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# Declining Fertility in Two Koreas: *The Demographic Implications for a Korean Reunification**

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**Abstract**

*Declining fertility has occurred within both North and South Korea. The shifting fertility trends within both countries may have important implications upon their eventual reunification. Prior research has identified the demographic advantage of a relatively young population in relation to the actual German reunification in 1990. Conversely, demographers have identified a demographic disadvantage, in that the ratio of South to North Koreans is relatively low. This study reexamines whether changes in fertility levels in both Koreas have altered the demographic advantages and disadvantages highlighted in prior studies. The findings suggest that below replacement level fertility within the two Koreas as well as the relatively higher fertility in North Korea may not only erode the demographic benefit identified in the earlier study, but also exacerbate the demographic disadvantage. Thus, from a demographic standpoint, reunification at an earlier point in time may be more beneficial than at a later one.*

**Keywords:** North Korea, South Korea, reunification, declining fertility, demographic advantage, demographic disadvantage

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## Introduction

The Democratic People's Republic of Korea (DPRK) remains one of the least known places in the world. What images the outside world does see are meticulously managed by the ruling regime, and rarely are the lives of its ordinary citizens revealed (French 2007). Economic and demographic information about North Korea has also been sparse and the accuracy and ability of data collection from the DPRK's Central Bureau of Statistics remains an open question (Eberstadt 2000; Eberstadt and Banister 1992; Goodkind and West 2001; Oh and Hassig 1999; Noland 2004). However, information is becoming more available and what is becoming evident is that North Korea's population may be changing. Fertility rates within North Korea have steadily declined since 1970 and total fertility rates now lie below replacement level (2.1) (DPRK 2008; U.S. Census Bureau 2011).

Concomitantly, South Korea has also undergone major changes in its population structure since national division, and is currently experiencing very rapid population aging (D. Kim and C. Kim 2004). While an aging population may be a global phenomenon that is currently being experienced by many industrialized nations, the relative pace is much faster in South Korea than in any other country, including North Korea (D. Kim and C. Kim 2004). Population projections estimate that by 2019, the elderly population (those 65 and older) will constitute 14 percent of the total population ("aged society"); and by 2026 that number is expected to rise to 20 percent ("super aged society") (A. Kim and Lie 2007). The cumulative effects of mortality decline, drastic economic growth, and the spread of family planning programs as well as reproductive health technologies have had profound social reverberations that have altered the calculus of childbearing (Choe and Park Kyung Ae 2006; D. Kim 2005; D. Kim and C. Kim 2004; Kwon 1993; Kye 2012). Today, South Korea's total fertility rate is one of the lowest in the world and has been so for several decades (1.2) (A. Kim and Lie 2007; D. Kim and C. Kim 2004; KNSO 2011a).

Although much research has examined the extremely low rates of fertility concerning South Korea and the associated burdens of a rapidly aging population (Frejka, Jones, and Sardon 2010; Jones and Gubhaju 2009;

D. Kim 2005; Ravaneral et al. 1999), fewer studies have examined the important implications low rates of fertility also experienced by North Korea may have for the reunification of the two countries. For one, prior studies addressing national unification from a demographic perspective have highlighted important "demographic benefits" that reunification could potentially bring to South Korea, in that a relatively younger North Korean population could aid in slowing and helping support a rapidly aging South Korean population, as the number of workers to retirees dwindles in South Korea (Eberstadt and Banister 1992; Koh 2012).

Conversely, researchers have also located "demographic disadvantages" in the relatively low ratio of South to North Koreans—thereby making the assimilation process more difficult (Eberstadt and Banister 1992; Koh 2012). The release of 2008 census data from North Korea, with assistance from United Nations (UN) Population Fund, provides the impetus of this study to reexamine how years of below replacement fertility within both Koreas *and* the relatively higher rates of fertility within North Korea with respect to South Korea, influences the demographic advantage of a younger population for a reunited Korea, as well as the demographic disadvantage of a relatively low ratio of South to North Koreans. We find that the aforementioned fertility profiles of the two Koreans erode away the demographic advantage while exacerbating the demographic disadvantages over time, suggesting that a delayed reunification may result in a forfeiture of demographic opportunities along these two dimensions.

The time and nature of reunification for the two Koreas is unknown, and there exists considerable political, economic, and social chasms between them (Jung and Nagle 1992; Auerbach, Chun, and Yoo 2005). The purpose of this paper is to examine several of the demographic issues that might attend to their eventual reunification, whether under the pretext of a peaceful and en masse reunification, or a gradual reintegration over time. The remainder of the paper is organized into four sections. The first section provides a brief review of changes in fertility within South and North Korea. The second section explains the data and methods utilized in the study. Finally, the third and fourth sections review the results of the analysis and conclude with a discussion.

## Fertility Trends within South Korea

The demographic profile of South Korea today when juxtaposed from its point of departure at partition 70 years prior reflects the extent to which South Korea has changed over a short length of time. As late as 1960, the fertility rate in South Korea was six children per woman, prompting one U.S. official to state, "If these Koreans don't stop overbreeding, we may have the choice of supporting them forever, watching them starve to death, or washing our hands of the problem" (A. Kim and Lie 2007, 56).

