

A Study on Cohort Effects of Unification Consciousness of South Korean*

Dongsun Kang** · Kyoungbong Woo***

Office of Employment Policy Evaluation, Korea Employment Information Service

Department of International Trade, Korea National Open University

Abstract

The recent trend of declining consciousness regarding the necessity of unification among South Korean citizens is evident. Does a cohort effect exist in this downward trend in the perception of the necessity of unification? The purpose of this study is to analyze whether birth cohorts statistically significantly influence the consciousness of the necessity of unification. To this end, the hierarchical age-period-cohort (HAPC) model was employed as the analytical model, and data from the Unification Consciousness Survey conducted by Seoul National University's Institute for Peace and Unification Studies from 2007 to 2021 was used. The analysis results showed evidence that the progress of economic inequality at the birth cohort level affected the decline in the perception of the necessity of unification. The 1980s birth cohort, which faced socioeconomic difficulties during their social advancement due to income and wealth polarization, is observed to have a distinctly negative perception of unification requiring massive financial resources, compared to the 1960s and 1970s birth cohorts.

Keywords

unification consciousness, cohort effect, polarization, hierarchical age-period-cohort analysis, Korean unification

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** (First Author) Dongsun Kang, Office of Employment Policy Evaluation, Korea Employment Information Service. Email: sunny7711@keis.or.kr

*** (Corresponding Author) Kyoungbong Woo, Dept. of International Trade, Korea National Open University. Email: wkb@knou.ac.kr

통일의식에 대한 코호트 효과 분석에 관한 연구*

강동선** · 우경봉***

한국고용정보원, 일자리사업평가팀

한국방송통신대학교, 무역학과

요 약

최근 한국 국민의 통일필요 의식의 하락 추세는 선명하다. 통일필요 의식 하락 추세에 있어 출생 코호트 효과는 존재하는가? 본 연구의 목적은 통일필요 의식에 있어 출생 코호트가 통계적으로 유의미한 영향을 미치는지 분석하는 것이다. 이를 위해 분석모형으로 위계적 연령-기간-코호트(HAPC) 모형을 채용하였으며 2007~2021년 기간 서울대학교 통일평화연구원의 통일 의식조사 데이터를 사용하였다. 분석 결과, 출생 코호트 수준에서 경제불평등의 진행이 통일 필요성 인식 하락에 영향을 미쳤다는 증거가 관찰되었다. 소득과 자산의 양극화 진행으로 인해 사회 진출 과정에서 사회경제적 어려움을 겪은 1980년대 출생 코호트는 막대한 재원이 투입되는 남북통일에 대해, 1960년대와 1970년대 출생 코호트와 비교해 선명하게 부정적인 인식을 가지는 것으로 판단된다.

주제어

통일의식, 코호트 효과, 양극화, 위계적 연령-기간-코호트 분석, 남북통일

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** (주저자) 강동선, 한국고용정보원 일자리사업평가팀. 이메일:sunny7711@keis.or.kr

*** (교신저자) 우경봉, 한국방송통신대학교 무역학과. 이메일:wkb@knou.ac.kr

I . Introduction

When discussing the future of Korean society, the unification of the Korean peninsula is a topic that is difficult to avoid, and if specific discussions on the unification process is to proceed, gathering the opinions of the South Korean people seems essential. Just as BREXIT, which was decided by the British referendum in 2016, had a significant impact on the subsequent British economic situation, South Korean citizens' choice regarding the Korean peninsula's unification could potentially create a dramatic change in the structure of the South Korean economy.

Among South Korean citizens, the generation born before 1959 can be said to have direct experience of the Korean War of 1950-1953 or to have lived through a period in which the impact of the war remained strong. For this generation, North Korea is a subject of hatred and system competition, but unification of the North and South has been recognized as a task that must be achieved someday. Meanwhile, the generation born in the 1960s, who were in their 20s in the 1980s when the influence of the democratization movement against the military dictatorship was strong, and the generation born in the 1970s, who were middle and high school students in the 1980s, are seen as the progressive generation in the South Korean society (Kim, 2015). For these generations, the unification of North and South Korea was perceived as a 'not so awkward' task for South Korean society. In other words, although the division has continued since the Korean War, it can be said that most South Koreans accept unification as an event that will happen someday.

However, there appears to have been a recent change in the South Korean people's consciousness on the unification of North and South Korea within South Korean society. Many studies have reported that the generation born in the 1980s and 1990s, called the MZ generation, is showing behavior patterns

that are distinctly different from previous generations throughout South Korean society (Lim 2019) and that they also hold a negative perception of North-South unification (Byeon, 2012; Kim & Kim, 2018; Woo, 2022). Additionally, the MZ generation is making conservative choices that contradict the progressive tendencies shown by the previous generations in their 20s and 30s, putting the current MZ generation at the center of the debate over ‘conservative youth’ in South Korean society (Woo, 2020).

In the Unification Consciousness Survey conducted by The Institute for Peace and Unification Studies, Seoul National University, six out of ten people responded that unification was necessary (Kim, 2021). In these results, if we exclude the response of ‘half-half’ regarding the need for North-South unification, the ratio of ‘necessary’ to ‘not necessary’ is 81:19. However, in the 2021 Unification Consciousness Survey, four out of ten citizens responded that unification was necessary, and the ratio of ‘necessary’ to ‘not necessary’ changed to 60:40 (Park et al. 2008; Kim et al. 2022). If the citizens who answered ‘half-half’ shifted their attitude to ‘not necessary,’ then the proportion of negative opinions on North-South unification will increase. What is particularly notable in the change of South Korean people’s awareness of North-South unification is the continued decline in the consciousness of the need for North-South unification among young people in their 20s and 30s. If the current trend continues, their consciousness of the need to unify North and South Korea will likely decline further.

