Conscription: Signaling or Human Capital Accumulation?

Boyuan Wang

March 19, 2024

Abstract

Many studies have found that conscription raises wages. One explanation for the wage premium is that conscripts accumulate valuable human capital during their service in the military. An alternative theory posits that conscription serves as a signaling device for a worker's quality such as good health and perseverance. This paper examines those possible mechanisms by estimating the impact of the duration of military service on income, employment, and educational attainment with data from South Korea and an IV approach. While the amount of human capital increases with the duration of service, the signal does not. Although I find a conscription premium: a positive relationship between conscription and income, the length of compulsory military service does not affect a worker's income or employment. On the contrary, I find that longer service length lowers conscripts' chances of obtaining post-graduate degrees suggesting a net human capital depreciation. My findings weaken the case for human capital as an explanation for the conscription premium and strengthen support for a signaling mechanism.

1 Introduction

A large body of literature, such as Lim (2018) and Lee and Jung (2020), studies the effect of conscription on labor market outcomes and educational

attainment. They find conscription positively affects those outcomes, but few examine the mechanism behind such an effect. Similar to a college degree, finishing compulsory military service (CMS) may help conscripts accumulate valuable human capital. It can also send a positive signal about a worker's quality to potential employers. There seems to be no consensus on the nature of higher education (Huntington-Klein, 2021). In this paper, I study which mechanism is mainly behind conscription's effect on a veteran's labor market outcomes and educational attainment. To study the issue, I use an IV approach and a rich dataset from South Korea to determine if the duration of CMS affects an individual's income, employment, and educational attainment. I identify the causal impact of conscription length on those outcomes by exploiting the exogenous variation in the duration due to North Korean provocation events. These events increase the duration of service but are plausibly unrelated to other unobserved determinants of outcomes. By focusing only on those who served as a conscript and examining the impact of the duration of CMS, I am able to control for the singling effect and study only the channel affecting human capital accumulation.

Many countries such as Russia and South Korea still rely on conscription for military service. Understanding the effect of conscription on the labor market and education outcomes is still important because it will help those countries form relevant policies. Existing literature such as Bauer et al. (2012) and Bingley et al. (2022) disagreed on whether conscription offers a wage premium to veterans. The paucity of literature examining the mechanism behind conscription makes it even more difficult to determine if conscription does come with a wage premium. More importantly, taking a break during work or study to serve as a conscript can be detrimental to one's labor market outcomes and educational attainment. If little or no positive human capital accumulation occurs during conscription, governments extending the length of conscription will be even more harmful for marginalized men.

As mentioned earlier, conscription may lead to human capital accumulation during the process or is primarily a signaling device to potential employers. If conscription is mainly a signaling device, then the length of Conscription,

which can only impact human capital accumulation, should not have an effect on the labor market outcomes of conscripts. As a country with one of the longest duration of CMS, South Korea has frequently changed the lengths of its conscription over the years. However, different male cohorts with different service lengths may face unique economic shocks that are correlated with individuals' labor market and education outcomes, which can be a potential source of bias. To examine how the length of the conscription in South Korea affects conscripts' income, education attainment, and employment status, I use the moving averages of North Korean (NK) provocation events when conscription started for each cohort as the instrument variables and the individual-level data from the Korean Labor and Income Panel Study (KLIPS).

I start by replicating the results in Lim (2018). Similar to their findings, I find being a conscript is associated with a higher income and this positive effect can only be observed in males with a low level of education. I then use the IV approach to examine the impact of the duration of CMS. I find that the length of conscription appears to have no effect on respondents' income or employment status. However, a longer conscription length does lower male conscripts' chances of acquiring graduate degrees, which suggests a possible depreciation of human capital. The evidence weakens the case for human capital accumulation as the primary mechanism behind the conscription premium. My findings support the claim that conscription mainly sends a positive signal to employers that veterans are of higher quality.

2   Background

2.1   Military Service in South Korea

The South Korean Military Service Law stipulates that all men between the ages of 18 and 38, except those who have a serious physical or mental injury, such as a torn anterior cruciate ligament (ACL), a missing index finger or a serious mental illness, must serve a mandatory military duty term. Exemptions are extremely hard to acquire for healthy males. Only athletes who won

international awards and artists who won exceptional awards can obtain an exemption. Healthy males must serve the full length and cannot quit early (Toyryla, 2023).

An enlisted man can choose a sector of service in the military. He can select among the Army, the Navy (including the Marine Corps), and the Air Force. Once he chooses the branch of the military, he can also choose what rank to apply to: enlisted soldier, non-commissioned officer, or commissioned officer. If he makes no choice, he must perform his service as an enlisted soldier in the Army. All the other options to perform his service must be made during the registration process, and are subject to qualification tests, which are different for each option (Hofverberg, 2022).

The duration of service also varies slightly between different branches over the years by about 2 months. The duration of the CMS in all branches changes in the same direction and by roughly the same length at the same time. Generally, the service length in the Army and Marine Corps is the shortest. The duration of conscription in the Navy and the Air Force is slightly longer. In some years, conscripts serve a longer term in the Air Force (Ari, 2019).

The active period of military service has generally varied in South Korea, depending on the geopolitical situation on the peninsula, ranging from 18 to 39 months. North Korean provocations play a major role in determining South Korea's duration of conscription. For instance, the South Korean government extended the duration of conscription for all branches in 1968 when a group of North Korean commandos infiltrated the South and attempted to assassinate the South Korean president (Ari, 2019).

Lim (2018) compares the wages of male conscripts to those who have never served in South Korea with an IV approach. They find conscripts enjoy a wage premium and it is the less educated men who receive such wage premium. They hypothesize that the wage premium can be from either more human capital accumulation or a positive signal to employers that veterans are potentially good workers. The findings of Lee and Jung (2020) further confirm the existence of the conscription premium in South Korea.

2.2 Analytical Framework

There are two potential channels through which conscription may affect an individual's income. The first channel is human capital accumulation. Bingley et al. (2022) find compulsory military service can lead to skill acquisition in Denmark. They find male conscripts' numeracy and literacy have significantly improved after conscription. The positive effect of conscription is the strongest for men with low scores in the Armed Forces Qualification Tests.