Following the 1960s, government-led efforts to reduce fertility in South Korea began in rural areas and subsequently spread to urban areas by the 1970s, providing financial, legal, and other disincentives to childbearing (D. Kim 2005). Popular antinatal campaigns included slogans such as "three-children families," which eventually transitioned into "girl or boy: one is enough" (D. Kim and C. Kim 2004). Antinatal campaigns have also included the widespread availability of contraception and contraceptive use remains high in South Korea. For instance, according to the 1994 National Family Health and Fertility Survey, 11.8% of women were using contraception to space births, while 85.9 % of South Korean women were using contraception to prevent pregnancy (Ravaneral et al. 1999).

Theories of declining fertility in South Korea have generally coalesced around four themes: rational choice, risk aversion, post-materialist values, and gender equity[1] (Frejka, Jones, and Sardon 2010). We do not contend that these four themes are exhaustive, nor do we evaluate whether one factor holds greater primacy relative to others. Rather, we briefly review some of the empirical findings from prior studies below.

For one, values within South Korea appear to be changing as younger cohorts are more likely to exhibit post-materialistic attitudes including more tolerant views toward abortion, divorce, and extramarital affairs (Abramson and Inglehart 1995). In fact, younger cohorts of South Koreans appear to have post-materialistic attitudes on par with countries like the

1. See McDonald (2002) for a summary of the prevailing arguments.

United States, despite the embedded influence of Confucianism (Abramson and Inglehart 1995).

Structural factors, including greater female educational attainment and the increased participation of women in the work force, also contributed to fertility declines (Kwon 1981). For instance, in 1955, the highest education level reached by 97 percent of Korean women aged 25 years and older was primary school, and only 3 percent completed middle and high school, with 0.3 percent obtaining a college education (Ravaneral et al. 1999). By 2005, the percentage of women who had advanced to higher education stood at 81 percent (Frejka, Jones, and Sardon 2010). Tsuya, Choe and Wang (2009, 16) comment that "The educational advancement of young Korean women during the last three decades is nothing but spectacular and, to our knowledge, unprecedented in the recent history of the world." Similarly, women's participation in the labor force between the early 1970s and 1990s has steadily increased from 39% to 47%, with the greatest increase taking place for women aged 20–24 (Ravaneral et al. 1999). Previous research has well documented the strong association between lower levels of fertility and both higher levels of education (Martin 1995; Rindfuss, Morgan, and Offutt 1996; Murthi 2002) and greater levels of workforce participation (Brewster and Rindfuss 2000).

Nevertheless, studies have found in the past gender roles were stratified and the strong Confucian emphasis on male over female career advancement may persist in South Korea (Ravaneral et al. 1999). Investing in sons' education was understood to be a mechanism for economic upward mobility, and thus, was given priority over the education of daughters. Gender gaps in college education between men and women persisted in South Korea and attitudes favoring female employment under any conditions were low among South Korean women, and were even lower among South Korean men (Ravaneral et al. 1999). Thus, Confucianism may directly impact demographic behavior because of the higher opportunity costs of childbearing it places on women in such societies.

The cumulative result of structural changes and antinatal policies have closely coincided with young women not only delaying marriage (Jones 2005, 2007) and childbearing, but also having fewer children at later ages

(i.e. the tempo effect) (Frejka, Jones, and Sardon 2010). What is interesting is that fertility declines have occurred across different educational and socioeconomic groups (Jones and Gubhaju 2009), and according to Jones (2007, 468) "the sinking of South Korea's fertility to very low levels since 1995 appears to be entirely the result of marriage trends." South Korean fertility declines represent one of the most historically unprecedented demographic shifts experienced by any country (Stephen 2013). Figure 1 displays the rapid decline in total fertility rates (TFRs) in South Korea and North Korea from 1960 to 2010. TFR is the most commonly used measure in population studies, in large part, due to its widespread availability (Kye 2012), and measures the average number of births a woman would have if she survived until the age of 50 at a given period of time (Hinde 1998).

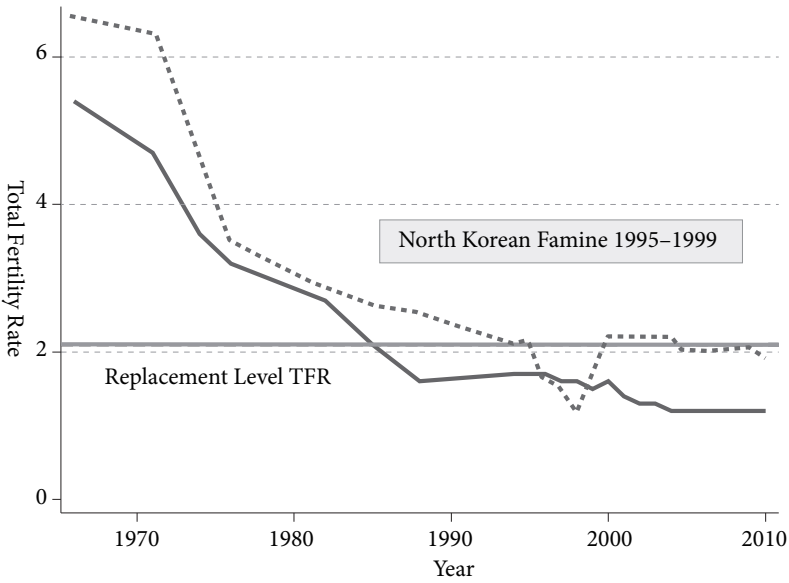


**Figure 1.** TFRs in South Korea and North Korea from 1960 to 2010

*Source*: Eberstadt and Banister (1992); U.S. Census Bureau (2011)

The direct consequence of precipitous fertility decline has been a dramatically aging population. In less than 25 years, South Korea's population of 65 and older has reached 12 percent of its total population—a feat that has taken France 175 years, the United States 65 years, and Japan 40 years (Kwon 2003).