This research aims to analyze the birth cohort effects in South Korean citizens’ consciousness of the need for unification using data from The Institute for Peace and Unification Studies, Seoul National University. Specifically, the hierarchical age-period-cohort cross-classified random effect model(HAPC-CCREM) analyzes whether a birth cohort shows statistically significant results in South Korean citizens’ consciousness of the need for unification, which offers a clear downward trend between 2007 and 2021. This paper then discusses what factors

influence the consistent selection of the relevant cohort. In the next section, we review literature and data on South Korea's progress in consciousness of the need for unification and economic inequality and then discuss the analysis model. The analysis results are then presented and concluded by suggesting the significance of the results and directions for future research.

This study can have significant implications for public policy by specifically identifying the micro-subject at the center of the changes in unification consciousness, examining the factors that influenced this micro-subject, and considering perspectives of inequality that were not addressed in previous studies.

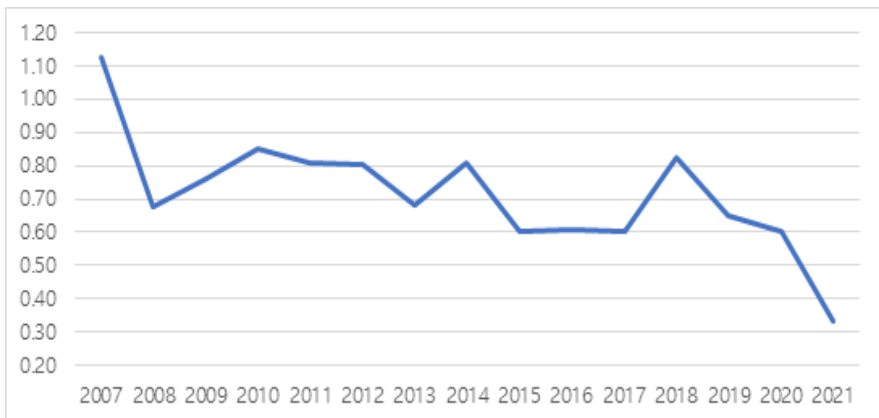
II. Literature Review and Hypotheses Development

South Korea's constitution, which was enacted in 1948, specifies that the President, the head of the executive branch, should make efforts for a peaceful unification of the Korean peninsula, but from 2007 through 2021 (Roh, Moo-hyun (2003-2008), Lee, Myung-bak (2008-2013), Park, Geun-hye (2013-2017)¹⁾, and Moon, Jae-in (2017-2022)) the proportion of South Koreans who believed unification was necessary continued to decrease, and those who think it is unnecessary increased. Figure 1 below shows the trend of South Korean people's responses to the need for North-South unification from 2007 to

1) The Korean Constitution specified the presidential term to be five years, making former president Park, Geun-hye's to be from February 25, 2013, to February 24, 2018, however, due to crimes that violated the Constitution on the National Assembly decided on her impeachment December 9, 2016. For impeachment to occur to the President of Korea, Article 65 of the Constitution requires a motion from the majority of the members and an approval from more than 2/3 of the National Assembly. On March 10, 2017, the National Assembly's resolution to impeach President Park Geun-hye was upheld and confirmed by a unanimous ruling of the Constitutional Court.

2021. Figure 1 shows the survey results asking about the need for North-South unification in the unification consciousness survey, which is coded as follows. (1) Very necessary: 3, (2) Somewhat necessary: 1, (3) Half-half: 0, (4) Somewhat not necessary: -1, (5) Not necessary at all: -3. The results from this type of coding do not simply represent the proportion of responses saying that unification of North and South Korea is necessary, but it can also reflect the proportion of opinions that are not necessary for each year.

〈Figure 1. Survey results on the necessity of North–South unification〉



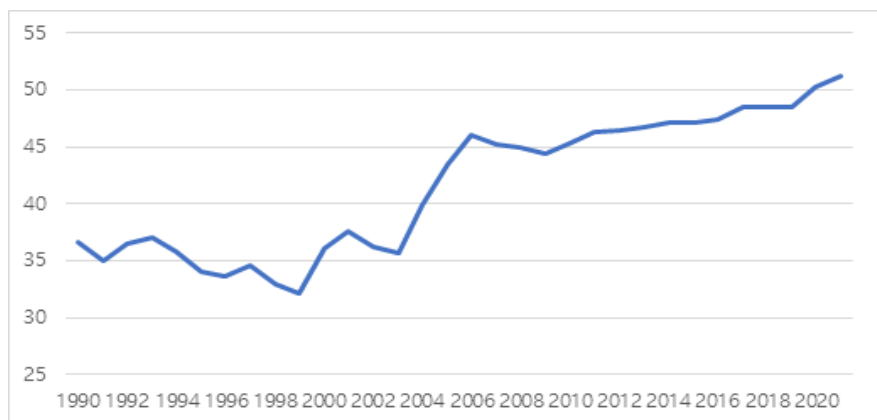
In Figure 1, shows the survey results of South Koreans' perception of the necessity of unification. Overall, it exhibits a downward trend, indicating that the perception of the necessity for unification has decreased over time. During the survey period, there was a sharp decline from 1.13 in 2007 to 0.33 in 2021, demonstrating that South Korean citizens' views on North-South unification have significantly shifted to a more negative stance during this period.

Rather than seeing it as an individual factors, the unification of North and South Korea can be seen as a complex event that can affect the lives of Korean

citizen in various ways. As a result, demographic characteristics and political, social, and economic factors interacted in a combination to influence the South Korean citizen's consciousness of unification (Park et al. 2013). Existing studies have argued that factors such as politics (Han & Jang, 2012; Yi, 2013; Lee, 2014), economy (Jung, 2017), and inter-Korean relations (Kim, 2022) can influence the Korean people's consciousness of unification. Studies have shown that demographic characteristics were also combined with political, social, and economic factors to influence the consciousness of the need for unification (Byeon, 2012; Kim & Kim, 2018; Woo, 2022). Some studies analyzed the differences in unification consciousness by generation based on birth period (Kim, 2015). However, since the differences in unification consciousness depend on the experiences of each generation during their youth, it is a limitation that factors that can be commonly applied to all generations are not present. Therefore, instead of comparing generational aspects at specific points in time, it is necessary to integrate and analyze the influences shown by generations at various times. To address this, the present study adopts a model that can resolve this issue by separating and analyzing age effects, period effects, and cohort effects that apply universally across all generations.

