I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 17938

The Effects of Exposure to a Large-Scale Recession on Higher Education and Early Labor Market Outcomes

Eleanor Jawon Choi
Jisoo Hwang
Hyelim Son

MAY 2025

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 17938

The Effects of Exposure to a Large-Scale Recession on Higher Education and Early Labor Market Outcomes

Eleanor Jawon Choi
Hanyang University and IZA

Jisoo Hwang
Seoul National University

Hyelim Son
University of Seoul

MAY 2025

Any opinions expressed in this paper are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but IZA takes no institutional policy positions. The IZA research network is committed to the IZA Guiding Principles of Research Integrity.

The IZA Institute of Labor Economics is an independent economic research institute that conducts research in labor economics and offers evidence-based policy advice on labor market issues. Supported by the Deutsche Post Foundation, IZA runs the world's largest network of economists, whose research aims to provide answers to the global labor market challenges of our time. Our key objective is to build bridges between academic research, policymakers and society.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

The Effects of Exposure to a Large-Scale Recession on Higher Education and Early Labor Market Outcomes*

This study examines the effects of timing of exposure to the Asian financial crisis on higher education and early labor market outcomes. We estimate a generalized difference-in-differences model exploiting variation in age at exposure and regional severity of the recession in South Korea. Using the Census and Youth Panel data, we find that individuals from hardhit regions are less likely to attain a college education, tend to shift away from humanities to STEM majors, and have lower-quality first jobs, than their peers in the same cohort. These effects are more pronounced among individuals who experienced the recession at younger ages.

JEL Classification: E32, I21, J24

Keywords: economic crisis, college education, college major, early labor market outcomes

Corresponding author:
Eleanor Jawon Choi
College of Economics and Finance
Hanyang University
222 Wangsimni-ro
Seongdong-gu
Seoul 04763
South Korea

E-mail: choiej@hanyang.ac.kr

* We thank Taehyun Ahn, Doug Almond, Silvia Barcellos, Leandro Carvalho, Jiwon Choi, Eunice Han, Dae-il Kim, Jinyoung Kim, June Kim, Italo López García, Charly Porcher, Kjell Salvanes, Seung Gyu Sim, and seminar and conference participants at AASLE, AEA, Hanyang University, Hitotsubashi University, Korea Empirical Applied Microeconomics Conference, KLEA, Korea Labor Institute, Princeton Industrial Relations Section Centenary Symposium, Seoul Labor Economics Working Group, SNU-UCSD Joint Webinar, SOLE, USC Center for Economic and Social Research, and WEAI for helpful comments and discussions. Elizabeth Kayoon Hur, Heebeom Song, Kyuseob Yu, and especially Dokyun An and Chae Lee, provided excellent research assistance. Part of the work on this paper was completed while Choi was visiting the USC Center for Economic and Social Research. Choi acknowledges financial support from Hanyang University (HY-202300000003624). Hwang acknowledges financial support from Creative-Pioneering Researchers Program through Seoul National University. All errors are our own.

1 Introduction

The effect of recessions on individual's educational attainment is theoretically ambiguous. For high school or college students, economic downturns could lead to an increase in college or graduate school attendance due to reduced labor market opportunities. On the other hand, their enrollment may decrease due to lower household income and credit constraints. For younger children, their future educational attainment can be affected through the effect of the recession on their parents or neighborhood. A severe recession may increase parental time due to unemployment, but it may also lead to reduced material investments at the household or community level. The dominant mechanism and how it could vary by individual's age at the time of the recession are thus questions that need to be answered empirically.

This paper studies the effect of timing of exposure to a large-scale recession on educational attainment and subsequent early labor market outcomes. We exploit variation in age at exposure and regional labor market shocks from the 1997–1998 Asian financial crisis (AFC) in South Korea. The AFC provides a valuable setting because it not only triggered the worst recession in South Korea's history since the Korean War, but was also very sudden and sharp, with relatively stable economic conditions both before and after. We investigate whether individual's age at exposure to the AFC affects college outcomes at the extensive (enrollment and graduation) and intensive (type and major) margins, employment probability, and quality of the first job. We also explore possible mechanisms by examining other household and regional outcomes.

We use data from the Census and twenty waves of the Youth Panel to analyze a nationally representative sample of young men and women in South Korea born between 1968 and 1996 (age 1–29 at the time of AFC). We estimate a generalized difference-in-differences model exploiting variation in age at exposure to the AFC within regions (or, equivalently, within-cohort regional variation in the AFC shock). The severity of the AFC shock is measured by the sharp increase in the unemployment rate between 1997 and 1999 in the region where the individual was born or lived at age 14. The key identifying assumption is that across-cohort differences in educational and early career outcomes between regions with more vs. less severe AFC shocks are driven by the the

AFC-triggered recession rather than by confounding factors.

We find negative effects of the AFC on higher educational attainment. Individuals from regions more severely affected by the recession are less likely to attend and graduate from four-year colleges than their peers in the same cohort. The impacts on four-year college education are larger for cohorts who experienced the crisis at a younger age. We also find intensive margin effects regarding college majors. Conditional on college enrollment, exposure to the AFC resulted in a significant decrease in humanities and a slight increase in STEM major selection.

For early labor market outcomes, while we find no effect on employment probability, the quality of the first job deteriorates for those who grew up in regions more severely affected by the crisis. Specifically, we find a decrease in earnings in their first job and a lower probability of being employed in a large firm or holding a white-collar position. The adverse effects of the recession on initial earnings and the likelihood of having a white-collar first job are more pronounced among individuals who were younger (under age 13) at the time of the recession.

We assess the validity of our identification strategy by examining various possible scenarios involving non-parallel region-specific cohort trends. The identification assumption would be violated if there is endogenous selection across regions within each cohort or if region-specific time-varying unobserved factors are confounded with the severity of the AFC. Specifically, we explore the possibility of endogenous selection into the region of birth (or region at age 14), confounding pre-trends, confounding contemporaneous local labor market shocks, and non-random attrition. Each scenario is examined through a series of internal validity checks, including a placebo test on cohorts older than college graduation age during the AFC, investigation of potential selection on observables and unobservables through covariate balance checks and regression sensitivity analyses, use of alternative specifications to account for region-specific cohort trends, application of an alternative measure of recession severity, and implementation of alternative sample restrictions. The results of these exercises suggest that our recession effect estimates are unlikely to be driven by selection or confounding factors.

We also conduct additional analyses to better understand the channels through which the

AFC impacted children's long-term outcomes. We consider three possible mechanisms: reduced parental monetary investments, increased family distress, and a decline in community-level resources. Heterogeneity analysis by parents' education level and analysis of private out-of-school education spending provides no clear evidence of differential reduction in parental financial support by AFC severity. However, we find some suggestive evidence of a deterioration in parental health, a larger increase in the divorce rate due to financial reasons, and a slower growth in government spending per capita on K–12 education in regions that were affected more severely by the AFC. We thus conjecture changes in family well-being and the quality of neighborhoods or schools to be more relevant than adjustments in parental monetary investments in explaining the recession effect. Larger impacts on younger children may be due to their lack of contemporaneous labor market substitution effects, the existence of "critical" periods in human capital development, or their longer exposure to persistent aftereffects following the AFC.

There are two separate strands of related literature which study the effect of recessions on education and labor market outcomes, respectively. Research on the cyclicality of higher education finds mixed results, with some studies documenting countercyclical (Betts and McFarland, 1995; Rice, 1999; Card and Lemieux, 2001; Sievertsen, 2016; Charles et al., 2018) while others procyclical (Sakellaris and Spilimbergo, 2000; Bedard and Herman, 2008; Rao, 2016) patterns in the demand for higher education. These studies address contemporaneous effects of economic conditions on educational attainment. Research on the effect of recessions on labor market outcomes, on the other hand, study penalties experienced by young workers who graduate from college or high school at the time of the shock (Genda et al., 2010; Kahn, 2010; Hershbein, 2012; Oreopoulos et al., 2012; Kondo, 2015; Altonji et al., 2016; Kawaguchi and Kondo, 2020; Rothstein, 2023).[1] While not limited to immediate outcomes, these studies focus on labor market entrants.

A recession can have different impacts by individual's age at exposure, however, and with both short- and long-run consequences. We thus attempt to fill these gaps in the literature. First, we examine age-differential effects using more than twenty birth cohorts who experienced the AFC

[1] In the context of the South Korean labor market, Choi et al. (2020) studies the long-term effects of college graduation during the Asian financial crisis.

during childhood, adolescence, or young adulthood. Second, unlike many prior studies which focus on the effect of recessions on either education or labor market outcomes, we examine them together in a unified setting. We are thus able to present a more holistic picture of how a large-scale recession impacts individuals from schooling to their first job.

In these aspects, our paper contributes to the emerging literature on the long-run effects of a recession by age at exposure. There are only a few prior studies in this area, among which Stuart (2022) is the most closely related. He exploits variations across counties and age at the time of the 1980–1982 recession in the U.S., and finds negative effects on four-year college degree attainment and earnings in adulthood, larger for those who were younger (ages 0–13 than ages 14–19) at the time of the recession.[2] We go beyond this work, however, by further exploring potential behavioral responses to and the mechanisms underlying the observed effects. Examining changes in college major choice and private education spending, for instance, provide insight on how individuals and households may respond to mitigate adverse impacts from economic downturns. Using parental characteristics and regional data, we also provide suggestive evidence that changes in parental monetary investment are not the main channel driving the negative recession effects on education and labor market outcomes.

Lastly, our paper complements research documenting the relationship between early-childhood environment and adult outcomes in general. Beyond the context of recessions, there is a large literature on the short and long-run effects of exposure to various shocks in early ages on future earnings or health (Almond et al., 2018). Research on the life-cycle approach to skill formation finds that children's development depends not only on total investment but also on its timing (Cunha et al., 2006; Heckman and Mosso, 2014). We provide evidence related to this line of work by showing age-differential effects of a large-scale recession on children's future higher education and early labor market outcomes.

[2]Rao (2016) also finds that macroeconomic shocks experienced before age 15 have a negative impact on educational attainment in the U.S. However, his study does not explicitly delve into how the effects of these shocks vary by age at exposure. Duque and Schmitz (2023) show that exposure to the Great Depression in utero or before age 3 is associated with a significant deterioration in economic and health outcomes after midlife in the U.S. While they do not find any noticeable effect of exposure during childhood or adolescence, they have not investigated the consequences of exposure after age 16.

The remainder of the paper is organized as follows. Section 2 provides background on the impact of the Asian financial crisis in South Korea. Section 3 describes the Census and Youth Panel data and explains our identification strategy. Section 4 presents the estimation results on education and early labor market outcomes and examines the internal validity of these results. In Section 5, we discuss potential mechanisms. Section 6 concludes.