## Fertility Trends within North Korea

North Korea's fertility profile is remarkably similar to that of South Korea, although North Korea has not experienced equivalent levels of economic development. Fertility declines have followed similar patterns as South Korea but at a slower pace. Since the study by Eberstadt and Banister (1992) North Korean fertility has dropped further, and has been below or near replacement levels for over a decade, but continues to be substantially higher than that of South Korea. Figure 1 also displays North Korean fertility trends alongside South Korea's from 1960 to 2010. Following the division of Korea, North Korean fertility has generally been higher than that of South Korea except during the North Korean famines of the late 1990s, when fertility rates plummeted below replacement levels (1.6), but have since rebounded to near replacement levels. There is a slight but momentary uptick in fertility after 1998, presumably a result of forgone births during the famines.[2]

Although structural factors like economic growth, female educational attainment, greater female labor force participation, and urbanization have been attributed to declines in fertility in South Korea (D. Kim 2005; Kwon 1981), those changes do not appear to be the causes of fertility decline in North Korea (Park Kyong-suk 2013). For one, during the 1950s and 1960s, the North Korean economy experienced rapid economic growth and labor shortages, and thus women were incorporated into the labor force in large

2. North Korean fertility trends are based on Eberstadt and Banister's data through 1992, which utilizes U.S. Census Bureau estimates and projections based on the 1993 census up through 2007. The period total fertility rate (PTFR) for 2008 is based on the 2008 DPRK census. Estimates beyond 2008 again utilize U.S. Census Bureau estimates.

numbers relatively early in North Korea (Park Kyong-suk 2013; Schwekendiek 2011). Despite the dual burdens of work and childrearing, declines in fertility did not occur until the 1970s, during periods of economic stagnation (Park Kyong-suk 2013). Unlike the South Korean case, North Korean fertility increased during periods of extensive urbanization in the late 1960s, and it does not appear that socioeconomic development was an underlying stimulus for couples to reduce their family size (D. Kim 1994). In fact, Park (2013) argues that fertility declines in North Korea occurred long after urbanization and increases in female educational attainment.

As the North Korean economy began to falter and showed signs of food shortages (Schwekendiek 2011), pronatal policies were overturned, and North Korean families were encouraged to limit the number of children to three (Hunter 1999). While the motivation to reduce fertility was present in earlier periods, Park (2013) argues that women occupied low social status and access to contraception was not readily provided by the state until the 1980s. According to Kim (1994, 148), these policies were "conducted mainly through personal contacts utilizing health clinic staffs, medical personnel, and women's organization leaders rather than mass media." Additionally, authorities enforced a relatively high legal age of marriage, which may have also resulted in lower fertility through infecundity (Hunter 1999);[3] however, Park (2013) notes that the post-1980 fertility declines were largely the result of maternal fertility decline and not delayed marriage. Nevertheless, much less is known about the structural conditions governing the demographic transition of North Korea due to its lack of transparency (Eberstadt and Banister 1992; Goodkind 1999).

## Data and Methodology

This study utilizes a cohort component approach (CCA) to separately project the population of North Korea from the baseline year of 2010 to 2040. The population of North Korea is projected from the baseline year of

3. According to Hunter (1999), the legal age of marriage was 27 for women and 30 for men.

2008, which marks the last official census release from North Korea. Population projections for South Korea utilize fairly recent 2010 census data and are calculated by the Korean Statistical Information Service (KOSIS). The two projected populations are then combined beginning from 2015 to 2040, using three different fertility variants: low, medium, and high—to give an idea of what a unified Korea may look like.

The rationale behind the CCA is that population size and structure change as a result of a relatively small number of different events—mortality, migration, and fertility (Hinde 1998). Population size changes when either a birth or death occurs or a person migrates. Therefore, population projections require four pieces of information: fertility estimates, migration estimates, life tables, and a baseline population that is stratified by age and sex from which to project.

One of the greatest areas of uncertainty in national-level projections is in the estimation of fertility rates, as multiple factors including economic development, social change, and cultural factors can influence fertility decisions (Hinde 1998). Unfortunately, one of the greatest areas of uncertainty also has the greatest influence on future population size and age structure. Because of limited data on North Korea, we rely on the period total fertility rate (PTFR), which measures the average number of births a woman would have if she survived until the age of 50 at a given period of time (Hinde 1998). However, population projections based on PTFRs can be misleading if fertility patterns do not represent general fertility trends (e.g. Japan Bureau of Statistics 1972; Lee and Paik 2006). PTFRs from the 2008 DPRK census do not appear to exhibit idiosyncratic behavior and are congruent with fertility trends from other sources (U.S. Census Bureau 2011).