Meanwhile, there is a continued discussion on the progress of economic inequality in South Korean society (Shin & Shin, 2007; Kim & Kim, 2013; Lee, 2019; Jeong, 2022). Although there are differences of opinion on the degree (size) of inequality and the measurement method, there appears to be no significant disagreement that income inequality has been deepening in South Korean society since the Asian Financial Crisis of 1997. Figure 2 below shows the trend in South Korea's top 10% income concentration ratio from 1990 to 2021.

〈Figure 2. Top 10% income concentration ratio (%)〉



Source: Hong(2015), Figures after 2013 are based on data updated by the author.

In Fig 2, based on the findings of Hong (2015), shows the income share of the top 10% in South Korea. It illustrates that the income share of the top 10% has significantly increased since the late 1990s, and income inequality has worsened since then. The progression of inequality has affected many aspects of South Korean society; a representative example is the continued decline in birth rates.

Using the data from the National Statistical Office for the total fertility rate by income group, Ha (2012) found that between 1990 and 2010, the birth rate decreased as income inequality increased. As income inequality worsens, it becomes difficult for low-income populations to keep up with the education investment of high-income people, and as a result, the low-income populations respond to increasing the burden of education expenses from their income while limiting the number of children (Ha, 2012).

In Figure 2, we can see also that the trend of the income shares of the top 10% continued to rise in the late 2000s. This could be seen as influenced by

the rapid rise in real estate prices during that period. Real estate prices first began to rise in the rural areas of South Korea in the late 2000s and started to spread nationwide at the start of the 2010s. Financial factors such as low-interest rates and increased household loans were the key factors that led to the rapid increase in apartment sales prices in the metropolitan area during this period. In the case of the apartment sales market in the metro area, when other conditions are held constant, prices did not fall despite an increase in supply, portraying an aspect of the Korean asset market. The rapid rise in apartment prices centered around the metropolitan area, which was accompanied by a deepening of asset inequality, polarization of real estate assets among the youth, and a widening gap in apartment sales prices across the country, worsened the asset inequality in South Korea (Jeong, 2022). What is interesting when reviewing existing research regarding South Korean citizens' consciousness of unification is that it is difficult to find studies that analyze the consciousness of the need for unification from the perspective of economic inequality, which has recently been recognized as an important issue in South Korean society.

In the process of reviewing previous research and data, the following hypotheses for this study were derived. The progression of economic inequality would have a negative impact on the prospects of South Korea's socioeconomic entities, especially the unification of North and South Korea, which would require enormous social costs. This study will use data from the period 2007 to 2021 to conduct an analysis focusing on the cohort effect.

III. Data and Methods

1. South Korean Unification Consciousness Survey 2007-2021

The data used in this study is from the "Unification Consciousness Study" from 2007 to 2021 conducted by The Institute for Peace and Unification Studies

at Seoul National University. The unification consciousness survey from The Institute for Peace and Unification Studies has useful data regarding unification consciousness, among various unification consciousness surveys, because the survey design and questions have remained consistent without significant changes since the first survey was taken out in 2007. The analysis used for this study was the long-term and however, the recent data from 2008 and 2009 were excluded. This is because in the 2008 and 2009 survey data, the age variable was investigated as a categorical variable, such as those in their 20s or 30s, rather than a continuous variable, making cohort analysis impossible. Accordingly, this study uses data from 13 years in a repeated cross-sectional form. The birth cohort is divided into six cohorts (1940, 1950, 1960, 1970, 1980, 1990~) ranging from those born in the 1940s to those born after 1990.

2. Variable Composition

1) Dependent Variable

For this study, the dependent variable is the Korean people's judgment of the need for unification within the Korean Peninsula. Data from questions that were continuously included in the survey from 2007 to 2021 were used for analysis. The question is structured as follows. Question: Do you think unification is necessary? Options: (1) Very necessary (2) Somewhat necessary (3) Half-half (4) Somewhat not necessary (5) Not necessary at all. However, to provide an intuitive understanding of the analysis results that will be presented later in this paper, the order of the response data for this question was changed and analyzed as follows. (1) Not necessary at all (2) Somewhat not necessary (3) Half-half (2) Somewhat necessary (1) Very necessary.

2) Independent Variable

To analyze factors influencing the degree of the need for unification, eight variables (age, gender, marital status, education, average monthly household income, area of residence, and occupation) were included in the first level

(individual level) by considering previous research. In addition, in the two-level (group level) estimation model, six cohorts (born in the 1940s, 50s, 60s, 70s, 80s, and after 90s) and thirteen survey points (2007, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021) were used to derive the cohort effect and period effect.

3. Cohort Effect and Hierarchical age-period-cohort Model

The cohort effect refers to the different effects that different generations have in response to changes over time, and this refers to the effects arising from the different social terrain and life experiences each generation has lived through. Cohorts are also commonly called generations, and the importance of generational analysis has been emphasized in many subsequent studies since it was first proposed by Mannheim (Mannheim, 1952). Mannheim notes that each generation gives its members the same social location. The same social location (within a generation) is the agent of social change through generation bond, or it can also exist as an entity as a group that shares historical experience and consciousness (Schuman & Scott, 1989; Park et al. 2005; Park, 2005).

APC analysis has received significant attention for its advantages as it can describe social, historical, and environmental factors that shape the course of an individual's life. However, empirical analysis of the APC model has limitations due to data structure and methodological issues (Yang & Land, 2013). For example, in a cross-sectional analysis carried out based on data surveyed at one point in time, only the age effect can be derived, and since the age effect that is derived at this time is only valid at that specific point in time, it is not known whether the same effect will appear at other points in time. Additionally, although cohorts can be divided based on age, the analysis does not reflect changes in the cohort over time. Furthermore, time series analysis, a method of analyzing objects over time, measures the same individual or group of individuals at multiple points in time and observes its changes. However, time

series analysis cannot explain the impact of a specific period and environment on the contemporary cohort (Glenn, 2005).