Savcic et al. (2023) find male conscripts who have served a longer term immediately after high school obtain a higher GPA in university. They believe conscripts acquire non-cognitive skills when they serve a longer term, which improves academic performance. Non-cognitive skills like responsibility, self-discipline, teamwork, perseverance, leadership, self-assurance, and other social skills can also improve one's labor outcomes such as income. As Lim (2018) points out, South Korean conscripts may also obtain work-specific skills. And longer service length makes it possible for conscripts to hone those skills. Lastly, there is also human capital depreciation in skills such as math and biology when conscripts take a break from work or study.[1]

The second channel is signaling to potential employers about the conscripts' quality. Males have to be healthy to serve in the South Korean military. Finishing the mandatory service is considered a rite of passage for South Korean men. And being able to endure the hardship of the service can certainly send a positive signal to potential employers.

In all, conscripts can acquire experience or technical know-how during their service. However, there may also be human capital depreciation. On the other hand, employers can safely assume those who have finished their service in the military are healthy, mentally stable, obedient, and may thrive in a team environment. To determine which mechanism is mainly at play: human capital accumulation or signaling, we can examine how the length of conscription affects labor market outcomes and educational attainment. Conscription length can only affect labor market outcomes and educational attainment through

---

[1]Hjalmarsson and Lindquist (2019) find conscripts are more prone to committing crimes suggesting a loss in human capital.

human capital accumulation. And if the conscription wage premium is mainly a result of signaling, conscription length should have no positive effects on those outcomes.[2]

3   Methodology

3.1   Data

The bulk of the panel dataset used in the analysis comes from the Korean Labor & Income Panel Study (KLIPS). The individual-level dataset contains detailed information about a respondent's date of birth, income, education, region of residence, employment status, occupation, age, military service record, and marriage status from 1998 to 2019. The survey relies on questionnaires filled out by 5,000 urban households in cities nationwide (city sub-districts, towns, and sub-counties) in South Korea. Only those who reside in the Jeju province and those who are serving in the military or institutionalized are excluded from the survey. To overcome the representation problems due to sample attrition, an additional sampling of 1,415 households was conducted in 2009. In 2018, an additional 5,044 households were sampled (KLI, 2022).

For data on North Korean provocations, I use data from the Center for Strategic and International Studies. It includes missile launches, nuclear tests, incursions, infiltration, hijacking, and other provocations. The center keeps track of all provocation events initiated by North Korea regardless of the number of casualties since 1958 (CSIS, 2019). As will be shown later, physical attacks such as incursions and hijacking primarily affect South Korea's conscription length compared to missile and nuclear tests[3]. The South Korean military expenditure to GDP ratio is obtained from the World Bank (WB, 2022).

---

[2]Puhani and Sterrenberg (2021) find no significant impact of the service length on labor market outcomes.

[3]Indeed, according to Lee (2022), a 2022 survey of 1,006 adults by the Korea Society Opinion Institute (KSOI) and the Kukmin Ilbo newspaper said the North Korean missile launches over the previous month would not influence their choice for the country's next president.

3.2 Empirical Strategy

Since only men are subject to mandatory military service and this paper examines the effect of service length, only males are included. I keep only people aged 59 or less because the legal retirement age is 60 years and the decision to retire is endogenous. According to the South Korean Defence White Papers, the military service length ranges from 18 to 39 months over the years. When the South Korean government decides to change the duration of the CMS, they change it for all branches of the military by roughly the same length (Ari, 2019). I keep only respondents whose service length is between 18 and 39 months to minimize the impact of measurement errors. Furthermore, anyone who served before the age of 18 or after the age of 38 is also dropped to minimize measurement errors. Professional military personnel who work in the defense sector are also dropped from the samples.

The duration of conscription varies primarily at the cohort level, and a cohort may be subject to the same socioeconomic shocks that are correlated with the length of conscription and the outcome variables. For example, the government may decide to shorten the duration of the service to deal with a labor shortage. And a labor shortage may drive up the income. So not controlling for such shocks may introduce a downward bias. Another confounding factor may come from the universities. Typically, South Korean men first graduate high school, complete one or two years of university studies, and then start their military service (Toyryla, 2023). As service length is shortened, universities may decide to cover more materials in the first two years of universities due to less depreciation of human capital. And more materials covered may improve students' chances of better job placement, which may also bias the results.

The duration also varies slightly at the individual level due to conscripts serving in different branches. It is plausible that some individual characteristics may be correlated with the duration of the CMS. On the other hand, serving in the Air Force or the Navy can mean better living conditions and more specialized knowledge that can potentially raise conscripts' wages. The data set does not have information on the branch in which a respondent served.

To deal with the potential endogeneity, I use the 6-year, 5-year, and 4-year

moving averages of all provocation events by North Korea before conscription started for each individual as the instruments. The idea is that a higher level of threat from North Korea may force the South to extend its conscription length to increase its military preparedness.

The two neighboring countries share one of the most heavily defended borders in the world. Since the Korean War, the two countries have had little economic interaction. Wallace (2016) concludes that North Korea engages in provocations for internal reasons. The list of reasons for provocations ranges from domestic economic pressure to garnering domestic support during regime succession. Provocations by the authoritarian regime ultimately maximize the interest of the Kim dynasty. As long as war does not break out, provocations from North Korea should be exogenous to other cohort-level and individual confounding factors in South Korea due to the long-term division between the two countries.

As shown below, equation 1 represents the second stage.

$$Y_{ict} = \alpha_0 + \alpha_1 Conscription\_Length_{ic} + \gamma X_{ict} + Region_j + Year_t + \epsilon_{ict} \quad (1)$$

Subscripts i, c, j, and t refer to the individual, the year when conscription started, the region, and the year of the survey, respectively. The instruments are the 6-year, 5-year, or 4-year moving averages (MA) of North Korean provocation events before conscription started for each individual. $Conscription\_Length_{ic}$ is the length of conscription for each individual in months. Y_{ict} is the dependent variable. It can be the log inflation-adjusted pre-tax income, whether a respondent holds a post-secondary or post-graduate degree, and whether a respondent is working. $Region_j$ and $Year_t$ are the region and year fixed effects, respectively. X_{ict} include the education level, age, the age when conscription started and log defense to GDP ratio when conscription started, the class, and the type of the job of a respondent. ϵ_{2ict} is the error term.