Nevertheless, prior studies have shown that period effects are of greater importance than cohort effects in explaining fertility change in industrialized Western countries (Rindfuss, Morgan, and Swicegood 1988) and in South Korea (Kye 2012). With these caveats in mind, we cautiously construct population projections using PTFRs taken from the 2008 DPRK census data (2.0). PTFRs are assumed to follow three different variants: low, medium, and high, which are derived from the United Nations Population Division and reported in *World Population Prospects* (Stover and Kirmeyer

2005). Under the high variant assumption, the PTFR increases from its 2008 level of 2.0 to 2.39 by 2024. Thereafter, the PTFR remains constant until 2040. With the medium variant assumption, the PTFR slightly decreases from 2.0 to 1.89 by 2024, and thereafter remains constant until 2040. Under the low variant assumption, the PTFR decreases from 2.0 to 1.39 by 2024, and thereafter remains constant until 2040. Figure 2 displays the projected PTFRs under the three different variants.

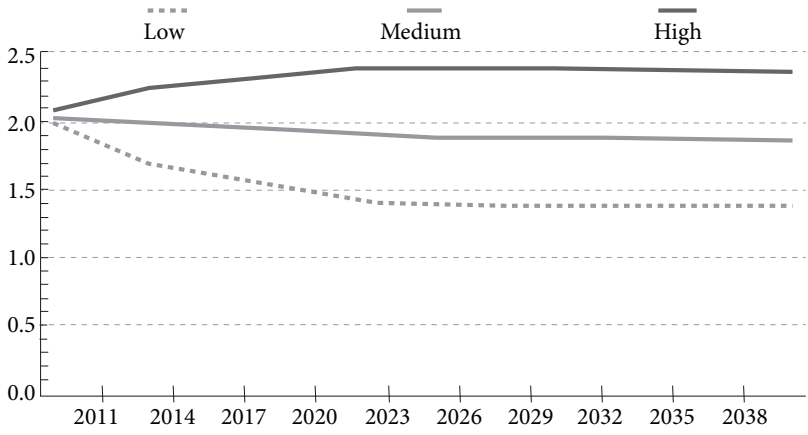


**Figure 2.** Projected PTFRs for North Korea under three different variants

International migration to and from North Korea is assumed to be zero throughout the projection period, because international migration is highly restrictive and strictly controlled by the state (Robinson 2010). On the other hand, South Korea has undergone significant changes to its labor supply with the depletion of its rural labor surplus beginning in the 1970s and the declining rate of labor participation of the youth population due to longer hours dedicated to schooling (Abella and Y. Park 1994). After years of out-migration, labor shortages and the rising cost of labor have changed South Korea from a net exporter of labor to a net importer of labor. For example, in 1990, South Korea had fewer than 19,000 migrant workers, as stringent immigrant laws prohibited unskilled labor immigration, but following labor

shortage upheavals and the subsequent institution of a trainee program in 1992, that number had grown to 335,000 by 2002 (H. Lee 2003). Despite greater numbers of in-migrants, net migration only constitutes a very small percentage of the total population. According to KOSIS figures, the net in-migration in 2012 was a surplus of only 6,606 persons.

The baseline population for North Korean projections starts with age and sex data from 2008 census data and mortality is assumed to follow model life tables for the Far East region (United Nations 1983). Life expectancy at birth is 65.6 years for males and 72.7 years for females, which is 11 years less than South Korea (Population Reference Bureau 2010). The underlying distribution for life expectancy follows a logistic curve with an upper asymptote of 72.4 years for males and 79.3 years for females, following a UN medium variant. Prior research has suggested that sex ratios in North Korea did not appear to display a preference for males (Goodkind 1999), unlike South Korea (Gupta and Li 1999; Kwon 2003; Park and Cho 1995). Those trends, however, appear to be reversing themselves within South Korea (Chung and Gupta 2007; Kwon 2003). Throughout the projection period, sex ratios are assumed to be constant and normal (105) for North Korea.[4]

This study utilizes the demographic software in *Spectrum* known as *DemProj*, which is extensively used for population projections of countries as well as regions. It is implemented by the Futures Group in collaboration with Research Triangle Institute (RTI) and the Centre for Development and Population Activities (CEDPA) (www.futuresgroup.com).

KOSIS population projections also utilize the cohort component method, using the 2010 Population and Housing Census as the base year. Population projections are formulated under three growth scenarios: low growth, medium growth, and high growth. For example, the medium growth variant is formulated by combining the medium assumptions regarding births, deaths, and international migration (KNSO 2011b). Those assumptions include a PTFR of 1.23 in 2010, which would increase to 1.42 by 2045, and then remain constant thereafter. Life expectancy (LE) for males would

4. Normal sex ratios are 105 males to 100 females at birth.

increase from 77.2 years in 2010 to 86.6 years in 2060, whereas for females, LE would increase from 84.1 to 90.3 years (KNSO 2011b). Net international migration is assumed to fall from 1.67 per thousand in 2010 to 0.53 per thousand in 2060 (KNSO 2011b).[5]

*Dependency Ratios and Ratio of South to North Koreans*

Dependency ratios are an important measure of the extent in which a population has aged. Population aging has been linked to rising costs of public pensions (Bongaarts 2004) and changes in labor, product, and capital markets (Börsch-Supan 2008). In their comparison study of a hypothetical unified Korea, Eberstadt and Banister (1992) examined the number of workers per person aged 65 and older, which is one component of the dependency ratio. More generally, the dependency ratio measures the number of people who are typically not in the labor force (those aged 0–14 and those aged 65 and older), relative to those persons within the working population. For the sake of comparability with prior studies, this paper examines older age dependency, or more specifically, the number of workers from age 15 to age 64, relative to the number of persons aged 65 and older. Typically, higher values are seen as more demographically beneficial relative to lower values.