Moreover, APC analysis requires solving the so-called identification problem to model the effects of age, period, and cohort, which are highly correlated with each other. Cohorts are divided by year of birth, calculated by subtracting age from the period in which the survey takes place. Therefore, age, period, and cohort have a perfect linear dependence relationship with each other. In this case, however, there is a problem where one variable is automatically calculated from the relationship between other variables, making it impossible to separate the three variables (age, period, and cohort) from one another (Glenn, 2005). This identification problem is the most severe methodological problem of the APC model, and a perfect linear dependence relationship makes it impossible to identify the model parameters, resulting in a problem where APC cannot be used as a model parameter (Greene, 2018).

Efforts to solve the identification problem begin with research focusing on the interaction between variables (age, period, and cohort) to measure the age effect(Schaie, 1965). Schaie(1965) proposed a traditional three-factor design for aging research combining longitudinal, cross-sectional, and time-lag designs to distinguish between the confounder effects of A, P, and C. Baltes(1968) pointed out that the cross-sectional and longitudinal designs by Schaie (1965) had an error in interpreting sample differences as pure age effects, and through a distributed design, a two-factor design was constructed to separate the main and mixed effects of age and cohort effects.

Mason(1973) developed a conventional constrained general linear model(CCGLM) to solve the identification problem and individually separate the effects of APC using virtual cross-sectional data. However, it is difficult for CCGLM to solve the multicollinearity problem completely, and depending on constraints, the model estimation can vary therefore, the issue of validity regarding the results was pointed out (Yang & Land, 2013).

Another APC methodology is the proxy variable approach (Heckman & Robb, 1985). This model is a methodology where one or more proxy variables are used to replace age, period, or cohort variables within the model and shares the problems of reliable proxy search and proxy-dependent results with constraint-based methods.

Next, the penalty function setting method estimates and compares the effects of the three patterns AP, AC, and PC and the results of the constrained APC model (Robertson et al. 1999).

The penalty is measured from the differences in the parameters weighted by a measure of goodness of fit, and it is used to “identify” the parameters. This value can be obtained by minimizing the penalty, and Robertson et al.(1999) concluded in their study that methods based on the minimization of the penalty function are only useful when the dependent variable is constant over time.

Since then, efforts to separate the independent effects of the three time dimensions of age, period, and cohort have continued to be sought. Yang & Land (2008) presented a methodology to reduce the linear trend between variables to two dimensions through principal component analysis on the three effects of age, period, and time through the APC-IE (intrinsic estimator) model. This constraint solution is another type, applying the inverse generalized Moore-Penrose to the APC problem. It can also be seen as an extension of principal component analysis, but the goal is to reduce data redundancy and estimate the APC effect rather than develop a predictive model. Basically, the logic of the APC-IE model is to eliminate the influence of the design matrix (which is fixed by the number of age and period groups and is not related to the outcome observations) on the coefficient estimates. The constraints that IE uses produce estimates with desirable statistical properties. For example, the variance is smaller than a constrained generalized linear model estimates over a fixed number of data periods. However, IE is only useful if researchers use theory and additional information to carefully assess the reliability of estimates and keep tentative conclusions about the effects (Glenn, 2005).

As cross-sectional data accumulated and the use of repeated cross-sectional data became possible, the limitations of APC analysis could have been overcome. Yang & Land(2006) pointed out that the existing APC model for repeated cross-sectional data may violate the error independence assumption of the fixed-effects regression model (OLS, Logit). To solve this problem, they developed the HAPC model, hierarchical age-period-cohort model, and specifically applied CCREM (cross-classified random effects two-level models) to repeated cross-sectional data to build a model that distinguishes individual, period, and cohort effects (Yang & Land, 2013). Although the model has limitations, the HAPC model is recognized as the standard method for analyzing generational effects (Linek & Petrussek, 2016). Based on the above, this study intends to adopt the HAPC model of Yang & Land(2013) as a model to analyze the cohort effect of South Korean people's consciousness of the need for unification between 2007 and 2021.

The model used in this analysis is the hierarchical APC cross-classified random effect(HAPC-CCREM) by Yang & Land(2013). The reasons for selecting the HAPC-CCREM in this study are as follows. The HAPC-CCREM has the advantage of being able to integratively analyze the three major factors(age, period, cohort) that can individually or interactively influence unification consciousness. By separating and analyzing the independent effects of each factor, it helps to understand how a specific phenomenon occurs due to changes in age, period, or the characteristics of a particular cohort. In this model, differences in units(individual or group) to which each variable belongs are assumed, and cohort and period effects are estimated through random effects that appear at the group level. Based on the model, age is set as a fixed effect variable at the individual level(level-1), and period and cohort are set as random effect variables at the group level(level-2). If this is expressed as a formula, it goes through the following process.

First, the individuals included in the data of this study have a specific age

and belong to a specific period and cohort. If the degree of hope for unification is uni_{ijk} , then the degree of hope for unification of a specific individual can be expressed in the following way.

Level 1 or "Within-Cell" Model:

$$\begin{aligned}
 uni_{ijk} = & \beta_{0jk} + \beta_1 age_{ijk} + \beta_2 gender_{ijk} + \beta_3 marital\ status_{ijk} + \beta_4 education_{ijk} \\
 & + \beta_5 average\ monthly\ household\ income_{ijk} + \beta_6 area\ of\ residence_{ijk} \\
 & + \beta_7 occupation_{ijk} + e_{ijk}, \text{ with } e_{ijk} \sim N(0, \sigma^2)
 \end{aligned}$$

i = individual

j = When the individual responded to the survey (1 = 2007, 2 = 2010 ..., 13 = 2021

k = Individual's birth cohort (1 = 1940s, 2 = 1950s, 3 = 1960s, 4 = 1970s, 5 = 1980s, 6 = after 1990s)

The first-level equations uni_{ijk} can first be predicted by individual-level variables as follows. In the above formula, β_{0jk} is the uni_{ijk} value when all other variables are 0 and correspond to the intercept, and e_{ijk} stands for the residuals that this model does not explain.