2 Background on the Asian Financial Crisis in South Korea

Throughout the early 1990s, foreign creditors held an optimistic outlook on East Asia's growth potential, leading to an influx of foreign capital into the region. However, capital inflows and market confidence abruptly reversed with the collapse of the Thai baht in July 1997. This event led to widespread financial turmoil throughout Asia, which became known as the Asian financial crisis (AFC). The AFC triggered the worst recession in South Korea's history since the Korean War, and remains so to date as its labor market conditions were largely unaffected even during the Great Recession (Lee, 2020).

The AFC-driven recession in South Korea provides an empirically advantageous setting for identifying the long-term effects of an economic downturn, because it was a large and unexpected shock to the economy, with varying degrees of impact across the country. Until the onset of the crisis, a rapid financial meltdown was unanticipated in South Korea given its solid fundamentals (Radelet and Sachs, 1998): there was a sustained annual GDP growth rate of 6–10%, unemployment rates were below 3%, inflation rates were stable around 5%, and public debt remained below 11% of GDP (Baliño and Ubide, 1999). However, the currency crisis had a devastating impact on the South Korean economy, largely due to its heavy reliance on short-term loans.[3] In November 1997, the government resorted to requesting financial assistance from the International Monetary Fund. By the end of December 1997, seven of the top 30 conglomerates (*chaebols*) either sought court protection or went into bankruptcy (Baliño and Ubide, 1999). The failure of these large

[3]Between 1993 and the end of September 1997, short-term external debt rose from 40 billion USD to 98 billion USD, accounting for 54% of the total external liabilities (Chopra et al., 2001).

firms, coupled with foreign investors' pessimism, resulted in a deterioration of financial institutions (Rhee and Lee, 2012), leading to a credit crunch that significantly impacted small and medium-sized enterprises (SMEs).[4] Massive layoffs and restructuring at both large firms and SMEs left many workers displaced, with the number of unemployed workers surpassing 1.4 million by 1999 (Cho and Keum, 2004).

Figure A1 documents the magnitude of macroeconomic shocks in terms of national unemployment rates and real GDP growth rates. Between 1997 and 1999, the unemployment rate soared from the pre-crisis level of 2.6% in Q4 1997, to a peak of 8.5% in Q1 1999. The real GDP growth rate fell dramatically from 4.2% in Q4 1997 to −3.4% in Q1 1998 and further to −7.3% in Q2 1998. The GDP growth rate quickly recovered to over 10% in 1999, and the unemployment rate began to decline in 1999 and stabilized at an average of 3.5% from 2001.

[Figure 1 here]

The severity of these impacts, however, was unequal across regions.[5] Figure 1 exhibits the variation in recession severity across 16 regions, measured by the difference in the annual unemployment rate between 1997 and 1999 in each region (ΔUR_r^{97-99}).[6] The difference ranges from 2.5 to 5.0 percentage points. The jump in the unemployment rate was particularly large in the Northwest and Southeast. The differing impacts of the crisis were partly due to disparities in industrial structure. For instance, areas that specialized in traditional manufacturing such as food and textiles (e.g., Busan and Daegu in the Southeast) were severely affected, as the crisis reinforced existing trends of declining labor-intensive industries (Hassink, 1999; OECD, 2001). The Ulsan indus-

[4]Bankruptcy filings of SMEs nearly doubled from 11,600 to 22,800 between 1996 and 1998 (Gregory et al., 2002).

[5]Regions refer to major administrative divisions, which include nine provinces (Gyeonggi, Gangwon, North Chungcheong, South Chungcheong, North Jeolla, South Jeolla, North Gyeongsang, South Gyeongsang, and Jeju) and seven major cities (Seoul, Busan, Daegu, Incheon, Gwangju, Daejeon, and Ulsan). Geographically, South Korea is about the same size as the state of Indiana, and each administrative division is comparable to a commuting zone in the U.S.

[6]Regional unemployment rates are calculated from the labor force statistics using the size of the working age population, employment-population ratio, and the number of people in the labor force by region. The regional labor market data are compiled by Statistics Korea from the Economically Active Population Survey (EAPS), which is comparable to the U.S. Current Population Survey. Note that there is no systematic association between the size of the AFC shock and its persistence, measured by the change in the average level of unemployment rate before and after the AFC.

trial complex (on the Southeastern coast) suffered as production in the car industry dropped by 43.8% in 1998 compared to the previous year. On the other hand, unemployment rates increased dramatically in the Seoul metropolitan area (in the Northwest), which had high concentrations of independent SMEs. *Chaebols* cut orders from subcontractors as a form of retrenchment and banks also prioritized larger enterprises during the crisis because their own risk of bankruptcy was more closely linked to large firms than SMEs (Hassink, 1999; OECD, 2001).

3 Data and Method

3.1 Data and Analysis Sample

We construct two analysis samples using data from the Population and Housing Census (Census) and the Youth Panel (YP). First, we use the 2% sample of the 2020 Census to examine educational attainment of 1968–1996 birth cohorts who were 1–29 years old at the onset of the AFC in 1997. The Census is conducted by Statistics Korea every five years to collect information on population, households, and housing characteristics. Our analysis sample includes 369,816 individuals born in South Korea, and their region of birth is used to link to the regional recession severity measure (Figure 1).

Second, we use annual longitudinal surveys from the YP to study college education and early labor market outcomes of individuals exposed to the AFC at ages 1–25. The YP data are maintained and released by the Korea Employment Information Service, which operates under the Ministry of Employment and Labor. The structure of the YP is comparable to the National Longitudinal Surveys in the U.S. Currently, two panel studies have been completed: six waves of YP2001 and fourteen waves of YP2007, which correspond to survey years 2001–2006 and 2007–2020, respectively. Because different birth cohorts are interviewed in the YP2001 and YP2007, we combine the two datasets and construct a sample of 13,878 individuals born between 1972 and 1996. The 1972–1977 birth cohorts are from YP2001, and the 1978–1996 birth cohorts are from YP2007.[7]

[7]The 1994–1996 birth cohorts were added to YP2007 in 2015 (wave 9) and followed up through 2020.

From the YP's longitudinal information, we construct cumulative variables on individuals' post-secondary education and labor market outcomes as of the last wave of the survey. The YP respondents were 24–42 years old at the last wave, i.e., wave 6 of YP2001 and wave 14 of YP2007. Because the YP contains information on region of residence at age 14 (and not region of birth), we restrict our sample to individuals who lived in South Korea at age 14 and merge it with the regional recession severity measure using region of residence at age 14.

There are a few notable features of the two samples constructed from the Census and YP data. First, birth region is available in the Census but not in the YP. Thus, we use region of residence at age 14 as a proxy for region of birth when analyzing the YP sample. Second, those born before 1972 are surveyed in the Census but not in the YP, which makes the 1972 birth cohort the oldest group in the YP sample. Third, college major choices are observed only in the YP. Lastly, labor market outcomes are comparable across cohorts in the YP sample, but not in the Census sample, because the Census shows a snapshot only every five years and therefore labor market outcomes of individuals are measured at different levels of experience.

[Table 1 here]

Table 1 shows summary statistics of the key variables used in our analysis. On average, the regional unemployment rate increased by about 3.6 percentage points during the AFC. Over 98% of both samples have graduated from high school, over 70% have ever attended college, and over 62% have a college degree. Because secondary education is almost universal in South Korea, higher education is recognized as a critical determinant of economic success. After completing their education, 85% of the YP sample find employment during the analysis period, among which 63% hold a white collar occupation as their first job.

3.2 Empirical Strategy

We estimate a generalized difference-in-differences (DID) model similar to Stuart (2022), exploiting variation in age at exposure to the AFC within regions (or, equivalently, within-cohort regional

variation in the AFC shock). The regression model is specified as follows:

$$y_i = \sum_{c<29} \beta_c AFC_r \times 1[\text{Age in 1997} = c] + \mathbf{X}_i'\boldsymbol{\gamma} + \delta_c + \lambda_r + \theta_{a(r)} \times c + \varepsilon_i, \tag{1}$$

where y_i is the educational or labor market outcome of person i who was c years old in 1997 and born in region r. AFC_r represents recession severity in region r induced by the Asian financial crisis and is measured by the sharp increase in the regional unemployment rate between 1997 and 1999, ΔUR_r^{97-99}. A vector of person i's predetermined characteristics $\mathbf{X}_i$ controls for person i's demographic characteristics and family background, such as sex and parents' educational attainment. Cohort fixed effects δ_c capture nationwide changes across cohorts in initial human capital endowments, educational environment, labor market conditions, and related government policies. Time-invariant differences in these factors across regions are absorbed by region fixed effects λ_r. We also include area-specific linear cohort trends, $\theta_{a(r)} \times c$, to account for cohort-level changes in outcomes and potential confounding factors that may vary across areas, with each area comprising multiple regions.[8][9] ε_i is an error term representing the remaining unobserved determinants of the outcome.

The parameters of interest are the coefficients β_c's on the interaction terms between the main treatment variables, AFC_r and cohort dummies. We use 29-year-olds in 1997 (i.e., 1968 birth cohort) as the reference group in the DID analysis. Hence, β_c measures the effect of exposure to a one percentage point larger increase in the regional unemployment rate during the AFC on individuals who were age c in 1997, relative to those who were age 29 in 1997.

Although β_{29} cannot be identified in regression model (1) by construction, β_{29} is unlikely to be different from zero for college education outcomes given that age 29 is beyond the college grad-

[8]We group multiple adjacent regions into six areas based on widely recognized traditional and cultural distinctions: 1) Gyeonggi, Seoul, and Incheon; 2) Gangwon; 3) North Chungcheong, South Chungcheong, and Daejeon; 4) North Jeolla, South Jeolla, and Gwangju; 5) North Gyeongsang, South Gyeongsang, Busan, Daegu, and Ulsan; and 6) Jeju. To avoid over-controlling, we use area-specific cohort trends instead of region-specific cohort trends. Other related studies, such as Stuart (2022) and Duque and Schmitz (2023), also control for cohort-specific trends at a broader geographic level than the primary treatment variable.

[9]We obtain similar results when we use a quadratic, instead of linear, function of age in 1997 to construct area-specific cohort trends (i.e., $\theta_{a(r)} \times c^2$).

uation age for most individuals. In Section 4.1, we show that β_c's for the educational attainment of those aged 25–28 in 1997 are precisely zero and therefore statistically indistinguishable from β_{29}. This result suggests that individuals aged 25 and older are effectively "untreated" cohorts when analyzing higher educational outcomes, and thus a valid reference group. For labor market outcomes, on the other hand, β_{29} may be different from zero and is likely to be negative, given that young workers experience earnings losses during a recession (e.g., Rinz, 2022; Rothstein, 2023; Salvanes et al., forthcoming). If $\beta_{29} < 0$, any negative estimates of β_c would understate the true recession effect on cohort c.