Eberstadt and Banister (1992) also examined the ratio of South to North Koreans as a second metric in which to evaluate a Korean unification. Higher values would indicate more South Koreans relative to North Koreans and may be seen as more conducive for assimilation (Eberstadt and Banister 1992). Macrostructural theories suggest that members of a small group will engage more with members of other, larger groups; notably because declining group size is less conducive to in-group interactions and more conducive to intergroup interactions (Blau 1977; Nieri 2012). For

5. KOSIS projections of net migration utilize model migration schedules based on age. International migration peaks in the young adult ages and subsequently decreases due to mobility depressing influences. Given South Korea's aging population and stringent in-migration laws, migration is assumed to decline over time.

instance, individuals may strongly prefer to interact with members of their own group, but relatively few members place additional obstacles and opportunity costs in realizing those in-group preferences, thereby making out-group interactions more likely. Thus, group interactions are understood not through specific group characteristics (e.g. micro), but rather through macrostructures (i.e. group size). For this reason, relatively smaller numbers of North Koreans to South Koreans may be more conducive for assimilation.

## Results

The highlighted demographic benefit of a younger population was driven in large part by North Korean fertility (Eberstadt and Bannister 1992). However, North Korea's demographic transition into a low fertility society, as well as South Korea's continued fertility declines, have eroded away much of the demographic benefit. The results suggest that reunification may not give much in terms of demographic benefit to South Korea, which seeks effective policy tools to reverse low fertility. Table 1 displays the results from our analysis.

The overall trend of the dependency ratio across all three population projection variants is one of decline. What is astonishing is that the number of workers to persons aged 65 and older has fallen dramatically since Eberstadt and Banister's 1992 study. In the prior study, that number of workers was 15, but according to our estimates that number will fall between 5 and 6 workers by 2015. When juxtaposed to the actual German experience in 1990, a unified Korea would have roughly the same amount of workers (5) around 2020 according to our low variant. Even under the more demographically advantageous assumptions of the medium and high variant, a unified Korea would very shortly reach the five worker mark around 2021 and 2022, respectively. From those future points in time, the ratio continues to erode over time across all three variants. To reiterate, our analysis suggests that a reunification with a relatively younger North Korea would not solve the impending aging crisis that faces South Korea, and in the very near future, would match the German reunification.

**Table 1.** Unified Korea Dependency Ratio under Three Projection Variants

(In Millions)

| Year | Low variant | | | Medium variant | | | High variant | | |
|---|---|---|---|---|---|---|---|---|---|
| | 15-64 | 65+ | Ratio | 15-64 | 65+ | Ratio | 15-64 | 65+ | Ratio |
| 2015 | 54.0 | 9.2 | 5.87 | 54.2 | 9.1 | 5.97 | 54.5 | 9.0 | 6.08 |
| 2016 | 54.2 | 9.5 | 5.73 | 54.5 | 9.3 | 5.85 | 54.8 | 9.2 | 5.99 |
| 2017 | 54.3 | 9.8 | 5.56 | 54.6 | 9.6 | 5.70 | 54.9 | 9.4 | 5.87 |
| 2018 | 54.2 | 10.1 | 5.37 | 54.6 | 9.9 | 5.54 | 55.0 | 9.6 | 5.73 |
| 2019 | 54.1 | 10.5 | 5.16 | 54.5 | 10.2 | 5.34 | 55.0 | 9.9 | 5.55 |
| 2020 | 53.9 | 10.9 | 4.92 | 54.3 | 10.6 | 5.12 | 54.9 | 10.3 | 5.34 |
| 2021 | 53.5 | 11.4 | 4.68 | 54.1 | 11.1 | 4.88 | 54.7 | 10.7 | 5.12 |
| 2022 | 53.2 | 12.0 | 4.44 | 53.8 | 11.6 | 4.65 | 54.5 | 11.1 | 4.90 |
| 2023 | 52.9 | 12.5 | 4.22 | 53.5 | 12.1 | 4.44 | 54.3 | 11.6 | 4.69 |
| 2024 | 52.5 | 13.1 | 4.00 | 53.2 | 12.6 | 4.22 | 54.0 | 12.1 | 4.48 |
| 2025 | 52.0 | 13.8 | 3.78 | 52.8 | 13.2 | 4.01 | 53.7 | 12.6 | 4.28 |
| 2026 | 51.6 | 14.4 | 3.59 | 52.4 | 13.7 | 3.82 | 53.4 | 13.1 | 4.08 |
| 2027 | 51.0 | 15.0 | 3.40 | 52.0 | 14.3 | 3.63 | 53.1 | 13.6 | 3.91 |
| 2028 | 50.5 | 15.7 | 3.22 | 51.6 | 14.9 | 3.47 | 52.9 | 14.1 | 3.75 |
| 2029 | 49.9 | 16.3 | 3.07 | 51.2 | 15.4 | 3.32 | 52.7 | 14.6 | 3.61 |
| 2030 | 49.3 | 16.9 | 2.92 | 50.7 | 16.0 | 3.17 | 52.4 | 15.1 | 3.48 |
| 2031 | 48.7 | 17.5 | 2.78 | 50.3 | 16.5 | 3.05 | 52.2 | 15.5 | 3.36 |
| 2032 | 48.1 | 18.1 | 2.66 | 49.9 | 17.0 | 2.93 | 52.0 | 16.0 | 3.25 |
| 2033 | 47.4 | 18.7 | 2.53 | 49.4 | 17.6 | 2.81 | 51.7 | 16.5 | 3.14 |
| 2034 | 46.7 | 19.4 | 2.41 | 48.9 | 18.2 | 2.69 | 51.4 | 17.0 | 3.03 |
| 2035 | 45.9 | 20.0 | 2.30 | 48.4 | 18.7 | 2.58 | 51.1 | 17.5 | 2.92 |
| 2036 | 45.2 | 20.6 | 2.19 | 47.9 | 19.3 | 2.48 | 50.8 | 18.0 | 2.83 |
| 2037 | 44.5 | 21.2 | 2.09 | 47.4 | 19.8 | 2.39 | 50.5 | 18.4 | 2.74 |
| 2038 | 43.8 | 21.8 | 2.01 | 46.9 | 20.3 | 2.31 | 50.3 | 18.8 | 2.68 |
| 2039 | 43.1 | 22.2 | 1.94 | 46.5 | 20.6 | 2.25 | 50.1 | 19.1 | 2.62 |
| 2040 | 42.5 | 22.6 | 1.88 | 46.2 | 20.9 | 2.21 | 50.0 | 19.3 | 2.59 |