The error terms for those in the same conscription cohort may be correlated. Similarly, the error terms in every survey year may also be correlated. Because of that, two-way clustering by survey year and year when conscription started

(cohort) is also implemented. Clustering at the cohort level means there is no need to cluster at the lower individual level. Since the survey only has information on respondents' province of residence and South Korea has only 16 provinces, there are too few clusters for clustering by region.

Service length is generated using the dates when conscription started and ended. The age when conscription started is generated with the date of birth and the beginning date of conscription. Log military spending to GDP ratio in South Korea is matched with every cohort as control. A cohort is a group of males who started conscription in the same year. Log income is obtained by taking the log of the inflation-adjusted income of each individual. There are two measures of educational attainment: whether a respondent holds a post-secondary degree or above and whether a respondent holds a post-graduate degree. These dummy variables are equal to one if a respondent holds the respective degree.

Figure 1 shows the first stage results of different moving averages of all North Korean provocation events in the previous years. Starting with the 4-year moving average, North Korean provocations have a positive and significant effect on conscription length. Regardless of the order of the moving average, provocations mostly have a positive and significant effect on service length.
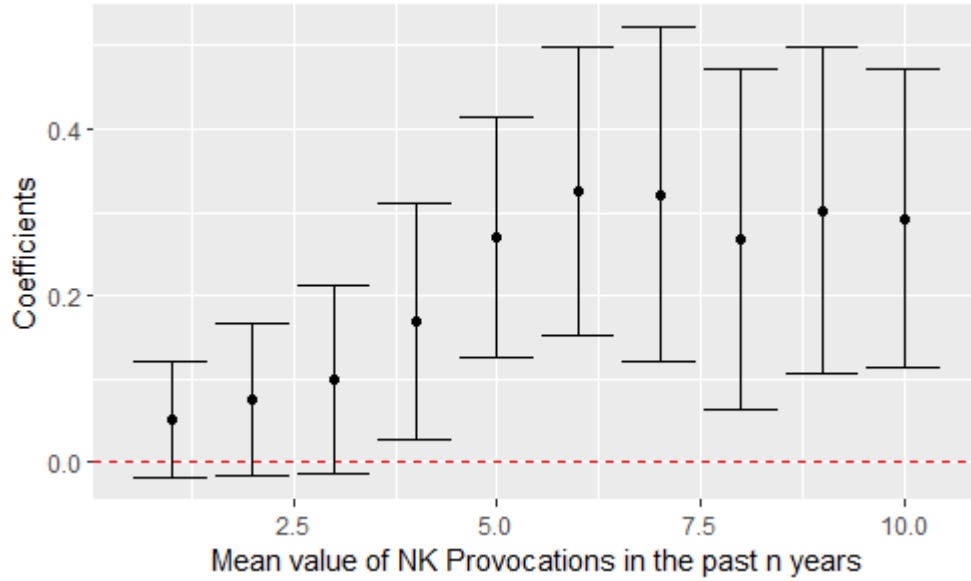
Figure 1: Effects of NK Provocations On SK Conscription Lengths (1)

Next, I include only incursions, physical attacks, and other events that led to actual damages in provocations. Figure 2 (a) contains the first-stage results of this measure of North Korean provocations. The new measure here appears to have a more significant effect than before. It is clear that more provocations from the North in prior years will lead to longer conscription periods even with a different measure of provocations.
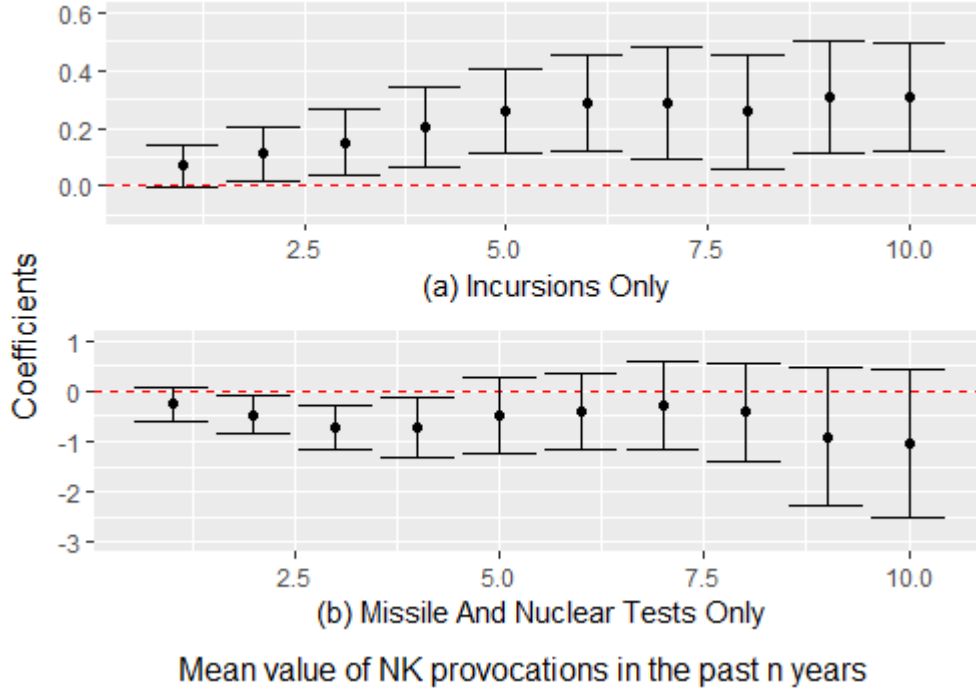
Figure 2: Effects of NK Provocations On SK Conscription Lengths (2)

Lastly, I include only nuclear and missile tests for provocation events. See Figure 2 (b) for the first-stage results of this measure of provocation events. As Lee (2022) reported, South Koreans do not seem too concerned about those missile and nuclear tests. The mostly insignificant effects here corroborate that claim. However, if there are attacks that lead to actual damages, then the situation may escalate.

Figure 3 shows the distribution of the length of the conscription in the sample. Table 1 contains the mean of all important dependent and independent variables by the median length of the service. Conscription length is measured in months. The older generation tends to serve a longer term in the military. As reported by Toyryla (2023), South Korean males finish their compulsory military service during university. The respondents in the sample also started their service around 21 years old, one or two years after starting university around age 19. A longer service length also comes with more military spending. Indeed, higher military preparedness also requires higher military expenditures.