In the analysis using the YP sample, we estimate a slightly modified version of equation (1) due to limitations of the YP data. First, we construct the regional unemployment spike, ΔUR_r^{97-99}, using region at age 14 as a proxy for birth region, as aforementioned. Second, we use individuals who were 25 years old in 1997 (i.e., 1972 birth cohort) as the reference group because they are the oldest cohort in the YP. In Section 4.1, we provide evidence that these modifications are unlikely to bias our estimates.

When we report the estimated AFC effects, $\hat{\beta}_c$'s, in the subsequent tables and figures, we combine adjacent cohorts to improve precision and ease of exposition: for instance, $\hat{\beta}_{1-3}$, $\hat{\beta}_{4-6}$, $\hat{\beta}_{7-9}$, $\hat{\beta}_{10-12}$, $\hat{\beta}_{13-15}$, $\hat{\beta}_{16-18}$, $\hat{\beta}_{19-21}$, $\hat{\beta}_{22-24}$, and $\hat{\beta}_{25-28}$. In the regression analysis, observations are weighted using individual sample weights provided in the Census or YP data.[10] Standard errors are clustered at the cohort-by-region level, which corresponds to the level of variation in the main treatment variables, $AFC_r \times 1[\text{Age in 1997} = c]$.[11]

The key identifying assumption is that across-cohort differences in educational and early career outcomes between regions with more vs. less severe AFC shocks are attributed to the AFC-driven recession rather than to confounding factors. Given that the regression includes area-specific linear cohort trends along with cohort and region fixed effects, the main potential threats to the identification strategy are any remaining non-parallel region-specific cohort trends. These could arise

[10] Results remain similar in unweighted regressions.

[11] Recent research on statistical inference shows that the level of standard error clustering should be determined based on the (quasi-)experimental design. If treatment assignment is made across certain groups, clustering at this group level can, in general, be justified (Abadie et al., 2023).

from endogenous selection across regions within each cohort or from region-specific time-varying unobserved factors confounded with recession severity across regions. For example, if individuals (from the same cohort) are negatively selected in regions with large AFC shocks, the recession effect would be biased downward, overstating any negative impact. We investigate the internal validity of our empirical strategy and establish a causal interpretation of the results in Section 4.3. In particular, we examine the possibility of endogenous selection into the region of birth (or region at age 14), confounding pre-trends, confounding contemporaneous local labor market shocks, and non-random attrition.

4 Results

4.1 Education Outcomes

This section examines the effect of AFC exposure on college education, focusing on outcomes such as enrollment, graduation, and major choice. Individuals in the Census sample are between 24 and 52 years old in the 2020 survey year, while those in the YP sample are between 24 and 42 years old in the final wave (wave 6 of YP2001 in 2006 and wave 14 of YP2007 in 2020). Most individuals in these age ranges have already made their decisions regarding higher education.

We first investigate the effect of the recession on total years of education. Figure 2 plots the estimated effect of the AFC by age in 1997, i.e., $\hat{\beta}_c$'s, using the Census. Compared to the reference group (those who were 29 years old in 1997), the effects are negative and statistically significant, particularly for those who were younger at the time of the recession. A one percentage point larger increase in the regional unemployment rate during the AFC lowers educational attainment by 0.28 years for individuals who were ages 1–3 in 1997, relative to those who were age 29. The effects become smaller in magnitude across cohorts until it becomes statistically indistinguishable from zero by age group 19–21 in 1997. The severity of the recession does not have a significant impact on years of education for individuals who were already in their twenties in 1997, as most of them would have already made their educational decisions by then.

[Figure 2 here]

Given that nine years of elementary and middle school are compulsory and high school enrollment rate is 99% in South Korea, we expect that the result in Figure 2 is coming from higher education. In Figure 3, we therefore look at the effects for college attendance (panel A) and graduation (panel B). The AFC significantly dampened future college attendance and graduation rates for those who were below age 22 in 1997, by about 2 to 7 percentage points for a one percentage point larger regional unemployment shock. We find larger negative effects on those exposed to the AFC at younger ages, and this cohort pattern is mainly driven by a reduction in four-year college education. Recession effect estimates for two-year college outcomes show no distinct pattern of cohort heterogeneity among individuals who experienced the AFC before age 22.

[Figure 3 here]

Before exploring further outcomes in the YP data, we replicate the analysis on educational attainment using the YP sample to ensure comparability with the Census. Figure 4 shows the result on college attendance (panel A) and graduation (panel B) using both Census and YP samples. As noted above, the reference group in the YP sample consists of individuals who were 25 years old, instead of 29, in 1997. We thus plot the Census results separately, using two different reference groups: age 29 and age 25 in 1997. Since the recession effects are precisely zero for those aged 25–28 relative to 29-year-olds in 1997, the two sets of estimates are very similar regardless of the choice of reference group. This exercise also serves as a falsification test for our DID design, showing that there are no cohort trends confounded with recession severity for those beyond college graduation age in 1997.

The YP sample also shows that individuals more severely affected by the recession during childhood or youth are less likely to attend or graduate from college. The overall patterns are similar with the Census results, although recession effect estimates in the YP sample are less precise because of the smaller sample size. The similarity of the results between the two samples also confirms that using region at age 14 as a proxy for region of birth in the YP sample is unlikely

to bias our estimates. We also check comparability in results for two-year and four-year college outcomes separately and find similar patterns across samples (Figure A2).

[Figure 4 here]

Overall, both samples find significant negative effects of the recession on higher educational attainment, which are more pronounced for those exposed to the AFC under age 13. The negative effect on educational attainment may be due to reduced parental financial support, family-related stress, or broader neighborhood-level factors, which we explore in Section 5.1. In the Census sample, a one standard deviation larger AFC shock leads to a 4.5 percentage point decrease in the college graduation rate (7.2% of the dependent variable mean) for individuals under age 13 in 1997, relative to those who were age 29 in the same year.[12] The corresponding estimate from the YP sample is a 5.1 percentage point (7.8%) decrease. The magnitude of our estimates is in line with Stuart (2022), where a change in economic conditions of about one standard deviation leads to a 4.4 percentage point (10.7%) decline in college degree attainment among individuals exposed to the 1980–1982 recession at ages 0–10 in the U.S.[13]

Next, we investigate whether experiencing a large-scale recession also affects college major choice, conditional on college enrollment. College major selection is one of the most consequential decisions college students make, as it leads to significant earnings gaps even among those with the same level of education (Altonji et al., 2012).

Table 2 shows the regression results on indicator variables for each field of study—humanities, social sciences, STEM (science, technology, engineering, mathematics), and medicine. Here we combine age groups into two broader categories (ages 1–12 and 13–24), because we do not detect meaningful differences by age at exposure using our main specification (Figure A3). We find a decrease in humanities and social sciences majors (column 1) and a weak increase in STEMM

[12]The standard deviation of the unemployment spike is 0.790 in the Census sample and 0.746 in the YP sample (Table 1).

[13]Stuart (2022) measures recession severity as the decrease in log real earnings per capita between 1979 and 1982 in county of birth.

majors (column 4; STEM plus medicine) among those more severely affected by the AFC.[14] The decrease in humanities and social sciences majors is mainly driven by the decrease in humanities major (column 2), whereas the slight increase in STEMM is due to conventional STEM majors (columns 5).

[Table 2 here]

Because labor demand-driven shifts in college major quota cannot explain our result, the finding suggests that students more heavily affected by the recession gravitated towards relatively "practical" majors.[15] Observing or experiencing high unemployment during childhood or youth may have heightened their awareness of, and preference for, fields with better employment prospects and job security. The result is consistent with Blom et al. (2021), which find that college students choose more lucrative majors during economic downturns. Our result is distinct in that we find such patterns even among individuals who were much younger than college-going age at the time of the recession. The fact that students in South Korea must choose their major upon entering college (not during their undergraduate years) pushes the relevant age forward, but we find similar magnitudes even among those who were below age 13 in 1997 (Figure A3). This suggests that recessions can have more lasting impacts on students' field of study and consequently, their career paths, than what is known in the existing literature.

4.2 Early Labor Market Outcomes

In this section, we study the impact of AFC exposure on early labor market outcomes, such as the likelihood of employment and the quality of the first job. We focus on the first job after graduation, excluding part-time jobs during high school or college. All analyses are conducted using data from the YP.

[14] Medical school is offered at the undergraduate level in South Korea, so we consider medicine to be a STEMM major on par with traditional STEM majors.

[15] In South Korea, the Ministry of Education tightly regulates the admissions quotas of four-year colleges by major (Han, 2022). More importantly, nationwide changes in college admissions would be absorbed by cohort fixed effects in our model.

[Figure 5 here]

Figure 5 presents the effect of the recession on the extensive margin, measured by the probability of ever being employed after entering the labor market. We find that exposure to a larger AFC shock does not affect whether an individual finds employment. However, Figure A4 panel A provides suggestive evidence that individuals who were more severely affected by the crisis tend to start their first job earlier by about 0.5 years.[16] This accelerated labor market entry is consistent with lower college attendance and completion shown in Section 4.1. In panel B, we further examine how the recession influences the likelihood of having a first job by a certain age between 19 and 29.[17] The estimates suggest that a larger AFC shock increases the likelihood of obtaining a first job in the mid-20s, although this effect fades away by the late 20s, when most individuals have entered the labor market. The results are consistent with no effect on the likelihood of ever being employed.

[Figure 6 here]

In Figure 6, we examine how the AFC affects the quality of the first job in terms of earnings, firm size, and occupation type, among the employed. Earnings and firm size are commonly used as indicators of job quality, and occupation type represents the skill level of the job (white collar or blue collar). Panel A shows that individuals exposed to the AFC under age 13 generally earn lower monthly wages in their first job compared to those who were older in 1997.[18] On average, a one percentage point larger increase in the regional unemployment rate during the AFC is associated with a 5.5% decline in later earnings for the younger group, though the magnitude of this effect diminishes with age of exposure.[19] While the pattern of negative effects for younger cohorts appears

[16] Age of initial employment is right censored for individuals who never had a job after graduation. It is left censored for individuals whose starting year of first employment is missing but the ending year is recorded.

[17] Note that because the YP collects information on labor market outcomes at the time of the survey, we cannot examine employment at a specific age (or age range) for all cohorts in our sample. An exception is the first job, which is reported retrospectively.

[18] The results are qualitatively similar when monthly earnings are analyzed in levels instead of logs.

