	0.113	0.222**	0.227**
	(0.906)	(0.958)	(1.981)	(1.995)
Duration of informal activities (years)	0.003	0.002	-0.003	-0.003
	(0.285)	(0.260)	(-0.246)	(-0.286)
Real total income (log)	0.011	0.014	0.001	-0.000
	(1.078)	(1.078)	(0.084)	(-0.015)
Share of informal income		0.000***		0.000
		(2.889)		(0.682)
Years lived in South Korea			0.039***	0.041***
			(3.747)	(3.758)
Edu SK: College or graduate school			0.056	0.036
			(0.582)	(0.368)
Edu SK: Online Univ Course			-0.026	-0.031
			(-0.276)	(-0.322)
Job: Temporary			0.149	0.170*
			(1.565)	(1.729)

TABLE 5
(CONTINUED)

	(1)	(2)	(3)	(4)
Job: Permanent, Self-employed, Employer			0.452*** (4.425)	0.462*** (4.427)
Job: Not in LF			-0.091 (-1.085)	-0.095 (-1.104)
Religion: Protestant			-0.203* (-1.725)	-0.178 (-1.471)
Religion: none			-0.215* (-1.819)	-0.180 (-1.479)
Number of household members	0.068*** (3.132)	0.071*** (2.986)	0.062*** (3.190)	0.068*** (3.293)
Survey = 2	0.010 (0.098)	0.001 (0.011)	-0.301** (-2.532)	-0.331*** (-2.682)
Survey = 3	0.125 (1.312)	0.141 (1.353)	-0.263** (-2.320)	-0.285** (-2.309)
Observations	432	417	432	417
R-squared	0.183	0.185	0.285	0.288

Notes: Robust t-statistics in parentheses. OLS results are reported in the table. The dependent variable is the log of monthly household income in South Korea. Secondary education in North Korea also includes lower than secondary levels of education. Hamkyung Province is the indicator variable for whether the respondent is from the Hamkyung Province. The reference group of informal sector activities is "no informal sector activity." Real total income is per capita income in real terms based on 2010's North Korean Won. Share of informal income is generated by dividing the real informal income by the real total income in North Korea. The reference group of South Korean education dummies is "secondary education or lower." The reference group of the job categories is "unemployed." Permanent dummy includes permanent workers, employers, and self-employed. Not in LF is an indicator variable whether the respondent is in the labor force. The reference group of the religion dummies is "Buddhists and Catholics." The numbers of the survey dummies denote waves. *** p<0.01, ** p<0.05, * p<0.1

probability of job stability and directly affecting income.

In terms of human capital accumulated in South Korea, duration of residence in South Korea is significantly associated with household income. According to the coefficient on duration of residence, one year stay in South Korea increases household income by 4%[5]; this finding

[5] The square term of the years spent in South Korea is found not to be

TABLE 6
RESPONDENTS' PRIMARY REASONS FOR DEFECTING FROM NORTH KOREA

		N	%
Primary reason for defection	Poverty and hunger	183	37.73
	Security threat	40	8.25
	Recommended by neighbors	13	2.68
	Recommended by earlier defectors	29	5.98
	Following family members	37	7.63
	Seeking family who defected earlier	33	6.80
	To make more money	22	4.54
	To seek political & social freedom	46	9.48
	Hatred against DPRK system	58	11.96
	Better future for children	21	4.33
	Other	3	0.62

implies that the extent of economic adjustment increases in proportion to the duration of stay in South Korea. However, human capital obtained in North Korea plays a more important role than that in South Korea when determining economic adjustment of defectors.

V. Robustness Check

Results from the previous sections are less likely to suffer from endogeneity because human capital in North Korea is acquired before the timing of defectors' adjustment in South Korea. However, omitted variables, such as the extent of risk-aversion, strength of motivation, and social network, may cause endogeneity bias. For example, defectors with family members in South Korea will be able to adjust faster than those without. In our survey questionnaire, participants were asked about their primary reasons for defection, which can also be used as a proxy for the degree of risk-aversion and motivation.

The summary statistics of the respondents' primary reasons for defection are shown in Table 6. The most evident reason for escaping from North Korea is poverty and hunger (37.73%), followed by hatred against North Korean system (11.96%). Personal reasons, such as following family members, seeking family members who defected, and recommendation by early defectors or neighbors, account for 23.09%

significant in determining household income.