The younger generation who serves a shorter military service is also more educated holding more post-secondary and post-graduate degrees. As shown in Figure 4, the length of the conscription appears to have little effect on income.
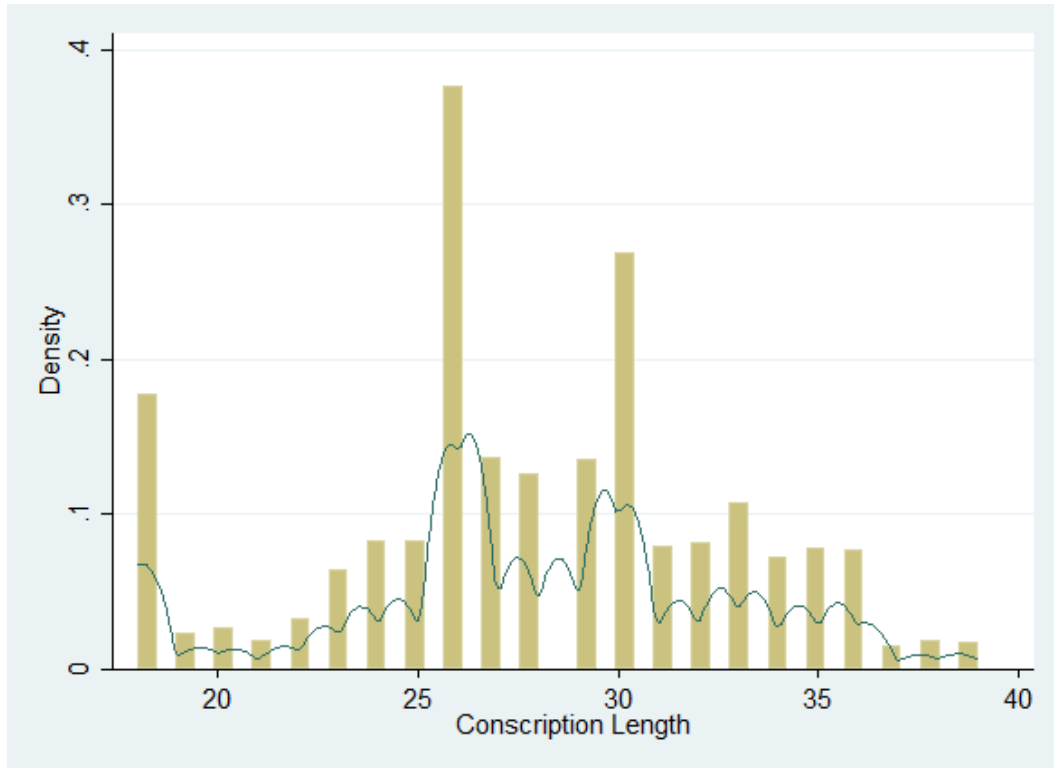
Figure 3: Distribution of Service length

Table 1: Summary Statistics

(1) Variables	(2) Full sample	(3) Short service length (< 28 mos)	(4) Long service length (> 28 mos)	(5) P-value of mean-comparison test (col 3&4)
Age	43.87	41.22	47.06	0
Age conscripted	20.78	20.82	20.74	0
Length of conscription (months)	27.79	24.24	32.08	0
Military spending as a percentage of GDP (%)	4.20	3.75	4.74	0
Inflation-adjusted pre-tax income (krw 10,000)	4,275	4,209	4,354	0
Post-secondary Or Post-graduate degree holders (%)	55.30	65.03	43.57	0
Post-graduate degree holders (%)	6.2	7.9	4	0
Unemployment rate (%)	3.49	3.42	3.56	0.512
Obs	31,231	17,081	14,151	-
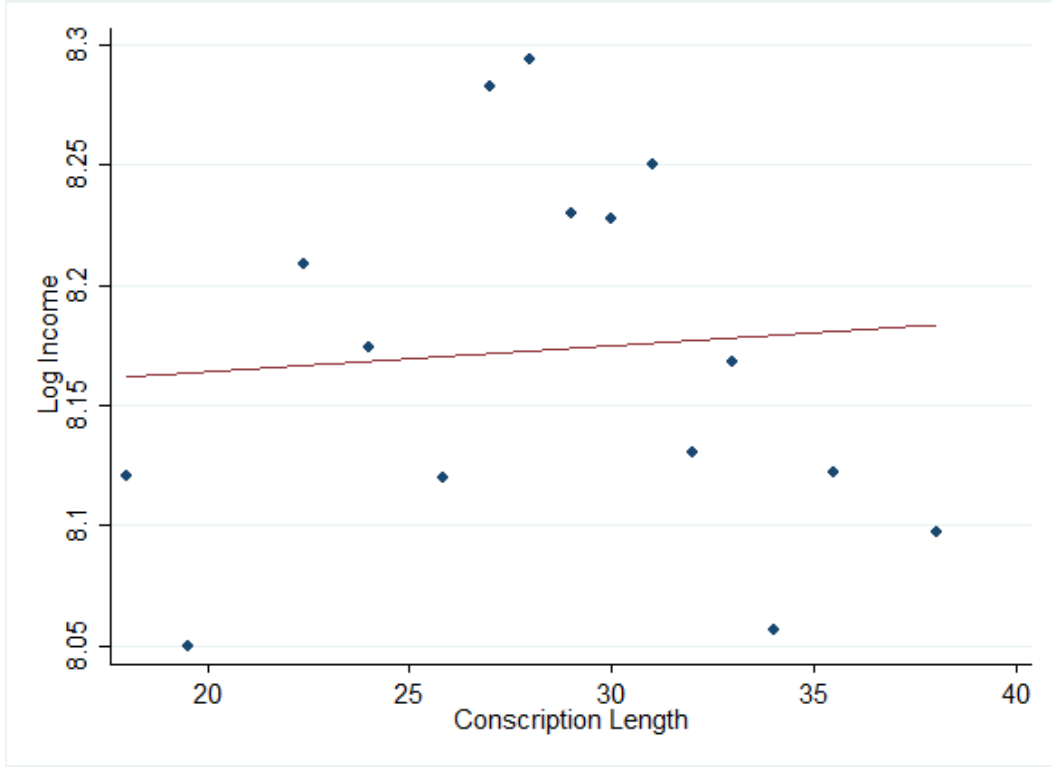
Figure 4: Conscription Length and Income

Note: the graph is a bin scatter plot of log inflation-adjusted income and the duration of conscription generated with the sample.