Level 2 or "Between-Cell" Model:

$$\beta_{0jk} = \gamma_0 + u_{0j} + v_{0k}, \text{ with } u_{0j} \sim N(0, T_u), v_{0k} \sim N(0, T_v)$$

Next, the group-level variables, period and cohort, need to be modeled. In the formula above, intercept β_{0jk} is the intercept of the average response for the need for unification of individuals born in k cohort living in period j . If this is expressed in a formula, β_{0jk} is the sum of the model's intercept (r_0), period

effect (u_{0j}), and cohort effect (v_{0k}). This establishes that factors such as age represent fixed effects at the individual level and period and cohort represent random effects that additionally predict the distribution of the intercept value within the age model. In addition to the fixed effect model of lower dimensional variables (individual variables), it corresponds to a random intercept model in which higher-dimensional variables (period, cohort) additionally predict the intercept. Combined with the individual-level model, this can be reconstructed into the final formula below.

Combined Model:

$$\begin{aligned} uni_{ijk} = & \gamma_0 + \beta_{0jk} + \beta_1 age_{ijk} + \beta_2 gender_{ijk} + \beta_3 marital\ status_{ijk} + \beta_4 education_{ijk} \\ & + \beta_5 average\ monthly\ household\ income_{ijk} + \beta_6 area\ of\ residence_{ijk} \\ & + \beta_7 occupation_{ijk} + u_{0j} + v_{0k} + e_{ijk} \end{aligned}$$

Independent variables at the individual level consist of key personal characteristics such as the individual's age, gender, marital status, education level, average monthly household income, residential area, and occupation. The individual's educational background is categorized as middle school or lower, high school or college graduate or higher. The monthly household income consists of less than 2 million won(less US\$ 1,500), between 2 million and less than 3 million won(US\$ 1,500~2,200), between 3 million and less than 4 million won(US\$ 2,200~2,900), and over 4 million won(over US\$ 2,900). The residential area consists of the metropolitan region (Seoul, Gyeonggi, Incheon), Yeongnam region (Daegu, Busan, Gyeongnam, Gyeongbuk), Homan region (Gwangju, Jeonnam, Jeonbuk), Central region (Daejeon, South Chungcheong, North Chungcheong), Gangwon, and Jeju. Occupations include primary industry, self-employed, blue-collar, white-collar, student, other, and housewife. HAPC-CCREMS includes factors to measure random effects based on the assumption that the level of the hope for unification, as a group-level

independent variable, can be influenced by factors by period and cohort as well as individual characteristics.

To select the final model, AIC and BIC were compared by excluding and then including the group-level variables (period and cohort) at level 2. The comparison results showed that the model including both period and cohort had the best fit, so this model was adopted.

IV. Result

1. Descriptive Results

Table 1, 2 show the results of the basic statistical analysis of the variables used in this study. The dependent variable, the degree of the need for unification, averaged 3.5 from 2007 to 2021, with a high proportion of responses saying that unification was necessary. Regarding individual-level variables, the average age was 43.3 years, 50.8% were male, and 73.3% of the respondents were married. Regarding education level, those attending college or higher (46.5%) showed the highest rate, and in terms of birth cohort, those born in the 1960s (3,796 people, 24.3%) showed the highest rate. The average household monthly income in the 3-3.99 million won (US\$ 2,200~2,900) category showed the highest ratio (34.2%), and regarding residential areas, the high rate in the metropolitan area (45.1%) is noticeable. Regarding occupation, the proportion of blue-collar workers (24.5%) and self-employment (23.4%) was high. The proportion of birth cohorts from the 1960s (24.3%) and 1970s (22.3%) was high in group-level variables.

〈Table 1. Basic statistical analysis 1〉

Category		Mean	Std.Dev
Dependent variable	Degree of need for unification	3.5	1.2
Level 1 Individual variable	Age	43.3	13.7
Level 2 Group variable	Cohort	2.7	1.3
	Survey period	2014.8	4.0

〈Table 2. Basic statistical analysis 2〉

Category		Item	%	Item	%
Individual variable Level 1	Gender	Male	50.8	Female	49.2
	Marital status	Married	73.3	Single	26.7
	Education	Middle school or lower	9.7	High school	43.8
		College or higher	46.5		
	Household average monthly income	Less than 2 million Won (less US\$ 1,500)	14.0	2-2.99 million Won (US\$ 1,500~2,200)	23.8
		3-3.99 million Won (US\$ 2,200~2,900)	34.2	More than 4 million Won (over US\$ 2,900)	28.0
	Residential area	Metropolitan region	45.1	Yeongnam region	26.7
		Honam region	11.1	Central region	11.5
		Gangwon	3.4	Jeju	2.0
	Occupation	Primary industry	2.1	Self-employed	23.4
Blue-collar		24.5	White-collar	19.0	

		Student	11.0	Other	3.0
		Housewife	17.0		
Group variable Level 2	Cohort	Born in 1940s	4.4	Born in 1950s	17.5
		Born in 1960s	24.3	Born in 1970s	22.3
		Born in 1980s	19.1	Born after 1990s	12.1
	Period	2007	7.6	2010	7.6
		2011	7.6	2012	7.6
		2013	7.6	2014	7.6
		2015	7.6	2016	7.6
		2017	7.6	2018	7.6
		2019	7.6	2020	7.6
		2021	7.6		

2. Modeling Results

Table 3 shows the analysis results of HAPC-CCREM. Of the total sample of 15,601 people, 13,063 people were used for the analysis after excluding missing values.