[19] Monthly earnings (before taking the logarithm) are in South Korean won (KRW) and inflation-adjusted to the 2020 value. 1 USD is worth approximately 1,400 KRW.

consistent with education outcomes, the estimates are not statistically significant, potentially due to measurement error in retrospectively reported starting wages in the YP data.[20]

Panel B shows the impact of the recession on the probability of being employed in a large firm. A large firm is defined as a firm with 300 or more employees, which is the criterion traditionally used by the Ministry of Employment and Labor and other government agencies to distinguish between SMEs and large firms.[21] We find that a one percentage point larger AFC shock is associated with approximately a 6 percentage point decrease in the likelihood of working at a firm with more than 300 employees (equivalent to 20% of the dependent variable mean) among those exposed to the AFC between ages 4 and 24, relative to the reference group. The negative effect is even larger in magnitude (10 percentage points) for youngest cohorts, who were 1 to 3 years old in 1997. The results are qualitatively similar when using alternative firm size cutoffs, such as more than 100, 500, or 1,000 employees (Figure A5).

As another measure of initial job quality, we consider the likelihood of having a white collar first job in panel C.[22] The estimates show that a one percentage point larger regional unemployment shock reduces the likelihood of holding a white collar job by 11.1 percentage points (17.5% of the dependent variable mean) for younger cohorts (under age 13 in 1997), compared with those who were age 25 at the time of the shock. For those who were between 13 and 24 years old in 1997, the effect is reduced to about half. We also investigate the impact of the recession on weekly hours of work, the likelihood of being a wage worker (as apposed to self-employed), and the likelihood of public sector employment, but generally find no significant effects.[23]

[20]Instead of exact initial starting wages for all individuals, the YP contains wage information within one year of starting work for 83% of the sample and within three years of starting work for 88% of the sample.

[21]For example, the Ministry of SMEs and Startups used the threshold of 300 employees to distinguish between SMEs and large firms until 2015. While the legal definition of SMEs is no longer based on the number of employees, a significant difference in job quality remains across the 300-employee threshold. For instance, the 2020 Survey on Labor Conditions by Employment Type reveals that employees in firms with less than 300 employees earn 61.8% of what employees in firms with more than 300 employees earn (Ministry of Employment and Labor, 2020).

[22]White-collar occupations include: 1) Business, administrative, financial, and insurance; 2) Research, engineering and technology; 3) Education, legal, social work, and public service; 4) Health and medicine; 5) Arts, design, broadcasting, and sports. Blue-collar occupations include: 1) Beauty, lodging, food, security, and cleaning; 2) Sales, transportation, and shipping; 3) Construction and mining; 4) Installation, maintenance, and industrial worker; 5) Agriculture and fisheries.

[23]Results are available upon request.

To summarize, while we do not observe an employment response to the recession, we do observe a deterioration in the quality of the first job. We also find that these effects tend to be more pronounced for those who were younger at the time of the recession, although the pattern is less distinct for firm size. Our estimates are comparable in magnitude to estimates from prior studies. We show an average 4.1% reduction in earnings for a one standard deviation increase in AFC severity among those exposed to the AFC during ages 1–12. Stuart (2022), for example, finds a 5.2% decline in earned income for a one standard deviation increase in recession severity among individuals age 0–10 at the time of the recession relative to the age group of 20–29. Chetty and Hendren (2018) find that growing up in a neighborhood one standard deviation better leads to about a 6.4–10.4% increase in adult income.

Heterogeneity in the recession effect on early labor market outcomes by age at exposure may be explained by the interplay of three forces: the direct labor market penalties during periods of economic downturn, the indirect effect resulting from the reduction in college education, and individuals' behavioral responses to the adverse shock. The direct labor market effect is documented in the scarring effect literature; entering the job market during a recession harms labor market outcomes for college graduates (Kahn, 2010; Oreopoulos et al., 2012; Altonji et al., 2016; Choi et al., 2020; Rothstein, 2023) and high school graduates (Genda et al., 2010; Hershbein, 2012). The indirect effect, on the other hand, operates through the effect of the recession on educational attainment. Individuals who already surpassed college entrance or graduation age by 1997 would thus be primarily subject to the direct effect than the indirect effect. Conversely, for those who experienced the recession before reaching typical college-going age, the adverse effect on labor market outcomes is more likely to be operating through indirect effects on their human capital accumulation rather than through immediate labor market penalties. Lastly, our finding from the previous section suggests that individuals' behavioral responses, such as selecting more remunerative college majors, could play a role in alleviating some of the recession effects.

4.3 Internal Validity

With cohort and region fixed effects, as well as area-specific cohort trends, included in our regressions, the primary threat to internal validity lies in any remaining non-parallel region-specific cohort trends that might be confounded with the severity of the AFC shock. We perform several tests to assess such a possibility, which could be due to endogenous selection into the region of birth (or region at age 14), confounding pre-trends, confounding contemporaneous local labor market shocks, or non-random attrition. Overall, the results of the internal validity checks suggest that our recession effect estimates are unlikely to be driven by selection or confounding factors.

Placebo test. Figures 2, 3, and 4 show that the impact of the recession on educational attainment is precisely zero for individuals exposed to the AFC at ages 25 to 28, using the cohort of 29-year-olds as the reference group. This finding provides strong support for our research design by confirming that there are no cohort trends in higher education associated with the severity of the recession for individuals who would have mostly completed their college education before the AFC. This exercise is analogous to demonstrating the absence of a treatment effect during a pre-intervention period in a standard event-study DID analysis, with the distinction that the time dimension is measured in cohorts rather than calendar year.[24]

Endogenous selection across regions. In Figures A6, A7, A8, and A9, we examine whether across-cohort differences in baseline ability and earnings potential differ by region of birth (or region at age 14), and whether such differences are confounded with recession severity across regions. To this end, we conduct two exercises: balance checks on individuals' baseline characteristics and sensitivity analyses using alternative specifications designed to account for potential selection on observables and unobservables.

[24] Another difference from a standard event-study DID is the less clearly defined timing of the intervention. Since the age range of 25–28 is beyond the typical college graduation age for most individuals, those exposed to the AFC in this age range can be considered an "untreated" group. In contrast, individuals aged 19–24 in 1997 likely include some "treated" individuals who made decisions regarding college enrollment or graduation during or after the AFC. In South Korea, some individuals may not complete their college education in their early 20s due to factors such as compulsory military service for men and the fairly common practice of delaying college entrance by one or two years to retake the college entrance exam.

First, we estimate the following balancing regression:

$$x_i = \sum_{c<29} \beta_c AFC_r \times 1[\text{Age in } 1997 = c] + \delta_c + \lambda_r + \theta_{a(r)} \times c + \varepsilon_i,$$

where x_i is a covariate predetermined before the occurrence of the AFC, such as individual's demographic characteristics or family backgrounds. Figure A6 shows that the associations between baseline covariates and recession severity across regions within cohorts are generally insignificant for sex and parents' educational attainment. An exception is a higher likelihood of having a mother with high school education among individuals more severely exposed to the AFC at ages 16–21 (panel E).

Next, we show that the estimated β_c's from the main regression model in equation (1) are not sensitive to the inclusion of individual background controls, $\mathbf{X}_i$, or area-specific linear cohort trends, $\theta_{a(r)} \times c$, in Figures A7, A8, and A9. For both education and labor market outcomes, the alternative specifications that omit individual-level covariates or area-specific cohort trends yield recession effect estimates that are very similar to those from the baseline regression. The robustness of these estimates suggests that any bias from non-random selection is likely minimal, if present at all.

Confounding pre-trends. Another possible scenario for non-parallel cohort trends is that regions with higher economic growth and faster expansion of college education may have experienced a slowdown, and these regions also happen to be the ones hit hard by the AFC. In such a situation, we may obtain spuriously negative estimates of recession effects. To account for potential differences in pre-trends in higher education and economic conditions across regions, we add to the regression interactions between cohort fixed effects and changes in regional characteristics from 1990 to 1995 ($\Delta W_r^{90-95} \times \delta_c$), such as log real GDP, log population, and the share of college graduates.[25] We observe similar results across all education and labor market outcomes, except for an attenuation

[25]Regional GDP, population, and the proportion of college graduates are from the Korean Statistical Information Service (KOSIS).

in the negative estimates for log earnings at first job (Figures A7, A8, and A9).

Confounding contemporaneous local labor market shocks. The variation in the unemployment hike, ΔUR_r^{97-99}, can be generated by any local labor market shock, such as regional changes in the size of the labor force, employment, and unemployment, or the composition of residents. If other local labor market shocks not triggered by the AFC happened to coincide with the AFC, the confounding shocks would be partially captured by the area-specific cohort trends in our baseline specification. Moreover, the robustness of the AFC effect estimates with and without area-specific cohort trends suggests that any bias from confounding local labor market shocks is likely minimal. Nevertheless, concerns may remain that our DID estimates do not fully isolate the effects of an AFC-induced decline in labor demand.

To address this concern, we conduct two additional robustness checks in Tables A1, A2, and A3. First, we use the magnitude of the decrease in the regional employment-population ratio between 1997 and 1999 ($-\Delta EPOP_r^{97-99}$), as an alternative measure of recession severity, AFC_r. While the unemployment rate has traditionally been a key indicator of labor market conditions, the exclusion of non-participants from the calculation can make it more sensitive to labor supply shifts. The employment-population ratio may provide a cleaner measure of labor demand shocks by directly capturing changes in employment.[26] Compared to the baseline results using ΔUR_r^{97-99} (in columns 1, 4, 7, and 10), the AFC effect estimates based on $-\Delta EPOP_r^{97-99}$ (in columns 2, 5, 8, and 11) also show negative recession effects and similar cohort patterns in educational attainment and first job quality—particularly in terms of the likelihood of holding a job at a large firm or in a white-collar occupation—although the magnitudes tend to be smaller. The magnitudes need not be directly comparable, as a one percentage point decrease in the employment-population ratio does not directly correspond to a one percentage point increase in the unemployment rate.

Second, we augment the baseline regression (1) by including interactions between cohort fixed

[26]Green (1977) elaborates on this point, and Leon (1981) documents that the employment-population ratio is a reliable cyclical indicator of the economy's ability to provide jobs.

effects and the initial share of region r's employment in manufacturing in 1995 ($MS_r^{95} \times \delta_c$).[27][28] Given that regions specialized in manufacturing were particularly hard hit by the AFC, as described in Section 2, these additional controls help capture potentially confounding shocks specific to manufacturing-intensive regions that might otherwise bias the AFC effect estimates. Compared to the corresponding estimates from the baseline specification (columns 1, 4, 7, and 10 of Tables A1–A3), the resulting estimates are larger in magnitude in the Census sample (columns 3, 6, and 9 of Table A1) and similar in magnitude but noisier in the YP sample (columns 3, 6, 9, and 12 of Tables A2 and A3).

Non-random attrition. In Figures A10 and A11, we investigate whether non-random attrition in the YP sample biases our results. Post-secondary education and labor market outcomes are not observed for those who exited the YP survey before completing their education or entering the labor market. If the attrition rate is systematically related with the magnitude of the AFC shock across regions within each cohort, the recession effect estimates would be biased in our DID analysis. The direction of the bias would depend on the sign of the correlation and the selection pattern of those dropping out from the YP. Given that most people in South Korea complete high school by age 19 and college by age 26, we restrict the analysis sample to those who were at least 19 or 26 years old in the most recent year of survey participation.[29] The estimated recession effects are effectively unchanged for college education (Figure A10) and early labor market outcomes (Figure A11).