4 Results

4.1 Main Results

I start by replicating the results in Lim (2018). The paper compares the labor market outcomes between males who have served in the military and those who never have with OLS and IV models. I regress log income on whether the respondent served in the military and other control variables using an OLS model. All respondents in the sample are males who have at least a high school education. Table 2 has those results. As shown in column 1 of the table, being a veteran is associated with a 4.22% increase in annual income. Columns 2, 3,

and 4 include only respondents with the respective degrees. Only column 2 which includes only high school graduates or lower has a positive and significant result. Similar to what Lim (2018) finds in their OLS and IV models, the wage premium can only be observed for men with a low education level.

Table 2: Replication of Lim (2018): Military Service and Income

	Dependent variable: Log inflation-adjusted income			
	(1)	(2)	(3)	(4)
Variables	Full sample	High school or lower	Post secondary degree	Post graduate degree
Military service	0.042***	0.042***	0.019	0.005
	(0.011)	(0.016)	(0.015)	(0.038)
Observations	62,495	30,511	28,254	3,730
R-squared	0.451	0.436	0.435	0.593

Note: The full sample only includes males who have at least a middle school education. Military service is equal to 1 if a respondent served as a conscript and 0 otherwise. All models controlled for education, age, the age square, health condition, family economic status, industry, and job type. Year and region fixed effects were also included. The standard errors are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1

Table 3 examines the effect of conscription length on income. The instruments are the 6-year, 5-year, and 4-year moving averages of North Korean provocations prior to conscription. Service length is measured in months. The first stage results can be seen in Table 10. It is clear that there are no significant effects in both the OLS and IV models. I find service length has no effect on income.

There are a few potential identification concerns here. The regression may lack power. Factors such as marriage status and the industry respondents work in may be relevant omitted variables. To address those concerns, I will use different specifications and samples in the following robustness checks.

Table 3: Conscription Lengths and Income

Variables	OLS	IV		
	(1)	(2) 6-year MA	(3) 5-year MA	(4) 4-year MA
Service length	0.003	0.018	0.006	-0.007
	(0.002)	(0.029)	(0.026)	(0.035)
Weak identification test		12.05	11.29	4.964
Observations	31,230	31,226	31,230	31,230
R-squared	0.309	0.299	0.310	0.306

Note: The instruments are the 6-year, 5-year, and 4-year moving averages (MA) of North Korean provocations prior to conscription. Service length is measured in months. All models controlled for education, age, the age of conscription, military spending for each cohort, class, and type of a respondent's job. Year and region fixed effects were also included. The standard errors are clustered by the survey years and the years when conscription started. See the first stage results in Table 10.
*** p<0.01, ** p<0.05, * p<0.1

4.2 Robustness Checks

I include individual fixed effects to address potential measurement errors at the individual level. Additionally, individual fixed effects can also absorb the missing variable of military branch. For computational simplicity, I regress the log inflation-adjusted income on individual fixed effects and use the residual as the dependent variable. As shown in Table 4, both the OLS and the IV models find no significant effects. The results here also confirm that service length has no effect on income. The first stage results can be found in Table 11.

Table 4: Individual Fixed Effects

	OLS	IV		
	(1)	(2)	(3)	(4)
Variables		6-year MA	5-year MA	4-year MA
Service length	0.002	0.012	0.002	-0.020
	(0.001)	(0.022)	(0.023)	(0.034)
Weak identification test		13.14	12.92	5.266
Observations	30,029	30,025	30,029	30,029
R-squared	0.458	0.450	0.458	0.423

Note: The instruments are the 6-year, 5-year, and 4-year moving averages (MA) of North Korean provocations prior to conscription. Service length is measured in months. All models controlled for education, marital status, age and age square, the age of conscription, military spending for each cohort, class, and type of a respondent's job. Individual, year, industry, and region fixed effects were also included. The standard errors are clustered by the survey years and the years when conscription started. See the first stage results in Table 11. *** p<0.01, ** p<0.05, * p<0.1

Next, I trim off only the top and bottom 5% of the sample by service length. Dropping those observations is necessary because lengths such as 6 and 50 months have never existed after the war according to Ari (2019). The sample now contains respondents with conscription lengths between 14 and 39 months. Fewer control variables are included and the errors are clustered at the cohort level only. As shown in Table 5, the results from all models contain no significant effects.

Table 5: Parsimonious Models

	OLS	IV		
	(1)	(2)	(3)	(4)
Variables		6-year MA	5-year MA	4-year MA
Service length	0.001	0.008	0.001	-0.020
	(0.001)	(0.024)	(0.029)	(0.041)
Weak identification test		15.59	13.95	7.547
Observations	32,734	32,729	32,733	32,734
R-squared	0.337	0.334	0.337	0.302

Note: The instruments are the 6-year, 5-year, and 4-year moving averages (MA) of North Korean provocations prior to conscription. Service length is measured in months. All models controlled for education, age, the age of conscription, military spending for each cohort, and type of a respondent's job. Individual, year, and region fixed effects were also included. The standard errors are clustered by the years when conscription started. See the first stage results in Table 12.   *** p<0.01, ** p<0.05, * p<0.1

The results appear to be robust to different specifications. Since everyone in the dataset served in the military, all respondents were subject to the signaling effect. Any significant effects of conscription lengths on labor market outcomes should be mainly a result of changes in human capital accumulation. And no significant effects are observed here. The lengths of conscription do not have an effect on income. And that means the primary mechanism is the signaling effect in which conscription sends a positive signal about veterans to prospective employers. So any wage premiums associated with conscription should be mainly a result of signaling.

4.3   The Heterogeneous Effects of Conscription

Lim (2018) finds that the conscription wage premium can only be observed in respondents holding a high school degree or lower. They explain the phenomenon as conscription helping low-skilled workers accumulate human capital that workers can later use in their jobs. To examine if that claim is true, I split the sample by whether respondents hold at least a high school degree. The

results of the analysis can be found in Table 6 and the first stage results are in Table 13. Only the 5-year moving average is used as the instrument for its high weak identification test value.