〈Table 3. HAPC-CCREM analysis results of unification consciousness survey〉

Fixed effect	Coef.	se	t Ratio	p-Value
Constant	3.267	0.070	46.42	0.000***
Age(Mean Centering)	0.020	0.002	11.47	0.000***
Female (Ref=Male)	-0.262	0.022	-11.87	0.000***
Single (Ref=Married)	-0.020	0.034	-0.59	0.557
Education (Ref=Middle school or lower)				
High school	0.057	0.039	1.48	0.139

College or higher		0.251	0.044	5.69	0.000***
Average monthly income (Ref=Less than 2 million Won, less US\$ 1,500)					
More than 2 million less than 3 million Won (US\$ 1,500~2,200)		0.038	0.033	1.12	0.262
More than 3 million less than 4 million Won (US\$ 2,200~2,900)		0.030	0.034	0.89	0.376
More than 4 million Won (over US\$ 2,900)		0.005	0.036	0.13	0.893
Residential area (Ref=Yeongnam region)					
Metropolitan region		0.211	0.024	8.87	0.000***
Central region		0.302	0.034	8.84	0.000***
Honam region		0.483	0.034	14.11	0.000***
Gangwon		0.318	0.054	5.89	0.000***
Jeju		0.486	0.068	7.12	0.000***
Occupation (Ref=Self-employed)					
Primary industry		0.149	0.067	2.22	0.026**
Blue-collar		-0.013	0.029	-0.44	0.658
White-collar		0.102	0.033	3.11	0.002**
Student		0.117	0.041	2.80	0.005**
Housewife		0.025	0.034	0.73	0.465
Others		0.057	0.067	0.86	0.391
Random effect		Coef.	Se	t Ratio	p-Value
Cohort	1940s	0.040	0.045	0.88	0.379
	1950s	-0.018	0.036	-0.52	0.605
	1960s	0.020	0.033	0.60	0.546
	1970s	0.017	0.032	0.54	0.593
	1980s	-0.082	0.035	-2.37	0.018**
	After 1990	0.024	0.043	0.55	0.579
Period	2007	0.338	0.055	6.18	0.000***
	2010	0.135	0.059	2.29	0.022**

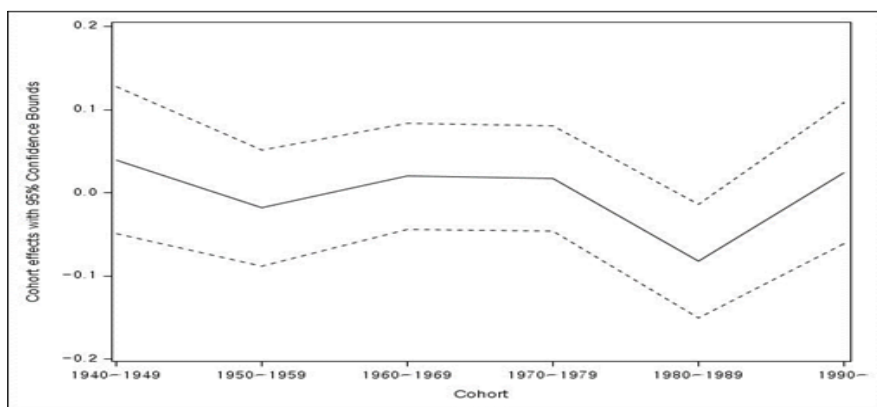
	2011	0.083	0.055	1.50	0.133
	2012	0.099	0.055	1.81	0.071*
	2013	0.007	0.055	0.13	0.899
	2014	0.045	0.055	0.83	0.409
	2015	-0.095	0.055	-1.72	0.086*
	2016	-0.073	0.055	-1.32	0.186
	2017	-0.080	0.055	-1.45	0.147
	2018	0.033	0.056	0.59	0.556
	2019	-0.068	0.056	-1.23	0.218
	2020	-0.117	0.056	-2.10	0.036**
	2021	-0.307	0.056	-5.50	0.000***
Variance Components	Variance	Se		p Value	
Period	0.025	0.011		0.011**	
Cohort	0.003	0.003		0.126	
Residual	1.211	0.015		0.000***	
N	13063				
-2 Res Log Likelihood	39707.5				
AIC	39713.5				
BIC	39715.2				

The fixed effect section shows the influence of individual-level variables. First, age showed a positive relationship, and when age increased by one year, the degree of the need for unification increased by 0.020. Compared to men, women rated the need for unification lower (-0.262). The negative results among women, as seen in previous research, appear to be due to lower expectations of the benefits of unification compared to men. And compared to those with a middle school education level or lower, those with a college degree or higher had a higher response to the need for unification (0.251), this result suggests that highly educated individuals tend to respond positively to the expectation of economic benefits from unification. No statistically significant results were observed in the analysis of the need for unification according to average

monthly income²⁾. In the case of residential areas, statistically significant positive values were shown in all regions of the Metropolitan, Central, Honam, Gangwon, and Jeju regions compared to the Yeongnam region, which was the reference group. Regarding occupation, the degree of the need for unification was higher for primary industry workers, white-collar workers, and students when compared to self-employed workers.

Next, Figures 3 and 4 illustrate the trends in unification hope based on graphs representing the independent effects of each variable (cohort, period). Specifically, the graphs of the random effects in the HAPC-CCREM show how the average for each cohort and period deviates from the overall average(0.0).

〈Figure 3. Cohort effect of HAPC-CCREM〉



In a random effect analysis, each coefficient is the average residual effect of

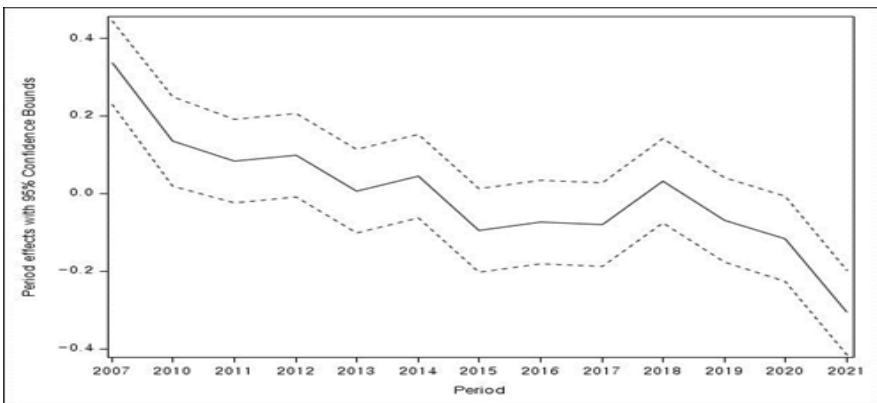
-
- 2) The results of the unification consciousness survey are significant as they allow us to analyze what awareness members of households in different income brackets and specific age groups have about the unification of the Korean Peninsula. However, it is not easy to directly analyze the relationship between income levels (especially at the individual level) and unification consciousness based on this data. For a more general discussion on how changes in income levels affect unification consciousness, an analysis using data that reflects individual income levels would be more appropriate.