TABLE 7
IMPACT OF DEFECTION MOTIVATION ON ECONOMIC OUTCOMES

	(1)	(2)	(3)	(4)
Secondary education in NK	-0.344	-0.247	-0.057	-0.056
	(-1.096)	(-0.803)	(-0.693)	(-0.662)
Served in military	0.005	-0.023	-0.064	-0.045
	(0.010)	(-0.044)	(-0.579)	(-0.408)
Workers' Party membership	0.339	0.371	0.200*	0.221**
	(0.691)	(0.740)	(1.837)	(2.012)
Informal: Home production, farming, repair	-0.345	-0.397	0.187*	0.190*
	(-0.722)	(-0.833)	(1.818)	(1.842)
Informal: Selling	-0.103	-0.215	0.073	0.069
	(-0.261)	(-0.533)	(0.850)	(0.789)
Informal: Smuggling & other	-0.205	-0.215	0.196*	0.202*
	(-0.366)	(-0.382)	(1.684)	(1.721)
Duration of informal activities (years)	0.106***	0.102***	-0.002	-0.003
	(2.765)	(2.602)	(-0.208)	(-0.235)
Real total income (log)	0.091*	0.091	-0.000	-0.001
	(1.856)	(1.610)	(-0.028)	(-0.051)
Share of informal income		0.013***		0.000
		(3.873)		(0.668)
Years lived in South Korea	0.083*	0.087*	0.041***	0.043***
	(1.797)	(1.830)	(3.619)	(3.629)
Edu SK: College or graduate school	0.284	0.297	0.058	0.044
	(0.826)	(0.847)	(0.575)	(0.423)
Edu SK: Online Univ Course	0.355	0.291	-0.019	-0.023
	(0.746)	(0.589)	(-0.190)	(-0.223)
Job: Unemployed			0.097	0.103
			(1.109)	(1.148)
Job: Temporary			0.255***	0.275***
			(3.089)	(3.247)
Job: Permanent			0.534***	0.548***
			(5.910)	(5.972)
Defect: Security threat	1.032**	1.040**	0.173*	0.166
	(2.151)	(2.153)	(1.654)	(1.567)
Defect: Recommended by neighbors	1.091	1.054	0.137	0.129
	(1.411)	(1.353)	(0.891)	(0.837)
Defect: Recommended by earlier defectors	0.995*	1.001*	0.099	0.081
	(1.951)	(1.936)	(0.710)	(0.544)

TABLE 7
(CONTINUED)

	(1)	(2)	(3)	(4)
Defect: Following family members	0.209	0.214	0.102	0.042
	(0.295)	(0.298)	(0.805)	(0.346)
Defect: Seeking family members who defected earlier	1.198**	1.137*	0.062	0.042
	(2.191)	(1.953)	(0.460)	(0.294)
Defect: To make more money	0.125	0.129	0.017	0.029
	(0.197)	(0.204)	(0.082)	(0.131)
Defect: To seek political & social freedom	1.046**	1.051**	0.123	0.118
	(2.154)	(2.139)	(1.017)	(0.960)
Defect: Hatred against DPRK system	-0.091	-0.066	0.072	0.060
	(-0.182)	(-0.130)	(0.607)	(0.509)
Defect: Better future for children	0.513	0.577	0.198	0.191
	(0.877)	(1.000)	(1.425)	(1.341)
Defect: Other	1.143	1.105	0.043	0.052
	(0.887)	(0.852)	(0.173)	(0.196)
Number of household members			0.061***	0.067***
			(3.041)	(3.175)
Observations	455	436	432	417
R-squared			0.292	0.295

Notes: Robust z-statistics in parentheses. Logit results are reported with the dependent variable being the indicator variable for job stability in Columns (1) and (2). OLS results are reported in Columns (3) and (4) with the dependent variable being the log of monthly household income in South Korea. Although included in the specification, the variables of which results are omitted due to space limits are age, sex, marital status, Hamkyung dummy, squared terms of age, religion and survey wave dummies. Secondary education in North Korea also includes lower than secondary levels. Hamkyung Province is the indicator variable for whether the respondent is from the Hamkyung Province. The reference group of informal sector activities is "no informal sector activity." Real total income is per capita income generated from both formal and informal sectors in real terms based on 2010's North Korean Won. Share of informal income is generated by dividing the real informal income by the real total income in North Korea. The reference group of South Korean education dummies is "secondary education or lower." The reference group of job dummies is "Job: Missing." Permanent dummy includes permanent workers, employers, and self-employed. Not in Labor Force is an indicator variable whether the respondent is in the labor force. The reference group of the religion dummies is "Buddhists and Catholics." The omitted group for defection reason dummies defected because of poverty. *** p<0.01, ** p<0.05, * p<0.1

of total cases. Active reasons motivated by money or political freedom account for 14.02%. These reasons are added as control variables in the equations presented in Tables 4 and 5.