**Table 2.** Unified Korea Ratio of South to North Koreans Under Three Projection Variants

(In Millions)

| Year | Low variant | | | Medium variant | | | High variant | | |
|---|---|---|---|---|---|---|---|---|---|
| | N. Korea | S. Korea | Ratio | N. Korea | S. Korea | Ratio | N. Korea | S. Korea | Ratio |
| 2015 | 24.7 | 50.0 | 2.02 | 25.0 | 50.6 | 2.03 | 25.2 | 51.4 | 2.04 |
| 2016 | 24.8 | 50.0 | 2.02 | 25.1 | 50.8 | 2.02 | 25.4 | 51.7 | 2.04 |
| 2017 | 24.8 | 50.0 | 2.02 | 25.2 | 51.0 | 2.02 | 25.6 | 52.1 | 2.04 |
| 2018 | 24.8 | 50.0 | 2.01 | 25.3 | 51.1 | 2.02 | 25.8 | 52.5 | 2.03 |
| 2019 | 24.8 | 49.9 | 2.01 | 25.5 | 51.3 | 2.01 | 26.0 | 52.8 | 2.03 |
| 2020 | 24.8 | 49.8 | 2.01 | 25.6 | 51.4 | 2.01 | 26.2 | 53.2 | 2.03 |
| 2021 | 24.8 | 49.7 | 2.00 | 25.7 | 51.6 | 2.01 | 26.4 | 53.5 | 2.03 |
| 2022 | 24.8 | 49.6 | 2.00 | 25.8 | 51.7 | 2.01 | 26.5 | 53.9 | 2.03 |
| 2023 | 24.8 | 49.5 | 1.99 | 25.9 | 51.8 | 2.00 | 26.7 | 54.2 | 2.03 |
| 2024 | 24.8 | 49.4 | 1.99 | 25.9 | 51.9 | 2.00 | 26.9 | 54.5 | 2.03 |
| 2025 | 24.8 | 49.2 | 1.98 | 26.0 | 52.0 | 2.00 | 27.1 | 54.8 | 2.02 |
| 2026 | 24.8 | 49.1 | 1.98 | 26.1 | 52.0 | 1.99 | 27.2 | 55.1 | 2.02 |
| 2027 | 24.8 | 48.9 | 1.97 | 26.2 | 52.1 | 1.99 | 27.4 | 55.4 | 2.02 |
| 2028 | 24.8 | 48.7 | 1.97 | 26.2 | 52.1 | 1.99 | 27.5 | 55.6 | 2.02 |
| 2029 | 24.7 | 48.5 | 1.96 | 26.3 | 52.2 | 1.99 | 27.7 | 55.9 | 2.02 |
| 2030 | 24.7 | 48.3 | 1.95 | 26.3 | 52.2 | 1.98 | 27.8 | 56.1 | 2.02 |
| 2031 | 24.7 | 48.0 | 1.95 | 26.4 | 52.1 | 1.98 | 28.0 | 56.3 | 2.01 |
| 2032 | 24.6 | 47.8 | 1.94 | 26.4 | 52.1 | 1.97 | 28.1 | 56.5 | 2.01 |
| 2033 | 24.6 | 47.5 | 1.93 | 26.4 | 52.1 | 1.97 | 28.2 | 56.6 | 2.01 |
| 2034 | 24.5 | 47.2 | 1.93 | 26.5 | 52.0 | 1.96 | 28.3 | 56.8 | 2.00 |
| 2035 | 24.5 | 46.9 | 1.92 | 26.5 | 51.9 | 1.96 | 28.5 | 56.9 | 2.00 |
| 2036 | 24.4 | 46.6 | 1.91 | 26.5 | 51.8 | 1.95 | 28.6 | 57.0 | 1.99 |
| 2037 | 24.3 | 46.3 | 1.90 | 26.5 | 51.6 | 1.95 | 28.7 | 57.0 | 1.99 |
| 2038 | 24.2 | 45.9 | 1.90 | 26.5 | 51.5 | 1.94 | 28.8 | 57.1 | 1.98 |
| 2039 | 24.1 | 45.6 | 1.89 | 26.5 | 51.3 | 1.93 | 29.0 | 57.1 | 1.97 |
| 2040 | 24.0 | 45.2 | 1.88 | 26.5 | 51.1 | 1.93 | 29.1 | 57.1 | 1.96 |