period and cohort, and in this study, it refers to period and cohort effect. Figure 3 shows the cohort effect of HAPC-CCREM, meaning the average residual effect relative to the average of the entire cohort. For cohorts born in the 1940s, 1960s, and after 1990, the degree of the need for unification increased when compared to the average for all cohorts. In comparison, the degree of the need for unification decreased for cohorts born in the 1950s and 1980s compared to the average of all cohorts. What is particularly noteworthy in these results is that only the cohort born in the 1980s showed a statistically significant negative coefficient value. The cohort born in 1980 has a lower value of -0.082 when compared to the average judgment of the need for unification of the entire cohort.

These results suggest that a specific event affecting the 1980s birth cohort may have led to their collective behavior. This study hypothesizes that this event is viewed from the perspective of the intensification of inequality, and more details on this will be discussed in Chapter 5.

The following Figure 4 is a graph showing the period effect derived through HAPC-CCREM, which means the average residual effect for the overall average of the period.

〈Figure 4. Cohort effect of HAPC-CCREM〉



The period effect shows a downward trend, and compared to the average of the entire period, the degree of the need for unification increased in 2007, 2010, 2011, 2012, 2013, 2014, and 2018, and decreased in 2015, 2016, 2017, 2019, 2020, and 2021. Regarding the downward trend in the consciousness of the need for unification between 2007 and 2021, Woo (2022) argued that the progress of economic inequality in South Korean society, inter-Korean relations, and the political orientation of the respondents were influential. In particular, the continued progress of economic inequality influenced the overall downward trend during this period and major events in inter-Korean relations, such as the attack on the Cheonan in 2010 and the Panmunjom Declaration in 2018, have influenced the consciousness of the need for unification to be up and down per each year.

The variance component results show how much of the variance in the degree of need for unification is explained by the characteristics at each level. Most of the variance in the degree of the need for unification was explained at a statistically significant level by individual-level characteristics. Furthermore, it was analyzed that the characteristics of the period also influenced the degree of the need for unification. On the other hand, the cohort characteristics' variance scale was relatively at its lowest compared to the individual level and period (0.003) and was not statistically significant ($p=0.137$). Therefore, the results show that individual-level factors such as age and the period effects they face are influenced rather than the cohort effect.

V. Discussion and Conclusion

The results of the HAPC-CCREM analysis confirm that the 1980s birth cohort had a statistically significant lower unification orientation of 0.082 compared to the average of the entire cohort. Figure 5 shows the income

inequality within birth cohorts measured using the Detrended Age-Period-Cohort(APCD) model proposed by Chauvel(2013)³⁾.

〈Figure 5. Income inequality by birth cohort〉

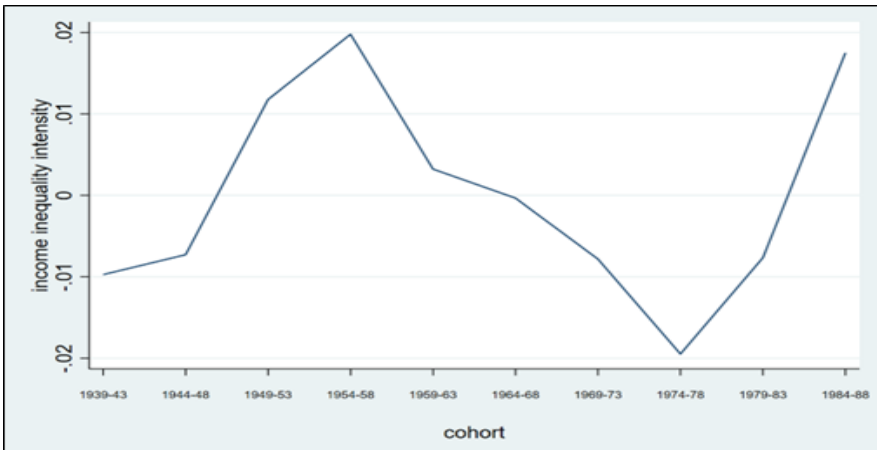


Figure 5 shows that intra-cohort income inequality is high for the 1950s and 1980s birth cohorts. This can be interpreted as the economic inequality in South Korean society identified in Figure 2 becoming severe, especially for the 1950s and 1980s birth cohorts. Previously, in Table 3, we confirmed that the 1950s and 1980s birth cohorts had a negative cohort effect on the consciousness of the need for unification and that only the 1980s birth cohort had statistically significant results.

In this context, the intensification of inequality can influence the collective behavior of specific generations. According to La Grange A and Jung HN (2004), the follow-up measures to the financial crisis in South Korea in the late

3) Figure 5 shows the analysis results using the Korean Labor & Income Panel Study (KLIPS) data for 1998, 2003, 2008, 2013, and 2018. A description of the APCD model is provided in the appendix.

1990s had a significant impact on the real estate market, and the commodification of land and housing exacerbated social inequality. Additionally, Ronald R and Doling J (2010) view home ownership in East Asian countries as a symbol of economic stability and social status. In the case of South Korea, they noted that housing ownership increased with rapid economic growth and that the surge in housing prices has become a social issue.