[27] To construct the initial employment share in manufacturing, we use employment counts in six industry sectors by region, which are available in KOSIS. The industry categories in the 1990s follow the sixth edition of the Korean Standard Industrial Classification (KSIC) published in 1991. According to the KSIC, the six industry sectors include 1) Agriculture, forestry, and fishing, 2) Manufacturing and mining, 3) Construction, 4) Wholesale and retail trade; Accommodation and food service, 5) Real estate; Business facilities management and business support services; Rental and leasing activities; Public administration and defense; Social security service; Education; Health and social work; Other personal services; Activities of households as employers; Activities of extraterritorial organizations and bodies; and 6) Electricity, gas, steam and air conditioning supply; Transportation and storage; Finance and insurance. Regional employment data are not available for finer industry categories within these major industries.

[28] When we use manufacturing employment shares in alternative initial years between 1992 and 1997, the results remain similar to those reported in Tables A1, A2, and A3.

[29] Among 13,878 individuals in the YP sample, 2.5% and 19.2% left the survey before age 19 and 26, respectively. Note that the two youngest cohorts, born in 1995–1996, not yet reached age 26 in the last wave of YP2007 and are therefore not included in this restricted sample.

5 Discussion of Possible Mechanisms

5.1 Negative Recession Effect

Section 4 shows that children who were exposed to a larger AFC shock have lower educational attainment and lower-quality first jobs. In this section, we conduct additional analyses to explore potential mechanisms underlying our findings.

The first possible explanation for the deterioration of education and early labor market outcomes is that the crisis limited households' financial capacity to invest in children's human capital. To investigate this hypothesis, we perform a heterogeneity analysis by parental education level as a proxy for parental resources since our data lacks retrospective questions about household income. Table 3 reports the result for college education and labor market outcomes using the YP sample. We find limited evidence of differential recession effects by parental education level: F-statistics and associated p-values indicate that children with less-educated fathers (without college education) are not significantly more affected by the AFC than those with college-educated fathers.[30]

[Table 3 here]

To consider the effect on parental monetary investment more directly, we also look at private out-of-school education spending. South Korean households are known for their heavy investment in children's private out-of-school education (e.g., cram school, private tutoring) in order to increase their chance of entering elite colleges.[31] We use information from YP2007, which has (retrospective) questions about respondents' overall experience of private out-of-school education during middle and high school. Because we cannot obtain the same information from YP2001, the reference group for this exercise is age 19 (instead of 25) in 1997, which is an old enough age to have completed high school. Figure 7 panels A and B show the results regarding whether the individual received any private education during secondary school and the total expenditure amount

[30] In South Korea, the father's education level more accurately reflects household resources than the mother's, due to significantly lower labor force participation and earnings among women compared to men, even among college graduates (Kim et al., 2016; OECD, 2023).

[31] 75% of students in elementary, middle, and high school received private out-of-school education in 2021 (Ministry of Education, 2021).

(including zeros), respectively.[32] We find that parents in regions with larger AFC shocks did not cut back on their children's private education. In fact, the effects on private education spending are *positive* at ages 7–9, which may suggest a behavioral response from parents to mitigate potentially adverse AFC effects on their children's human capital accumulation.

[Figure 7 here]

As additional evidence, Figure 7 panels C and D show results for the likelihood of attending in-state college and having part-time work during high school, respectively. We find no evidence of a higher likelihood of enrolling in in-state college, which would be more affordable than out-of-state college, among those who were more severely affected by the AFC. We also investigate part-time work experience during high school as a proxy for household economic hardship and find no significant effects.[33] Overall, we do not find strong evidence of a reduction in parental financial support as the primary mechanism of our findings.

Second, even if there are no significant differences in parental monetary investment by recession severity, children's human capital development may be affected by non-monetary factors such as family distress. Stressors such as parents' health deterioration or marital instability may be greater in regions more heavily impacted by the crisis.

To explore this possibility, we investigate various measures of parents' health using data from the 1998 Korean National Health Examination Survey (KNHES).[34] We identify parents with children using household member relationship codes and categorize them according to their youngest child's age in 1997: ages 1–6, 7–12, 13–18, 19–24 and 25.[35] Table 4 reports the estimation results

[32]Note that the amount is not inflation-adjusted because the survey asks about the overall experience during middle and high school, rather than on a yearly basis.

[33]We focus on the high school period because part-time work during college may be driven by a desire to gain work or life experience rather than for financial reasons.

[34]The KNHES is cross-sectional data conducted every three years by the Korea Disease Control and Prevention Agency. We use data from the year closest to the AFC, 1998, and therefore, use the difference in regional unemployment rate between 1997 and 1998 (rather than 1997 and 1999) as AFC_r. Results remain similar when we use ΔUR_r^{97-99}. Since the KNHES does not collect information on birth region, we use the region at the time of the survey to link individuals to regional unemployment rates.

[35]Since there may be multiple children within a household, it would be difficult to interpret results if the grouping of parents by children's age is too granular. We prefer to use the age of the youngest child for parent group classification, rather than the oldest, because the survey collects information only on individuals living in the same household. The

following equation (1). We find greater deterioration of health outcomes among parents living in regions more severely affected by the AFC. Specifically, estimation results on indicators of poor health (column 1), having health concerns (column 2), feeling stressed (column 3), feeling sad or depressed (column 4), and having suicidal thoughts (column 5) all suggest worse health status among these parents.[36] These results are consistent with previous studies that document the negative effect of recessions or job loss on various measures of physical and mental health (e.g., Charles and DeCicca, 2008, Deb et al., 2011, Marcus, 2013, Mendolia, 2014, Schaller and Stevens, 2015).[37]

[Table 4 here]

In addition, we investigate whether children from more affected regions were more likely to have experienced adverse life events such as the death of a family member or parental divorce using YP2007.[38] In Table A4, we find no recession effect on parental death (column 1), but we do find that individuals from larger-shock regions are more likely to have experienced the death of a family member other than a parent (column 2).[39] While the data does not allow us to identify the specific cause of death, our result is consistent with prior studies which show that recessions or job displacement can increase morbidity and mortality (Sullivan and von Wachter, 2009; Coile et al., 2014; Schwandt and von Wachter, 2023). The effects on parental divorce are also generally positive though mostly statistically insignificant (column 3). When we additionally consider the

oldest child in the household may not be the parents' actual oldest child if he/she has moved out. Results remain similar when we restrict the sample to parents of only children.

[36]See the notes in Table 4 for the exact definition of each variable. Results remain qualitatively similar when we use z-scores instead of indicator variables as outcomes.

[37]Self-assessed health is used extensively in the health economics literature, and is known to be a good proxy of actual health and subsequent mortality (e.g., Idler and Benyamini, 1997, Borg and Kristensen, 2000, Contoyannis and Jones, 2004, Jylhä, 2009).

[38]Because the YP2001 survey does not have the question on (retrospective) life events, we study 1978–1993 birth cohorts from our YP2007 sample who were asked this question in wave 2. Because the youngest cohort (born in 1993) was age 15 at the time of wave 2, we define the dependent variable as a dummy variable that equals 1 if the individual experienced such an event between his/her age in 1997 and age 15 so as not to include events that occurred prior to the AFC. For the 1978–1981 birth cohorts, who experienced the AFC between ages 16–19, the recession effect on life events between 1997 and age 15 is zero by design.

[39]Distress within the broader family can adversely affect children's outcomes. For example, Stans (2022) show that the death of a grandparent during a critical educational stage can have lasting negative consequences for children's educational outcomes.

cause of divorce using data from the Civil Registration and Vital Statistics, we find a positive correlation between the 1997–1999 change in the regional unemployment rate and the 1997–2003 change in the rate of divorce due to financial reasons (Figure A12 panel A).[40]

Third, the effect of the recession could operate at the broader community level. Previous studies such as Chetty et al. (2016) show adverse effects of living in high-poverty neighborhoods on children's long-term outcomes. If the quality of neighborhoods or schools declined in regions more severely hit by the AFC, the outcomes of children from those regions could be worse even if their parents were not directly affected by the recession. As a proxy for school quality, we calculate regional education spending per capita using information from the Statistical Yearbook of Education published by the Korean Educational Statistics Service.[41] Figure A12 panel B indicates a weak negative correlation between the size of the AFC shock and the growth in regional education spending per capita between 1997 and 2003.[42]

Although suggestive, we thus conjecture that family distress and broader neighborhood factors were primary channels in driving adverse recession effects rather than reduced parental monetary investment. The result is consistent with Carneiro et al. (2022) which point to family stress, rather than income loss per se, as the underlying mechanism for the impact of parental job loss on children's education outcomes using Norwegian data.

5.2 Age-Differential Recession Effect

Why the recession effects are more pronounced for younger cohorts (under age 13 in 1997) is yet another question. Although it is outside the scope of this paper to empirically disentangle the exact

[40]The YP does not provide information on the cause of divorce. While the Vital Statistics includes this information, it does not contain data on the age of children at the time of divorce. Thus, we cannot apply our regression model (1). We use the change in 1997–2003 divorce rate as the outcome, because divorce takes a few years to be settled. There is a national trend of accelerating divorce rate in the early 2000s after the AFC until reaching a peak in 2003 (Statistics Korea, 2009; Jones, 2015).

[41]We divide annual regional education expenditure by the number of students in the region. The regional education expenditure includes expenditure spent on kindergarten, primary and secondary school education spending. Accordingly, when calculating the number of students in the region, we sum the total number of students at these grade levels. Expenditure is in 1,000 of 2020 KRW.

[42]To capture any delayed effects of the recession on education spending and quality, we use the change in education spending between 1997 and 2003, as in the divorce analysis above.

mechanisms underlying this finding, we discuss three potential reasons based on evidence from the literature.

First, it should be noted that individuals who are not old enough to work would not be subject to labor market substitution effects during the recession. Several studies indicate that the demand for college education is counter-cyclical because of opportunity cost considerations, i.e., when jobs are scarce, attending college becomes a less costly option (e.g., Betts and McFarland, 1995; Rice, 1999; Card and Lemieux, 2001; Sievertsen, 2016; Charles et al., 2018). Thus, for individuals old enough to work, the negative recession effect on their human capital development may be partly offset by the positive substitution effect toward college-going. As a result, the total AFC effect on educational outcomes could be less negative for older cohorts. Since college graduates find better-quality first jobs than those without college degrees, this would also lead to age-differential AFC effects on labor market outcomes.