As shown in Table 6, both the OLS and the IV models find insignificant results for both post-secondary degree holders or above and high school diploma holders or below. The insignificant results reject the claim that low-skilled workers gain much experience during conscription. The wage premiums enjoyed by low-skilled workers are mainly because of the signaling effect. The hardships that conscripts have to endure during military service and the good health that is needed to be in the service are certainly what employers of manual labor are looking for. However, the insignificant results indicate the possibility that there can be a greater impact for individuals with a lower education.

Table 6: Results by Education Level

	Dependent variable: Log inflation-adjusted income			
	OLS		IV	
Variables	(1) High school or below	(2) Post-secondary or above	(3) High school or below (5-year MA)	(4) Post-secondary or above (5-year MA)
Service length	0.003	0.002	0.048	-0.002
	(0.003)	(0.003)	(0.038)	(0.019)
Weak identification test			6.117	13.54
Observations	13,959	17,271	13,959	17,271
R-squared	0.280	0.314	0.165	0.317

Note: The instrument is the 5-year moving average (MA) of North Korean provocations prior to conscription. The full sample is split by education level. Service length is measured in months. All models controlled for education, age, the age of conscription, military spending for each cohort, class, and type of a respondent's job. Year and region fixed effects were also included. The standard errors are clustered by the survey years and the years when conscription started. See the first stage results in Table 13.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

There appears to be little change to the conscripts' level of human capital due to changes in the length of service. Existing literature finds that less educated men tend to benefit from conscription. While my findings do not contradict that of existing literature, I find that such a benefit is not primarily driven by positive human capital accumulation.

The lengths of conscription may also have different effects on people with different types of jobs. In Table 7, I examine if the service length may have different effects for males with office and non-office (manual) jobs. As shown in the table below, I split the sample by whether a respondent has an office job. I find no significant results in both the OLS and the IV models. It seems like the type of job that a male holds is irrelevant to the effect of conscription length on income.

Table 7: Results by Type of Jobs

	OLS		IV	
	(1)	(2)	(3)	(4)
Variables	Office	Non-office	Office (5-year MA)	Non-office (5-year MA)
Service length	0.001	0.003	0.024	-0.012
	(0.002)	(0.002)	(0.028)	(0.040)
Weak identification test			13.76	9.904
Observations	14,296	15,733	14,296	15,733
R-squared	0.461	0.333	0.408	0.279

Dependent variable: Log inflation-adjusted income

Note: The instrument is the 5-year moving average (MA) of North Korean provocations prior to conscription. The full sample is split by whether a respondent holds an office job or not. Service length is measured in months. All models controlled for education, age, the age of conscription, military spending for each cohort, class, and type of a respondent's job. Year and region fixed effects were also included. The standard errors are clustered by the survey years and the years when conscription started. See the first stage results in Table 14. *** p<0.01, ** p<0.05, * p<0.1

In all, a longer conscription length does not lead to a higher wage for people of different educational backgrounds or different types of jobs. That suggests there is little net human capital gain for conscripts. Finishing the compulsory military service mainly sends a positive signal to employers about a worker's quality.

5   Employment and Educational Attainment

Hjalmarsson and Lindquist (2019) find conscripts are more likely to commit

crimes. That suggests conscription may have an effect on a conscript's chance of employment. I study the effect of conscription length on an individual's chance of finding work here. Table 8 has the results of the analysis. See the first stage results in Table 15. The dependent variable is equal to 1 if a respondent is working and 0 otherwise. The rest of the specifications remain the same as before. In all columns, I find no significant results. Conscription lengths have no effect on the unemployment rate.

Table 8: Conscription Lengths and Employment Status

	OLS	IV		
	(1)	(2)	(3)	(4)
Variables	OLS	6-year MA	5-year MA	4-year MA
Service length	0.000	-0.001	-0.001	-0.002
	(0.000)	(0.001)	(0.001)	(0.001)
Weak identification test		12.33	11.44	5.070
Observations	31,230	31,226	31,230	31,230
R-squared	0.931	0.930	0.930	0.928

Note: The dependent variable is equal to 1 if a respondent is working and 0 otherwise. The instruments are the 6-year, 5-year, and 4-year moving averages (MA) of North Korean provocations prior to conscription. The dependent variable is equal to 1 if a respondent is employed. All models controlled for education, age, age of conscription, and military spending for each cohort. Year and region fixed effects were also included. The standard errors are clustered by the survey years and the years when conscription started. See the first stage results in Table 15.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Taking breaks during one's education can lead to human capital depreciation. It is therefore possible that those who serve a longer term in the military may suffer more human capital depreciation. And more human capital depreciation can certainly in some cases lead to lower educational attainment. I study how conscription length can affect an individual's chance of obtaining an advanced degree in this section.

I examine the effect of service lengths on an individual's chance of obtaining post-secondary or post-graduate degrees and report the results in the first two

columns of Table 9. The dependent variable in those columns is equal to 1 if a respondent holds a post-secondary or post-graduate degree and 0 otherwise. Only the 6-year and 5-year moving averages of North Korean provocation events are used as instruments. See the first stage results in table 16. As shown in the table, both the OLS and the IV models find no significant results. That means shorter conscription length does not affect an individual's chance of obtaining a post-secondary degree. As Toyryla (2023) points out, most Korean males complete their military service 1 or 2 years after they start university. Korean males rarely complete their military service after university graduation. According to Enthoven (2013), even those who go to universities overseas complete their mandatory military service during their university years.