For the 1980s birth cohort, the period from 1997, when the Asian Financial Crisis of 1997 occurred, and after that corresponds to their adolescence period, and the period from 2007 to 2021, which is the subject of analysis in this study, corresponds to people in their 20s and 30s. The 20s and 30s age range in South Korean society is a period that normatively leads to college education, employment, marriage, home purchase, childbirth, and childcare. This age range can be seen as the period in South Koreans' life cycle where the highest cost spending is concentrated. Meanwhile, Woo & Park (2007) condensed the labor market situation experienced by the South Korean generation born in the 1980s and named it the '880,000 Won generation⁴). (As of the mid-2000s) 95% of people in their 20s were employed as temporary workers, and the average monthly income before taxes for these workers was 1.19 million Won, so the weighted average monthly income of people in their 20s is calculated to be about 880,000 Won. Therefore, when the 1980s birth cohort first entered the labor market, the proportion of permanent workers at large corporations was low and the income gap between them and temporary workers was huge.

The 1980s birth cohort is the generation directly exposed to the continued economic inequality in South Korean society since the late 1990s. Moreover, the

4) 880,000 won in the '880,000 Won generation' is equivalent to about US\$ 900 based on the 2007 exchange rate(936 won per dollar). This is about 40% of the nominal monthly average wage of Koreans at the time(2.17 million won, about US\$ 2,300 at the time) and 74% of the average monthly wage of all non-regular workers(1.19 million won, about US\$ 1,300 at the time). As of 2023, 880,000 won is about US\$ 600, 1.19 million won is about US\$ 900, and 2.17 million won is about US\$ 1,600.

continued progress of economic inequality has created a harsh socioeconomical environment for the 1980s birth cohort, especially compared to the 1960s and 1970s birth cohorts. It is believed that this situation naturally caused the 1980s birth cohort to have negative perceptions of the issue of North-South unification, as it requires enormous social capital. In this context, the results in Figures 3 and 5 are evidences proving, at the birth cohort level, that the progression of economic inequality has impacted the decline in South Korean people's consciousness of the need for unification. The findings of this study is not just limited to helping us understand the context of changes in South Korean society's consciousness of North-South unification. This study can have significant implications in terms of public policy by specifying the micro-subject at the center of the change in unification consciousness and examining the factors that influenced the micro-subject.

It is necessary to mention the limitations of this study. First, it is essential to note that the data used in the analysis is limited to 2007-2021, and the data structure is not based on a panel design. Second, in a broader sense, the 1990s birth cohort, which can be seen as being in a similar environment to the 1980s birth cohort, did not produce negative results regarding consciousness of the need for unification. In this regard, the explanation of this study has limitations. In addition to the progress of economic inequality, there is a need to explore what factors have a statistically significant impact on the consciousness of the need for unification among South Korean birth cohorts. Nevertheless, the findings of this study, which focused on the cohort effect of unification consciousness, will provide valuable implications to understand the present and infer the future of South Korean society.

It is also an important task for subsequent research to analyze how wealth and income inequality have become entrenched within specific generations in South Korea and how these inequalities have led to differences in their collective behavior or orientations.

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Appendix

In the analysis of income inequality by birth cohort in Figure 5, the detrended APC model (APCD) was used, which is a model that decomposes linear trends and fluctuations through some constraints (Wilmoth, 1990; Chauvel, 2013). The APCD model focuses on the three effects fluctuating around a linear trend, and we used the RIF of the Gini coefficient as the dependent variable for analysis. In general, the level of individual inequality can be measured using aggregate indicators such as the Gini coefficient. The Gini coefficient can be converted to an influence function for each individual, such as the first-order differential coefficient. This is used to explore the impact of a specific observation on the Gini coefficient (Hampel, 1974), and the definition is similar to the first-order differential coefficient, therefore, the expected value of the influence function is 0. The expected RIF value is the corresponding distribution statistic (Firpo et al. 2009). In a linear regression model with RIF as the dependent variable, the conditional expected value is the non-conditional expected value according to the law of Iterated Expectations. Hence, the linear regression model can be expressed accordingly (Firpo et al. 2018).

$$E[RIF(y; v)|X] = X\beta$$

Therefore, the conditional expected value of RIF concerning the mean is the same as that of a general linear regression model. By using the value of RIF as a dependent variable, estimating the change in the corresponding distribution statistics (Gini coefficient, etc.) according to the change in the average value of an explanatory variable is called an RIF regression model. The RIF value of the Gini coefficient used in this study is as follows.

$$RIF(y; G) = 2 \frac{y}{\mu} G + 1 - \frac{y}{\mu} \int_0^y F(z) dz$$

The Gini coefficient assigned to each individual through RIF transformation was used as the dependent variable based on the above. In addition, the years used in the analysis were 1998, 2003, 2008, 2013, and 2018, using a 5-year interval survey data following Chauvel & Schroder (2015). The age group of the head of the household is 25 to 64 years old in 5-year increments. The birth cohort included in the analysis is 1934~1934, ..., 1989~1993, but due to model limitations, cohorts born between 1934~1938 and 1989~1993 were excluded from the APCD regression analysis. Furthermore, the variables used to control household characteristics were the householder's education level, employment status, married spouse status, single-person household, presence of children under 15 years of age, and gender.

The model used in the analysis is the APCD model proposed by Chauvel(2013), which allows the identification of deviations in the cohort effect from the overall trend. The equation of the APCD model proposed by Chauvel (2013) is as follows.

$$Y^{apc} = \alpha_a + \pi_p + \gamma_c + \alpha_0 rescale(a) + \gamma_0 + rescale(c) + \beta_0 + \sum_j \beta_j X_j + \epsilon_j$$

In the above equation, α_a is the age effect, π_p is the period effect, r_c is the cohort effect vector, β_j is the constant term, and is the regression coefficient of population and sociological control variables. Chauvel's model includes three constraints to identify deviations of the cohort effect from the overall trend (Chauvel, 2013). First, the sum of the three vectors representing a, p, and c is 0. Next, the gradient of the three vectors a, p, and c are 0, and these two constraints can eliminate the linear trend and reflect nonlinearity. Lastly, as the first and last cohorts appear only once, the standard error increases, so they are excluded from the estimation. Afterward, the two trend variables are added to absorb the linear trend. The least squares model (OLS) can estimate this APC model. If there is no cohort effect in this model (if the cohort effect does not differ from the age and

period effect), the regression coefficient r_c of the detrended cohort effect is 0. If r_c is not 0, we can identify the nonlinearity of the cohort effect.

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