Second, children who are younger may be more affected by the recession because those ages are "critical" periods in human capital development. Research on the life-cycle approach to skill formation indicates that different capacities are malleable at different stages of life, but that investments in the early years of childhood are especially important for developing cognitive skills (Cunha et al., 2006; Heckman, 2007; Cunha and Heckman, 2008; Heckman and Mosso, 2014). Therefore, it is possible that AFC and its impact on parents, local schools, and the regional economy disrupted the development of human capital, especially for younger children.

Lastly, younger children may be more affected by the recession because of longer exposure to persistent aftereffects following the event. Although South Korea's economy recovered rather quickly after the AFC (Figure A1), some consequences would linger for individuals. For instance, if the AFC deteriorated parents' health or increased the likelihood of parents' divorce, younger children would be exposed to those circumstances for a longer period than adolescents. That is, even if there is no "critical" period in skill formation, long-lasting aftereffects of the AFC could result in larger "dose" of the treatment among younger children. This channel is consistent with Chetty et al. (2016), who find a roughly linear pattern of exposure effects on children's long-term

outcomes after moving to a better neighborhood.

6 Conclusion

This study examines the impact of a large-scale recession on higher education and early labor market outcomes, exploiting variation in age at exposure and regional unemployment spikes from the 1997–1998 Asian financial crisis (AFC) in South Korea. Using data on 1968–1996 birth cohorts from the Census and Youth Panel, our difference-in-differences analysis shows that exposure to the recession has significant effects on individuals' college education and early labor market outcomes. Individuals from regions more severely affected by the crisis are less likely to attend and complete a four-year college than their peers in the same cohort. Conditional on college enrollment, exposure to the AFC leads to a significant decrease in humanities majors and an increase in STEM majors. While there is no effect on employment probability, we observe a deterioration in the quality of the first job, measured by wage, firm size, and white-collar status, among individuals who grew up in regions hard-hit by the AFC.

Importantly, the negative effects are substantial and more pronounced for those who experienced the economic downturn at a younger age (under age 13). A one standard deviation larger AFC shock results in a 7.2–7.8% decrease in the college graduation rate, a 4.1% decrease in earnings at first job, and an 13.1% decrease in the probability of having a white-collar job. The magnitude of the effect is reduced by about half for those who were teenagers or young adults at the time of the recession. Further analysis shows that non-monetary and broader neighborhood factors, such as family distress or school quality, rather than reduced parental monetary investments, are likely to be primary channels driving these adverse recession effects. Heterogeneous effects by age at exposure, on the other hand, may be explained by differences in the size of contemporaneous labor market substitution effect, the presence of "crticial" periods in human capital development, and/or differences in the duration of exposure to the aftereffects of the AFC.

Our findings provide two policy implications. First, children may bear larger long-term costs

of recessions than young adults who are directly affected by a weak labor market. Thus, efforts to promote human capital investment among younger cohorts may be just as important as immediate stimulus measures or active labor market policies to reduce the costs of business cycles. Second, a substantial deterioration in human capital accumulation can occur following a large-scale recession even without significant reductions in educational spending within the household. This suggests that direct cash transfers to households alone may not be sufficient to mitigate the negative recession effects on children's human capital accumulation, without considering changes in non-monetary factors at the household level or in resources at the local level.

References

Abadie, Alberto, Susan Athey, Guido W. Imbens, and Jeffrey M. Wooldridge, "When Should You Adjust Standard Errors for Clustering?," *The Quarterly Journal of Economics*, 10 2023, *138* (1), 1–35.

Almond, Douglas, Janet Currie, and Valentina Duque, "Childhood Circumstances and Adult Outcomes: Act II," *Journal of Economic Literature*, December 2018, *56* (4), 1360–1446.

Altonji, Joseph G., Erica Blom, and Costas Meghir, "Heterogeneity in Human Capital Investments: High School Curriculum, College Major, and Careers," *Annual Review of Economics*, 2012, *4* (1), 185–223.

_ , Lisa B. Kahn, and Jamin D. Speer, "Cashier or Consultant? Entry Labor Market Conditions, Field of Study, and Career Success," *Journal of Labor Economics*, 2016, *34* (S1), S361–S401.

Baliño, Tomás J.T. and Angel J. Ubide, "The Korean Financial Crisis of 1997—A Strategy of Financial Sector Reform," *IMF Working Papers*, 1999, *1999* (028).

Bedard, Kelly and Douglas A. Herman, "Who Goes to Graduate/professional School? The Importance of Economic Fluctuations, Undergraduate Field, and Ability," *Economics of Education Review*, 2008, *27* (2), 197–210.

Betts, Julian R. and Laurel L. McFarland, "Safe Port in a Storm: The Impact of Labor Market Conditions on Community College Enrollments," *Journal of Human Resources*, 1995, *30* (4), 741–765.

Blom, Erica, Brian C. Cadena, and Benjamin J. Keys, "Investment over the Business Cycle: Insights from College Major Choice," *Journal of Labor Economics*, 2021, *39* (4), 1043–1082.

Borg, Vilhelm and Tage S. Kristensen, "Social Class and Self-Rated Health: Can the Gradient Be Explained by Differences in Life Style or Work Environment?," *Social Science & Medicine*, 2000, *51* (7), 1019–1030.

Card, David and Thomas Lemieux, "Dropout and Enrollment Trends in the Postwar Period: What Went Wrong in the 1970s?," in "Risky Behavior among Youths: An Economic Analysis," University of Chicago Press, 2001, pp. 439–482.

Carneiro, Pedro, Kjell G. Salvanes, Barton Willage, and Alexander Willén, "The Timing of Parental Job Displacement, Child Development and Family Adjustment," IZA Discussion Papers No.15630, Institute of Labor Economics (IZA) October 2022.

Charles, Kerwin Kofi and Philip DeCicca, "Local Labor Market Fluctuations and Health: Is There a Connection and for Whom?," *Journal of Health Economics*, 2008, *27* (6), 1532–1550.

_ , Erik Hurst, and Matthew J. Notowidigdo, "Housing Booms and Busts, Labor Market Opportunities, and College Attendance," *American Economic Review*, October 2018, *108* (10), 2947–94.

Chetty, Raj and Nathaniel Hendren, "The Impacts of Neighborhoods on Intergenerational Mobility II: County-level Estimates," *The Quarterly Journal of Economics*, 2018, *133* (3), 1163–1228.

_ , _ , and Lawrence F. Katz, "The Effects of Exposure to Better Neighborhoods on Children: New Evidence from the Moving to Opportunity Experiment," *American Economic Review*, 2016, *106* (4), 855–902.

Cho, Joonmo and Jaeho Keum, "Job Instability in the Korean Labour Market: Estimating the Effects of the 1997 Financial Crisis," *International Labour Review*, 2004, *143* (4), 373.

Choi, Eleanor Jawon, Jaewoo Choi, and Hyelim Son, "The Long-term Effects of Labor Market Entry in a Recession: Evidence from the Asian Financial Crisis," *Labour Economics*, 2020, *67*, 101926.

Chopra, Ajai, Kenneth H. Kang, Meral Karasulu, Hong Liang, Henry Ma, and Anthony J. Richards, "From Crisis to Recovery in Korea: Strategy, Achievements, and Lessons," *IMF Working Papers*, 2001, *2001* (154).

Coile, Courtney C., Phillip B. Levine, and Robin McKnight, "Recessions, Older Workers, and Longevity: How Long Are Recessions Good for Your Health?," *American Economic Journal: Economic Policy*, 2014, *6* (3), 92–119.

Contoyannis, Paul and Andrew M. Jones, "Socio-Economic Status, Health and Lifestyle," *Journal of Health Economics*, 2004, *23* (5), 965–995.

Cunha, Flavio and James J Heckman, "Formulating, Identifying and Estimating the Technology of Cognitive and Noncognitive Skill Formation," *Journal of Human Resources*, 2008, *43* (4), 738–782.

_ , James J. Heckman, Lance Lochner, and Dimitriy V. Masterov, "Interpreting the Evidence on Life Cycle Skill Formation," in E. Hanushek and F. Welch, eds., *Handbook of the Economics of Education*, Vol. 1, Elsevier, 2006, chapter 12, pp. 697–812.

Deb, Partha, William T Gallo, Padmaja Ayyagari, Jason M Fletcher, and Jody L Sindelar, "The effect of job loss on overweight and drinking," *Journal of Health Economics*, 2011, *30* (2), 317–327.

Duque, Valentina and Lauren L. Schmitz, "Early-life Exposure to the Great Depression and Long-term Health and Economic Outcomes," *Journal of Human Resources*, 2023.

Genda, Yuji, Ayako Kondo, and Souichi Ohta, "Long-Term Effects of a Recession at Labor Market Entry in Japan and the United States," *Journal of Human Resources*, 2010, *45* (1), 157–196.

Green, Christopher, "The Employment Ratio As an Indicator of Aggregate Demand Pressure," *Monthly Labor Review*, 1977, *100* (4), 25–32.

Gregory, Gary, Charles Harvie, and Hyun-Hoon Lee, "Korean SMEs in the Wake of the Financial Crisis: Strategies, Constraints, and Performance in a Global Economy," 2002.

Han, Joseph, "College Majors in Limited Supply: The Case of Private Universities in Korea," *The Korean Economic Review*, 2022, *38* (3), 381–414.

Hassink, Robert, "South Korea's Economic Miracle and Crisis: Explanations and Regional Consequences," *European Planning Studies*, 1999, *7* (2), 127–143.

Heckman, James J., "The Economics, Technology, and Neuroscience of Human Capability Formation," *Proceedings of the National Academy of Sciences of the United States of America*, 2007, *104* (33), 13250–13255.

_ **and Stefano Mosso**, "The Economics of Human Development and Social Mobility," *Annual Review of Economics*, 2014, *6* (1), 689–733.

Hershbein, Brad J., "Graduating High School in a Recession: Work, Education, and Home Production," *The BE Journal of Economic Analysis & Policy*, 2012, *12* (1).

Idler, Ellen L and Yael Benyamini, "Self-Rated Health and Mortality: A Review of Twenty-Seven Community Studies," *Journal of Health and Social Behavior*, 1997, pp. 21–37.

Jones, Gavin W., "Divorce Trends and Patterns in Asia," in "Routledge Handbook of Families in Asia," Routledge, 2015, chapter 22, pp. 332–344.

Jylhä, Marja, "What Is Self-Rated Health and Why Does It Predict Mortality? Towards a Unified Conceptual Model," *Social Science & Medicine*, 2009, *69* (3), 307–316.

Kahn, Lisa B., "The Long-term Labor Market Consequences of Graduating from College in a Bad Economy," *Labour Economics*, 2010, *17* (2), 303–316.

Kawaguchi, Daiji and Ayako Kondo, "The Effects of Graduating from College during a Recession on Living Standards," *Economic Inquiry*, 2020, *58* (1), 283–293.