Table 9: Conscription Lengths and Educational Attainment

Dependent variable: Respondent holds the following degrees				
	Post-secondary degree or above		Post-graduate degree	
Variables	(1) 6-year MA	(2) 5-year MA	(3) 6-year MA	(4) 5-year MA
Service length	-0.001	0.014	-0.031***	-0.030***
	(0.020)	(0.021)	(0.010)	(0.009)
Weak identification test	13.25	12.78	13.25	12.78
Observations	30,026	30,030	30,026	30,030
R-squared	0.415	0.403	0.070	0.091

Note: The dependent variable in the first two columns is equal to 1 if a respondent holds a post-secondary or above and 0 otherwise. The dependent variable in the last two columns is equal to 1 if a respondent holds a post-graduate degree and 0 otherwise. The instruments are the 6-year and 5-year moving averages (MA) of North Korean provocations prior to conscription. Service length is measured in months. All models controlled for age, age of conscription, military spending for each cohort, class, and type of a respondent's job. Year and region fixed effects were also included. The standard errors are clustered by the survey years and the years when conscription started. See the first stage results in 16.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Although South Korean males' chance of going to college is not affected by the lengths of their military service, it is still possible that their chance of obtaining a post-graduate degree may be affected. Since most Korean men

finish their CMS during university, a longer duration of conscription can lead to more human capital depreciation on knowledge acquired from university courses. Such loss of human capital during university may seriously lower their grades, desire for a post-graduate degree, and chance of being admitted into a graduate school. I study whether longer conscription length affects people's chance of finishing graduate school and report the results in columns 3 and 4 of Table 9. I find that service length has a negative and significant effect on a conscript's chance of obtaining a post-graduate degree. An additional month of military service lowers an individual's chance of obtaining a post-graduate degree by about 3.1 percentage points. The unsurprising results confirm that longer breaks during one's education may lead to human capital depreciation.

Serving a longer term in the military does not hurt a conscript's chance of finishing college or chance of employment. However, a longer service in the military does lower his chance of obtaining a post-graduate degree. Ultimately, an individual has to do well in their undergraduate career to enter graduate school. The human capital depreciation may severely lower their GPA and prevent them from entering and finishing graduate school. In all, longer breaks only appear to affect an individual's chance of finishing graduate school because most people complete their military service during university.

6 Conclusion

There is a paucity of literature on the mechanism through which conscription affects labor market outcomes and educational attainment. By studying how conscription length affects those outcomes, I am able to control for the signaling effect and focus on the changes in human capital due to changes in conscription length. Using North Korean provocation events as an instrumental variable and data from South Korea, I find the length of conscription does not have an effect on the income, the chance of obtaining post-secondary degrees, or the employment status of conscripts. However, conscripts' chance of obtaining a post-graduate degree is lower when the conscription length is longer.

The results suggest that conscription affects labor market outcomes primar-

ily by sending positive signals about veterans to prospective employers. Since longer breaks from work or study will cause human capital depreciation, a longer mandatory military service can certainly be costly and has few benefits to conscripts even during peacetime. However, the results also suggest that such costs hardly impact labor market outcomes and are primarily borne by those who seek to pursue post-graduate degrees. For countries that already have conscription and are suffering from a shortage of military personnel, the findings of this paper suggest that those countries can slightly increase the lengths of their compulsory military service without ruining conscripts' labor market prospects. Additionally, exceptions should be made for those pursuing post-graduate degrees.

In the Russo-Ukrainian War, both sides relied heavily on conscripts. On the other side of the world, the U.S. and Canadian armed forces are beginning to have recruitment shortages in 2023. While conscription may be on its way out, recruitment shortages and possible future high-intensity armed conflicts can force countries to reconsider their positions on conscription. The findings of this paper can help governments with their cost-benefit analysis of the adoption or abolishment of the institution.

References

Ari, B. P. (2019). Changes in military service period in the past (history of change) and the reason. https://agibbyeongari.tistory.com/303.

Bauer, T. K., Bender, S., Paloyo, A. R., and Schmidt, C. M. (2012). Evaluating the labor-market effects of compulsory military service. *European Economic Review*, 56(4):814–829.

Bingley, P., Lyk-Jensen, S. V., and Rosdahl, A. (2022). Military service and skill acquisition: Evidence from a draft lottery. *Journal of Human Capital*, 16(3):404–436.

CSIS (2019). Database: North Korean Provocations - Beyond Parallel — beyondparallel.csis.org. https://beyondparallel.csis.org/database-north-korean-provocations/. [Accessed 17-09-2023].

Enthoven, J. (2013). Korean students balance military service, academics — stanforddaily.com. https://stanforddaily.com/2013/04/08/korean-students-balance-military-service-academics/. [Accessed 21-09-2023].

Hjalmarsson, R. and Lindquist, M. J. (2019). The causal effect of military conscription on crime. *The Economic Journal*, 129(622):2522–2562.

Hofverberg, E. (2022). FALQs: The Conscription System of South Korea | In Custodia Legis — blogs.loc.gov. https://blogs.loc.gov/law/2022/12/falqs-the-conscription-system-of-south-korea/. [Accessed 26-02-2024].

Huntington-Klein, N. (2021). Human capital versus signaling is empirically unresolvable. *Empirical Economics*, 60(5):2499–2531.

KLI (2022). Klips — kli.re.kr. https://www.kli.re.kr/klips_eng#secondPage. [Accessed 17-09-2023].

Lee, D. and Jung, Y. (2020). The effectiveness of military service experience on job experience. *Journal of Advances in Military Studies*, 3(3):91–112.

Lee, M. (2022). [WHY] South Koreans and their apparent lack of concern over their northern neighbors. https://koreajoongangdaily.joins.com/2022/08/27/national/northKorea/Korea-North-Korea-nuclear-weapons/20220827070006818.html.

Lim, H. (2018). Compulsory military service, civilian wages, and retirement decision: Evidence from korean individual-level data. *International Journal of Manpower*, 39(1):106–132.

Puhani, P. A. and Sterrenberg, M. (2021). Effects of mandatory military service on wages and other socioeconomic outcomes.

Savcic, R., Theodoropoulos, N., and Xefteris, D. (2023). Conscription and educational outcomes. *Journal of Population Economics*, pages 1–26.

Toyryla, L. (2023). Military Service in Korea — 90daykorean.com. https://www.90daykorean.com/military-service-in-korea/#:~:text=Typically%2C%20Korean%20men%20will%20first,they%20start%20their%20military%20service. [Accessed 17-09-2023].

Wallace, R. D. (2016). *North Korea and the Science of Provocation: Fifty Years of Conflict-Making.* McFarland.

WB (2022). World Bank Open Data — data.worldbank.org. https://data.worldbank.org/indicator/MS.MIL.XPND.GD.ZS?locations=KR. [Accessed 17-09-2023].