Conversely, the demographic disadvantage of having fewer South to North Koreans also worsens over time in all three variant estimates. Our estimates are nearly identical with Eberstadt and Banister's findings in 1992 (2), largely due to the effects of famine in North Korea during the mid to late 1990s, which drastically reduced fertility and increased mortality, leading to a smaller North Korean population (Noland 2004). Since the famines, the North Korean population seems to have rebounded, but future famines may be a real possibility considering the unstable food security situation within North Korea (Noland 2004). Table 2 displays the ratio of South to North Koreans.

Our lower variant projections estimate that the ratio of South to North Koreans falls below two by 2023, and thereafter continues to decline. Under the assumptions of the medium and high variant, the ratio falls below two by 2026 and 2036, respectively, and thereafter declines. Overall, the demographic disadvantage of a relatively low ratio of South to North Koreans worsens over time under all three conditions, albeit more slowly under the medium and high variant. This is largely because of the substantial difference in fertility levels between the two Koreas.

## Discussion

The declines in fertility experienced by both Koreas may have substantial practical implications for an eventual reunification. Decades of below replacement fertility have left both populations increasingly older. If current demographic trends continue, the prospects of a relatively young population erode over time. When juxtaposed with the actual German experience in 1990, our estimates find that in the coming decade (2020, 2021, and 2022), the number of workers to persons aged 65 and older will match that of Germany (5). Therefore, due to declines in fertility between the two countries to below replacement levels, the policy prescription that a relatively younger North Korean population would ease the population aging pressures of South Korea does not seem viable, as North Korea also appears to be going through the demographic transition.

It is important to bear in mind that much of the prevailing arguments for reunification as a means of slowing South Korea's aging population, as well as the framework of this particular study, have largely been predicated upon age structure and relative population size alone. Within the demographic literature, relatively larger numbers of economically active persons are generally viewed as demographically beneficial (Barlow 1994; Crenshaw, Ameen, and Christenson 1997); however, in the Korean case, there are concerns over the heterogeneity between the two populations across factors such as educational attainment, skills, and culture. In fact, Auerbach, Chun, and Yoo (2005) argue that the greatest potential cost of Korean unification is not the direct reconstruction of the North Korean economy, but the closure in the productivity gap between North and South Korean workers through the expansion of social transfers to North Koreans. Therefore, conclusions based on dependency ratios alone belie the gaps in skills and education levels between the two populations, and the validity of whether larger numbers of economically active persons should be considered a "demographic benefit" at all within the Korean context. We consider this a major limitation of our study and an avenue that future research may fill when more data about North Korea becomes available.

Moreover, despite the increasing importance of economic well-being as a reason for defection (K. Kim and O. Lee 2003; Lankov 2006), it remains unclear if North Korean workers would be willing to assume those economic roles, if they are mostly limited to lower status jobs. If the experiences of North Korean refugees are a harbinger of the challenges that face Korean unification, Chung (2008, 19) highlights the ambivalence of North Korean refugees and their socioeconomic status in South Korea, stating:

> The North Koreans arrive empty-handed, and yet they are officially welcomed and told that they are South Korean citizens, just like their brethren in their new nation. They receive resettlement money that gives them a taste of middle-class life. Sooner or later, they spend it out. Then, the capitalist class system works against those without capital. Would they accept their position at the bottom of South Korean society? The answer is no. Many of them try to assume middle-class status by utilizing

> their symbolic capital, as politically significant beings. This leaves many North Koreans unwilling to accept the job they feel will marginalize them into the lower class.

Socioeconomic mobility and the closure in the skill and education gap for recently arrived North Koreans and their South Korean counterparts would require various forms of social capital that include educational attainment, credentialing, and strong relative and friendship networks, which many refugees not only lack upon arrival, but also find difficult to cultivate in South Korea (K. Kim and O. Lee 2003; Lankov 2006). In fact, Chung (2008) finds that over half of refugee youths do not complete high school within South Korea's notoriously competitive education system, while those from elite educational backgrounds face new licensing requirements for professional and white collar positions, thereby resulting in underemployment and a drop in social status.

The results of our study also find that the demographic disadvantage highlighted by Eberstadt and Banister (1992) worsens over time due to the significant gap in fertility rates between the two Koreas. According to macrostructural arguments (Blau 1977), lower ratios of South to North Koreans imply that the assimilation process may be more difficult. If we juxtapose with the German experience, the number of West to East Germans was four to one (Eberstadt and Banister 1992) and despite years of integration, there remain economic and social differences between the former East and West Germanys (Bach and Trabold 2000). Although we find that the ratio of South to North Koreans is nearly identical to Eberstadt and Banister's findings, the ratio declines over time across all three variants, if demographic trends continue.