Kim, Jinyoung, Jong-Wha Lee, and Kwanho Shin, "Impact of Gender Inequality on the Republic of Korea's Long-Term Economic Growth: An Application of the Theoretical Model of Gender Inequality and Economic Growth," *ADB Economics Working Paper Series*, 2016, (473).

Kondo, Ayako, "Differential Effects of Graduating during a Recession across Gender and Race," *IZA Journal of Labor Economics*, 2015, *4* (1), 1–24.

Lee, Jungmin, "The Labor Market in South Korea, 2000-2018," *IZA World of Labor*, 2020.

Leon, Carol Boyd, "The Employment-Population Ratio: Its Value in Labor Force Analysis," *Monthly Labor Review*, 1981, *104* (2), 36–45.

Marcus, Jan, "The Effect of Unemployment on the Mental Health of Spouses – Evidence from Plant Closures in Germany," *Journal of Health Economics*, 2013, *32* (3), 546–558.

Mendolia, Silvia, "The Impact of Husband's Job Loss on Partners' Mental Health," *Review of Economics of the Household*, 2014, *12* (2), 277–294.

Ministry of Education, "Private Education Expenditures Survey of Elementary, Middle, and High School Students in 2021," Technical Report 2021. [in Korean].

Ministry of Employment and Labor, "Survey Report on Labor Conditions by Employment Type," Technical Report 2020. [in Korean].

OECD, *OECD Territorial Reviews: Korea 2001* 2001.

_ , "Employment and Unemployment by Five-Year Age Group and Sex," https://data-viewer.oecd.org/?chartId=6c25817a-a8bf-433c-9b30-65c1d78ee47c 2023. Accessed on April 07, 2025.

Oreopoulos, Philip, Till von Wachter, and Andrew Heisz, "The Short-and Long-term Career Effects of Graduating in a Recession," *American Economic Journal: Applied Economics*, 2012, *4* (1), 1–29.

Radelet, Steven and Jeffrey D. Sachs, "The Onset of the East Asian Financial Crisis," *NBER Working Paper*, 1998, (w6680).

Rao, Neel, "The Impact of Macroeconomic Conditions in Childhood on Adult Labor Market Outcomes," *Economic Inquiry*, 2016, *54* (3), 1425–1444.

Rhee, Changyong and Hangyong Lee, "Lessons from the 1997 and the 2008 Crises in the Republic of Korea," Technical Report No.298 2012.

Rice, Patricia, "The Impact of Local Labour Markets on Investment in Further Education: Evidence from the England and Wales Youth Cohort Studies," *Journal of Population Economics*, 1999, *12* (2), 287–312.

Rinz, Kevin, "Did Timing Matter? Life Cycle Differences in Effects of Exposure to the Great Recession," *Journal of Labor Economics*, 2022, *40* (3), 703–735.

Rothstein, Jesse, "The Lost Generation? Labor Market Outcomes for Post-Great Recession Entrants," *Journal of Human Resources*, 2023, *58* (5), 1452–1479.

Sakellaris, Plutarchos and Antonio Spilimbergo, "Business Cycles and Investment in Human Capital: International Evidence on Higher Education," in "Carnegie-Rochester Conference Series on Public Policy," Vol. 52 Elsevier 2000, pp. 221–256.

Salvanes, Kjell G., Barton Willage, and Alexander L.P. Willén, "The Effect of Labor Market Shocks across the Life Cycle," *Journal of Labor Economics*, forthcoming.

Schaller, Jessamyn and Ann Huff Stevens, "Short-Run Effects of Job Loss on Health Conditions, Health Insurance, and Health Care Utilization," *Journal of Health Economics*, 2015, *43*, 190–203.

Schwandt, Hannes and Till von Wachter, "Socio-Economic Decline and Death: The Life-Cycle Impacts of Recessions for Labor Market Entrants," Working Paper 26638, National Bureau of Economic Research April 2023.

Sievertsen, Hans Henrik, "Local Unemployment and the Timing of Post-Secondary Schooling," *Economics of Education Review*, 2016, *50*, 17–28.

Stans, Renske A, "Short-Run Shock, Long-Run Consequences? The Impact of Grandparental Death on Educational Outcomes," *Economics of Education Review*, 2022, *91*, 102310.

Statistics Korea, "Korean Social Trends 2009," Technical Report 2009. [in Korean].

Stuart, Bryan A., "The Long-Run Effects of Recessions on Education and Income," *American Economic Journal: Applied Economics*, January 2022, *14* (1), 42–74.

Sullivan, Daniel and Till von Wachter, "Job Displacement and Mortality: An Analysis Using Administrative Data," *The Quarterly Journal of Economics*, 2009, *124* (3), 1265–1306.

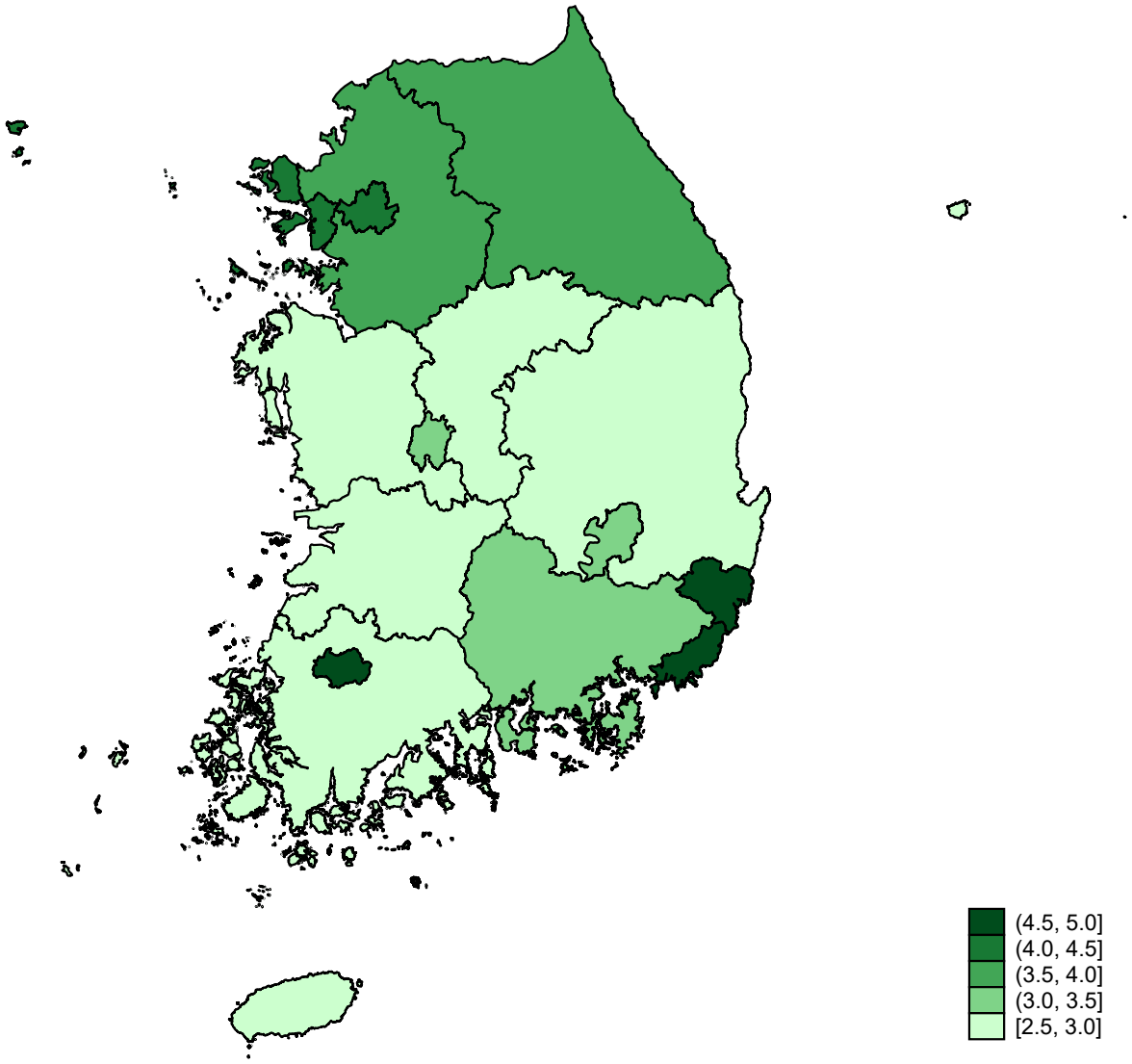


Figure 1: Regional Variation in Recession Severity (ΔUR_r^{97-99}) Induced by the Asian Financial Crisis

Notes. The severity of the recession in each region is measured by the difference in the annual unemployment rate between 1997 and 1999, ΔUR_r^{97-99}.

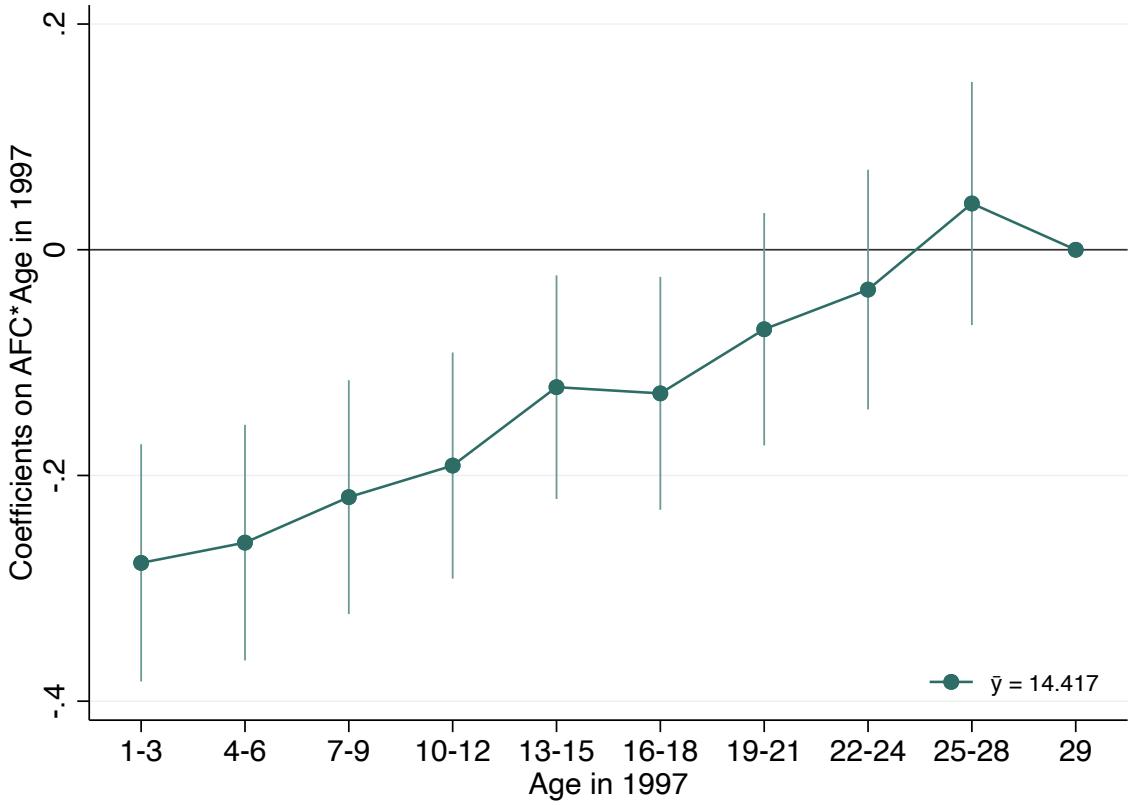


Figure 2: Effects on Years of Education (Census)

Notes. Vertical spikes around each point estimate represent the 95% confidence interval, clustered at the level of cohort by birth region. Regressions include the male dummy variable and fixed effects for age in 1997 and birth region, as well as area-specific linear cohort trends. Observations are weighted using individual sample weights provided in the Census data.