Appendix A First Stage Results

Table 10: Conscription Lengths and Income

	Instruments		
	(1)	(2)	(3)
Variables	No. of NK provocation events		
6-year moving average	0.309***		
	(0.089)		
5-year moving average		0.257***	
		(0.076)	
4-year moving average			0.165**
			(0.074)
Age	0.248***	0.264***	0.291***
	(0.029)	(0.024)	(0.023)
Log military spending as % of GDP	-0.525	-0.838	-1.515**
	(0.840)	(0.703)	(0.672)
Level of education (schooling)	0.213*	0.210*	0.205*
	(0.116)	(0.117)	(0.117)
Work status (wage/ non-wage)	0.088	0.091	0.085
	(0.197)	(0.196)	(0.196)
Age conscripted	-0.424***	-0.437***	-0.457***
	(0.073)	(0.073)	(0.073)
F-statistic	12.05	11.29	4.964
Observations	31,226	31,230	31,230

Note: region, year, and all job fixed effects were omitted.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 11: Individual Fixed Effects

Variables	Instruments		
	(1)	(2)	(3)
	No. of NK provocation events		
6-year moving average	0.324***		
	(0.089)		
5-year moving average		0.270***	
		(0.075)	
4-year moving average			0.169**
			(0.074)
Age	0.238***	0.255***	0.285***
	(0.030)	(0.025)	(0.026)
Log military spending as % of GDP	-0.330	-0.665	-1.412**
	(0.853)	(0.700)	(0.712)
Level of education (schooling)	0.205*	0.200*	0.195
	(0.119)	(0.120)	(0.119)
Work status (wage/ non-wage)	0.849*	0.849*	0.854*
	(0.467)	(0.453)	(0.444)
Age conscripted	-0.429***	-0.443***	-0.466***
	(0.075)	(0.076)	(0.077)
F-statistic	13.14	12.92	5.266
Observations	30,025	30,029	30,029

Note: region, year, industry, and job fixed effects were omitted.
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Parsimonious Models

Variables	Instruments		
	(1)	(2)	(3)
	No. of NK provocation events		
6-year moving average	0.309***		
	(0.078)		
5-year moving average		0.239***	
		(0.064)	
4-year moving average			0.161***
			(0.059)
Age	0.311***	0.332***	0.356***
	(0.029)	(0.024)	(0.023)
Log military spending as % of GDP	-3.579***	-4.025***	-4.619***
	(0.812)	(0.683)	(0.657)
Level of education (schooling)	0.581***	0.577***	0.573***
	(0.151)	(0.151)	(0.151)
Work status (wage/ non-wage)	1.028	1.032	1.028
	(0.693)	(0.683)	(0.681)
Age conscripted	-0.701***	-0.719***	-0.739***
	(0.092)	(0.091)	(0.091)
F-statistic	15.59	13.95	7.547
Observations	32,729	32,733	32,734

Note: region, year, industry, and job fixed effects were omitted.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 13: Results by Education Level

Variables	High school or below	Post-secondary or above
	(1)	(2)
	No. of NK provocation events	
5-year moving average	0.220**	0.329***
	(0.0890)	(0.0891)
Log military spending as % of GDP	-1.900*	0.201
	(1.142)	(1.007)
Level of education (schooling)	1.691***	-0.111
	(0.457)	(0.224)
Work status (wage/ non-wage)	0.249	-0.217
	(0.329)	(0.220)
Age conscripted	-0.441***	-0.377***
	(0.107)	(0.0972)
Age	0.331***	0.222***
	(0.0392)	(0.0364)
F-statistic	6.117	13.54
Observations	13,959	17,271

Note: region, year, and all job fixed effects were omitted.
*** p<0.01, ** p<0.05, * p<0.1

Table 14: Results by Type of Jobs

	Office	Non-office
	(1)	(2)
Variables	No. of NK provocation events	
5-year moving average	0.315***	0.238***
	(0.085)	(0.076)
Log military spending as % of GDP	0.877	-1.991**
	(0.864)	(0.825)
Level of education (schooling)	-0.121	0.567***
	(0.126)	(0.177)
Work status (wage/ non-wage)	-0.028	0.557*
	(0.379)	(0.303)
Age conscripted	-0.383***	-0.450***
	(0.094)	(0.099)
Age	0.194***	0.315***
	(0.029)	(0.033)
F-statistic	13.76	9.904
Observations	14,296	15,733

Note: region, year, and all job fixed effects were omitted.
*** p<0.01, ** p<0.05, * p<0.1

Table 15: Conscription Lengths and Employment Status

	Instruments		
Variables	(1)	(2)	(3)
	No. of NK provocation events		
6-year moving average	0.311***		
	(0.089)		
5-year moving average		0.259***	
		(0.077)	
4-year moving average			0.167**
			(0.074)
Log military spending as % of GDP	-0.488	-0.808	-1.488**
	(0.842)	(0.703)	(0.673)
Level of education (schooling)	0.214*	0.211*	0.207*
	(0.116)	(0.117)	(0.116)
Age conscripted	-0.422***	-0.435***	-0.456***
	(0.073)	(0.073)	(0.073)
Age	0.247***	0.263***	0.291***
	(0.029)	(0.024)	(0.023)
F-statistic	12.33	11.44	5.070
Observations	31,226	31,230	31,230

Note: region, year, and all job fixed effects were omitted. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 16: Conscription Lengths and Educational Attainmen

Variables	Post-secondary degree or above		Post-graduate degree	
	(1)	(2)	(3)	(4)
	No. of NK provocations events			
6-year moving average	0.304***		0.304***	
	(0.088)		(0.088)	
5-year moving average		0.254***		0.254***
		(0.077)		(0.077)
		(0.074)		
Log military spending as % of GDP	-0.428	-0.736	-0.428	-0.736
	(0.858)	(0.720)	(0.858)	(0.720)
Work status (wage/ non-wage)	0.095	0.098	0.095	0.098
	(0.196)	(0.195)	(0.196)	(0.195)
Age conscripted	-0.400***	-0.413***	-0.400***	-0.413***
	(0.073)	(0.073)	(0.073)	(0.073)
Age	0.237***	0.253***	0.237***	0.253***
	(0.029)	(0.024)	(0.029)	(0.024)
F-statistic	13.25	12.78	13.25	12.78
Observations	31,228	31,232	31,228	31,232

Note: region, year, and all job fixed effects were omitted.   *** $p<0.01$, ** $p<0.05$, * $p<0.1$