However, whether relative group size facilitates inter-group interactions is also heavily influenced by inter-group attitudes and perceptions. For example, within the United States, Blacks continue to have lower levels of intermarriage (Qian and Lichter 2007), higher rates of residential segregation (Massey and Denton 1993), and are perceived more negatively by Whites than Latinos (Yancey 2003), despite the latter's numerical superiority (Ramirez 2003). Thus, relative group size may not have a strong influ-

ence on interaction outcomes, especially in circumstances where intergroups perceptions are negative. In fact, Chung (2008, 16–17) finds that for refugees, North Korean culture is portrayed as "traditional, backwards, and uncivilized," whereas South Korean culture is relationally constructed as "modern, advanced, and civilized," contradicting the key foundation that the two Koreas continue to share a common culture. Moreover, intermarriage, a key litmus of social integration (Lee Jungmin and Bean 2004), is cited as the most problematic aspect of social adaptation facing refugees in South Korea (K. Kim and O. Lee 2003). Thus, it is important to bear in mind that additional factors beyond group size are also critically important towards facilitating assimilation. A final point of discussion is the extent to which fertility may converge within South and North Korea. It is not altogether clear what structural factors (i.e. economic events, social change, and cultural factors) are driving fertility declines in North Korea, as imperfect and asymmetric information hinders in-depth knowledge of North Korean society. Furthermore, it is unclear whether food security is a short term or structural characteristic of North Korea. Nevertheless, fertility outcomes in North Korea may be sensitive to its current food security situation.

The famines of the late 1990s mark the closest convergence in fertility rates between North and South Korea. These famines were due to gross mismanagement of food production, a lacking partner willing to give extensive concessionary aid, U.S. trade sanctions, and environmental causes (Goodkind and West 2001). Although environmental causes have played a role, foreign and domestic policy choices by the North Korean government may have been the larger culprit (Haggard and Noland 2008). The estimated human toll of the famine is between 600,000 to 1 million North Korean dead, and represents one of the worst famines of the 20th century (Haggard and Noland 2008). Since that time, the North Korean economy has improved slightly, and in 1999, recorded a narrow growth after years of negative economic growth (World Bank 2011). Grain production that year was announced to have increased by a factor of 1.4 over the prior year to 4.28 million tons (Noland 2004). Despite the domestic improvements, North Korea still anticipated a shortage of food reserves of about 1.2 million tons in 2000, relying on international aid to cover that gap (Noland 2004).

However, relatively recent policy initiatives have reduced the prospects of improved food security. The regime in North Korea has attempted to ban private trade in grain, which is the primary mechanism by which most North Korean families obtain food (Haggard and Noland 2008). Second, the government has also threatened to expel the World Food Program (WFP), a key intermediary of international aid between the outside world and North Korea (Haggard and Noland 2008). Finally, the regime's aggressive actions towards its southern neighbor have strained relations, and the South Korean government has responded by suspending aid and fertilizer shipments, subsequently resulting in declines in grain production in North Korea (Haggard and Noland 2008). Because international aid is a key component of North Korean food reserves and domestic production, how the government is able to gain or lose concessions will have a significant influence on North Korean society and the personal choices of fertility. If North Korea experiences another famine, fertility rates may dramatically drop once more and again possibly converge with that of South Korea. Whether North Korean fertility is sensitive to food shortages remains controversial and Park (2013) finds contradictory evidence that fertility did not experience a substantial dip during periods of food shortage, and argues that estimates of death due to famine were too high, citing the growing informal economy as an alternative for obtaining food.

With the looming dependency burden of an elderly population, the South Korean government, once a pioneer in implementing antinatal policies, shifted to pronatal policies in the early 2000s—expanding childcare allowances, childcare leave, on-site childcare, and tax exemptions based on number of children (Chin et al. 2012; D. Kim 2005).[6] Despite the greater willingness of the state to incur a larger share of the childrearing costs for families, utilization rates remain relatively low and it is uncertain whether those policies are presently realistic, given the strong cultural norms of hier-

6. Government assistance to low-income families has existed since 1961, but has been relatively limited. The Framework Act on Healthy Families (2004) marks a transition away from private responsibility of childcare to one where the government takes a more expansive role (Chin et al. 2012).

archical management, emphasis on work over family, and traditional gender roles found in the workplace (Chin et al. 2012). Therefore, families have been apprehensive about taking full advantage of maternity leave for fear of negative reactions from employers (Frejka, Jones, and Sardon 2010). Second, the government's response has been limited when compared to other industrialized countries facing aging populations, and does not fully address the substantial costs associated with childrearing—particularly education, which is the largest single expense for most Korean families with school children (Caldwell, Phillips, and Khuda 2002; D. Kim 2005). Third, policy has yet to more seriously address men's responsibility in childrearing, unlike in European countries facing similar declining fertility where this has been addressed (Frejka, Jones, and Sardon 2010).

To summarize, our analysis suggests that declining fertility in both Koreas may have important implications in an eventual Korean reunification. As both Koreas have transitioned from high to low fertility countries, national reunification as a means of slowing the rapidly aging population of South Korea may no longer be a viable option. Furthermore, we find that the ratio of South to North Koreans declines over time, largely due to the higher fertility profile in North Korea relative to South Korea. Our findings suggest that reunification at an earlier date may be more demographically beneficial relative to a later one. However, much of the prevailing arguments of the demographic benefits and disadvantages of a Korean reunification have been predicated upon biological factors of population size and age structure, when in fact, qualitative factors such as educational attainment, skill levels, and attitudes are also likely to influence reunification outcomes.

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