The results are reported in Table 7. Columns (1)–(2) and (3)–(4) present results with job status and household income as the dependent variable, respectively. The results of demographic characteristics, such as age, gender, marital status, religion, and region of origin, do not differ significantly from those in the previous tables. The results are robust to the sampling method or survey waves. We only report the key variables in the table because of space constraints.

The key variables in Columns (1) and (2) related to human capital, that is, years participating in the informal sector and the share of informal income, have positive and statistically significant coefficients. Years spent in South Korea also contribute to the employment outcome. People who fled because of threats, defected because of neighbors' recommendations, and sought family or freedom have higher odds of securing stable jobs in South Korea than those respondents who defected because of poverty (Columns 1-2).

Household income in South Korea is used as the dependent variable in Columns (3) and (4). In these columns, membership in Workers' Party, informal farming, and years spent in South Korea have positive and statistically significant coefficients. Reasons for defection have no statistically significant influence on income in South Korea. Overall, our key findings do not change even when we include reasons for defection as additional control variables.

VI. Conclusion

This study investigates the effects of human capital accumulated in North and South Korea. This concept was examined in terms of economic adjustment, namely, job stability and household income in South Korea. We used three proxies for human capital obtained in North Korea: education level, membership in the Workers' Party, and involvement in informal economic activities. Human capital accumulated in South Korea is measured using education and duration of residence in the South.

Informal economic activities conducted in North Korea exert significant and positive influences on economic adjustment in the South. Time spent in informal activities is correlated with job stability,

whereas types of informal activities are correlated with household income. The share of informal income is associated with both measures of economic adjustment in most regression results. Membership in the Workers' Party and the length of residence in the South positively affect household income. However, education in the North and the South has no significant contribution to economic adjustment.

In terms of effects on economic adjustment, our results indicate that human capital accumulated when the defectors lived in the North is more important than human capital obtained after their arrival in the South. This finding has important policy implications. North Korean defectors may encounter difficulties while attempting to resettle in South Korea if their human capital is not enhanced before they arrive in the South. Our results indicate that North Koreans' involvement in informal economic activities can be an effective mechanism for successful adjustment in a market economy, such as that of South Korea.

(Received 26 September 2016; Revised 17 October 2016; Accepted 21 October 2016)

Appendix

Appendix Table 1
Consumer Price Index in North Korea

Year	CPI	Year	CPI
1996	0.165	2006	2.908
1997	0.181	2007	5.788
1998	0.182	2008	5.694
1999	0.252	2009	6.106
2000	0.179	2010	100
2001	0.209	2011	328.770
2002	0.304	2012	619.197
2003	0.924	2013	779.920
2004	2.476	2014	672.026
2005	2.520		

Notes: The CPI's in North Korea are calculated based on Pyongyang, Hyesan, and Shineuju's commodity prices throughout the year. Until the year 2010, the price index is based on the composition of rice (40%), pork (30%), and corn (30%) prices. After the year 2010, due to the limited information on pork and corn prices, the price index is entirely based on the rice prices throughout the three regions. The price information was obtained through browsing DailyNK newspaper articles (http://www.dailynk.com/english/index.php).

References

Duleep, Harriet O., and Mark C. Regets. "Measuring Immigrant Wage Growth Using Matched CPS Files." *Demography* 34 (No. 2 1997): 239-49.

Han, Seong Yeul, and Jung Min Chae. *The Behavioral Analysis of North Korean Refugees' Adaptation Process in South Korean Society.* Seoul: North Korean Refugees Foundation, 2003 (in Korean).

Hunter, Helen-Llouise. *Kim Il-song's North Korea.* Westport, CT: Praeger, 1999.

Hum, Derek, and Wayne D. Simpson. "Reinterpreting the Performance of Immigrant Wages From Panel Data." *Empirical Economics* 29 (No. 1 2004): 129-47.

Jeon, Woo-Taek. *Studies on Social and Psychiatric Thoughts on Korean Reunification.* Seoul: Yonsei University Press, 2007 (in Korean).

Jeon, Woo-Taek, Jin-Sup Um, and Shi-Eun Yu. "A Panel Study on North Korean Defectors' Attitudes and Life Satisfaction." *Journal*

of the Korean Neuropsychiatric Association 49 (No. 1 2010): 90-103 (in Korean).

Kang, Hye-Young, Eun-Young Hur, Yeon-Sook Jeon, and Bon-Jeong Ku. *A Study on Living Standards of North Korean Defectors after 5 Years of Entry to Korea.* Seoul: Ministry of Unification, 2009 (in Korean).

Kim, Byung-Yeon, and Dongho Song. "The Participation of North Korean Households in the Informal Economy: Size, Determinants, and Effect." *Seoul Journal of Economics* 21 (No. 2 2008): 361-85.

Kim, Byung-Yeon, and Moonsoo Yang. *The State and Markets in North Korea.* Seoul: Seoul National University Press, 2012 (in Korean).

Kim, Chang Su. *DPR Korea 2008 Population Census National Report.* Pyongyang: Central Bureau of Statistics, 2009.

Kim, Hyun-Soo, Yong-Soon Lee, and Min-Kyoo Kim. "Study on Enhancing Competency for Employability of North Korean Refugees." Korea Research Institute for Vocational Education & Training, 2013. Available at: http://repository.krivet.re.kr/handle/201303/5180.

Korea Hana Foundation. "A Report on Survey Results of Economic and Social Activities of North Korean Defectors in 2015." Korea Hana Foundation, February 17, 2016 (in Korean). Available at: http://www.koreahana.or.kr/eGovHanaReportDetail.do?pageIndex=1&key=83192.

Ministry of Unification. "The Annual Number of North Korean Defectors Entering into South Korea." Ministry of Unification, 2016 (in Korean). Available at: http://www.unikorea.go.kr/content.do?cmsid=1440.

North Korean Refugees Foundation. *The Survey Report on North Korean Refugees' Economic Activities in 2013*. Seoul: North Korean Refugees Foundation, 2013 (in Korean).

Oh, Kongdan, and Ralph C. Hassig. "North Korea in 2009: The Song Remains the Same." *Asian Survey* 50 (No. 1 2010): 89-96.

Safi, Mirna. "Immigrants' Life Satisfaction in Europe: Between Assimilation and Discrimination." *European Sociological Review* 26 (No. 2 2010): 159-76.

Statistics Korea. "The Number of Employed and Unemployment Rates." Statistics Korea, September 9, 2015 (in Korean). Available at: http://www.index.go.kr/potal/main/EachDtlPageDetail.do?idx_cd=1063.

_____. "Monthly Average Working Days, Hours, and Total Income." Statistics Korea, September 19, 2016 (in Korean). Available at: http://www.index.go.kr/potal/main/EachDtlPage Detail.do?idx_cd=1485.

Sul, Jin-Bae, and Eun-Hee Song. "The Effect of Female North Korean Refugees' Self-esteem and Economic Adaptation on Their Satisfaction with Life in South Korea." *The Journal of Peace Studies* 14 (No. 4 2013): 291-314 (in Korean).

Yang, Philip Q. "Explaining Immigrant Naturalization." *The International Migration Review* 28 (No. 3 1994): 449-77.

Yi, Soon-Hyung, Soo-Churl Cho, Changdai Kim, and Meejung Chin. *Social and Psychological Acculturation of North Korean Defector Families.* Seoul: Seoul National University Press, 2007 (in Korean).

Yoon, In-Jin. "Social Adjustments of North Korean Migrants and Measures to Facilitate Their Resettlement." *Journal of Asiatic Research* 50 (No. 1 2007): 106-43 (in Korean).

_____. *North Korean Migrants: Life, Perceptions, and Support Policy for Resettlement.* Seoul: Jipmundang Press, 2009 (in Korean).

Yu, Shi-Eun, Byung-Yeon Kim, Woo-Taek Jeon, and Seung-Ho Jung. "Determinants of Labor Market Participation and Wages of North Korean Female Refugees in South Korea." *Asian Economic Policy Review* 7 (No. 1 2012): 113-29.