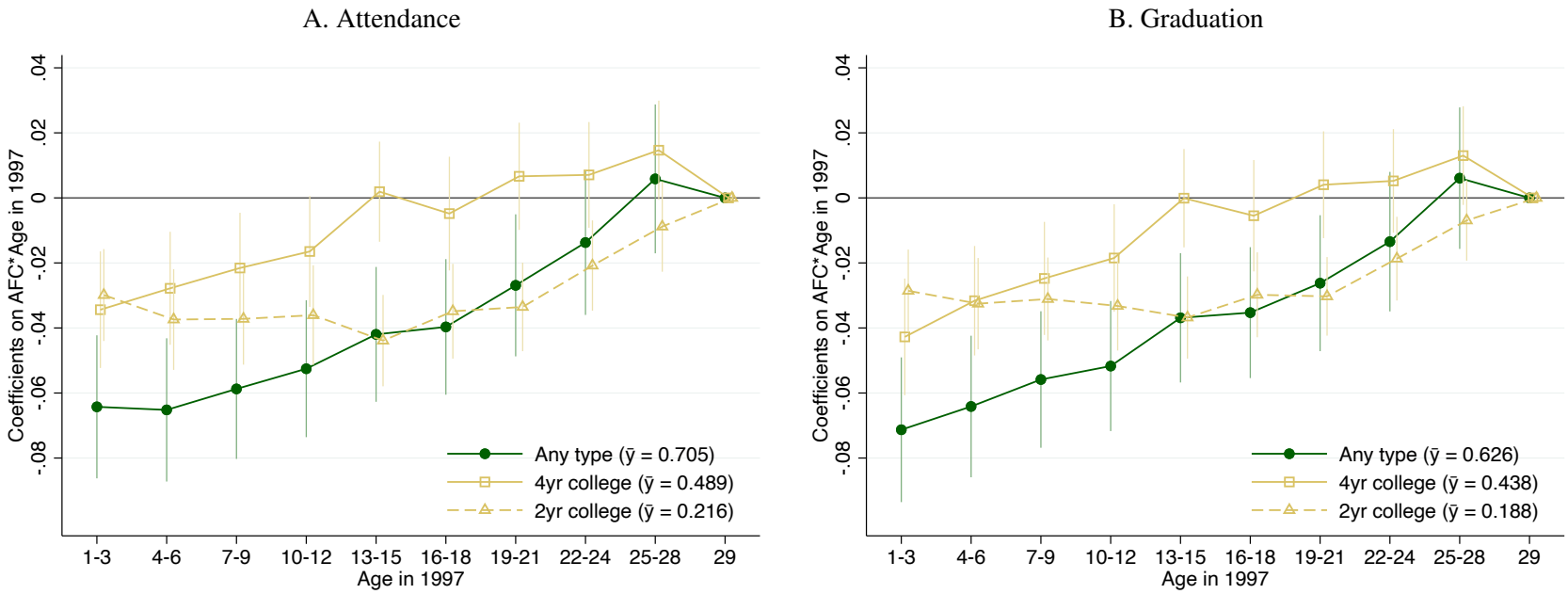


Figure 3: Effects on College Education (Census)

Notes. Vertical spikes around each point estimate represent the 95% confidence interval, clustered at the level of cohort by birth region. Regressions include the male dummy variable and fixed effects for age in 1997 and birth region, as well as area-specific linear cohort trends. Observations are weighted using individual sample weights provided in the Census data.

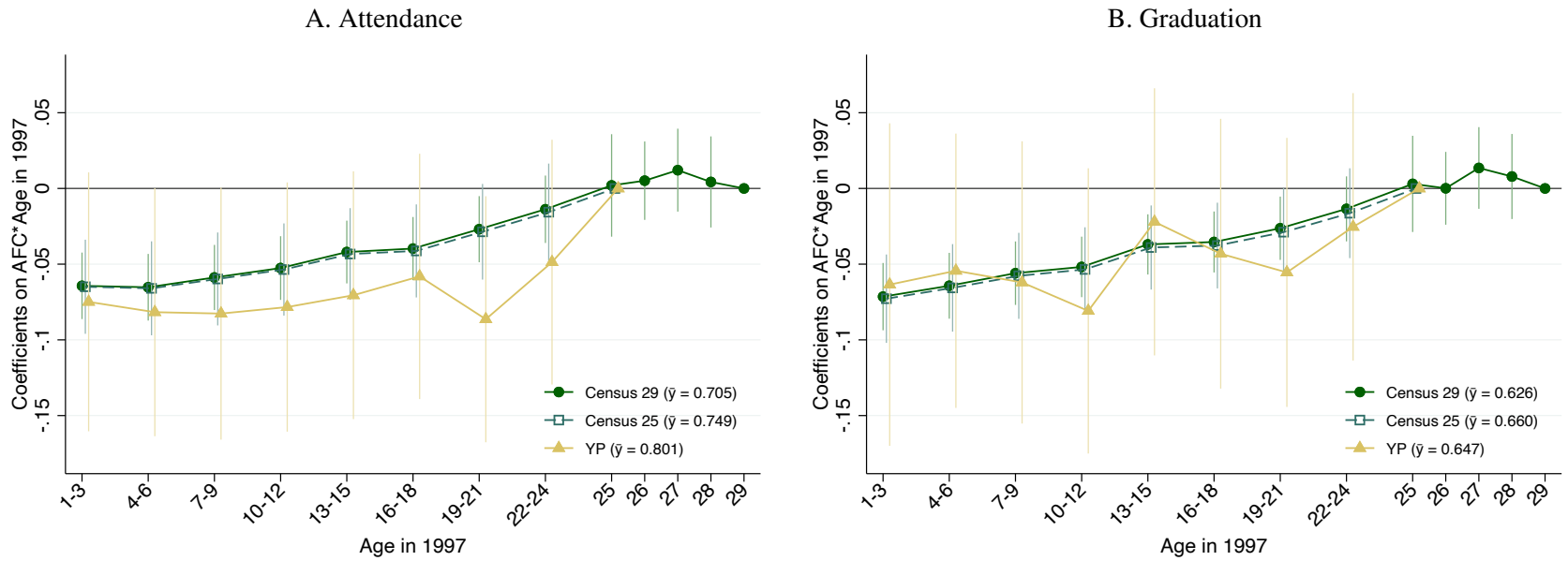


Figure 4: Effects on College Education (Census and YP)

Notes. Vertical spikes around each point estimate represent the 95% confidence interval, clustered at the level of cohort by birth region (Census) or region at age 14 (YP). Regressions include fixed effects for age in 1997 and birth region (Census) or region at age 14 (YP), as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male (Census and YP) and father's and mother's education (YP). Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the Census or YP data.

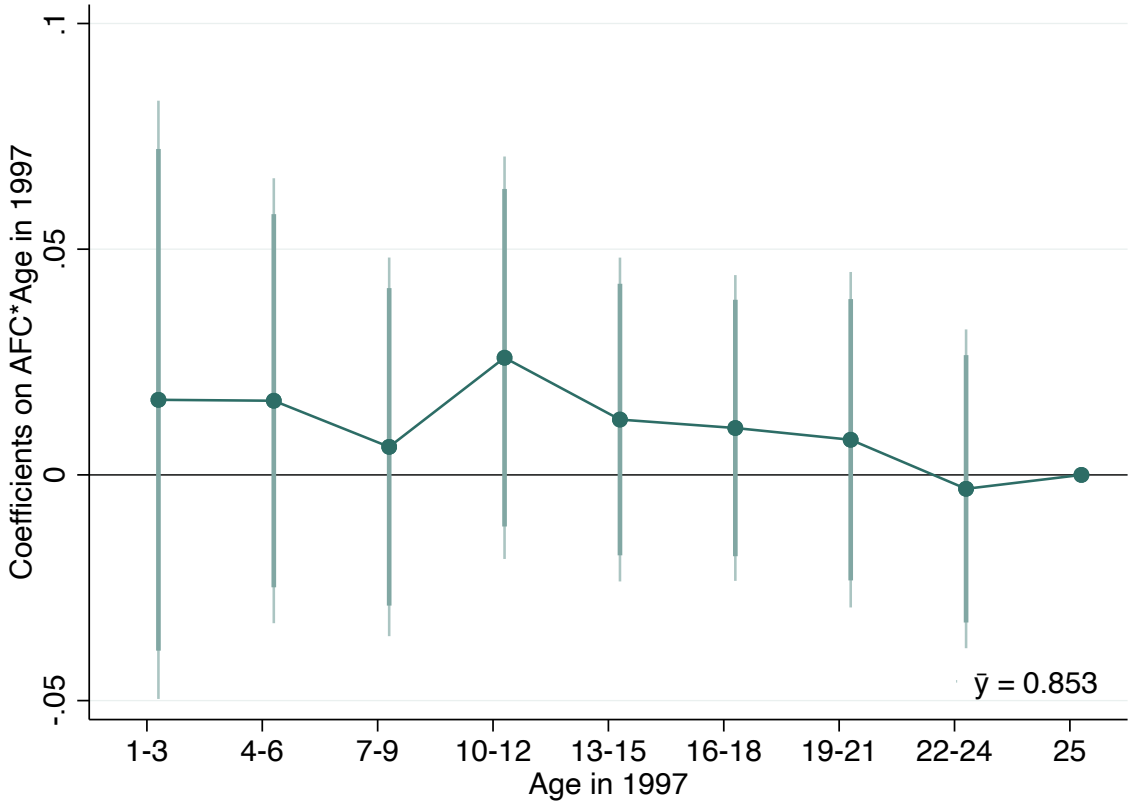


Figure 5: Effects on Probability of Ever Being Employed (YP)

Notes. Vertical spikes around each point estimate represent the 95% and 90% (marked darker and thicker) confidence intervals, clustered at the level of cohort by region at age 14. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data.

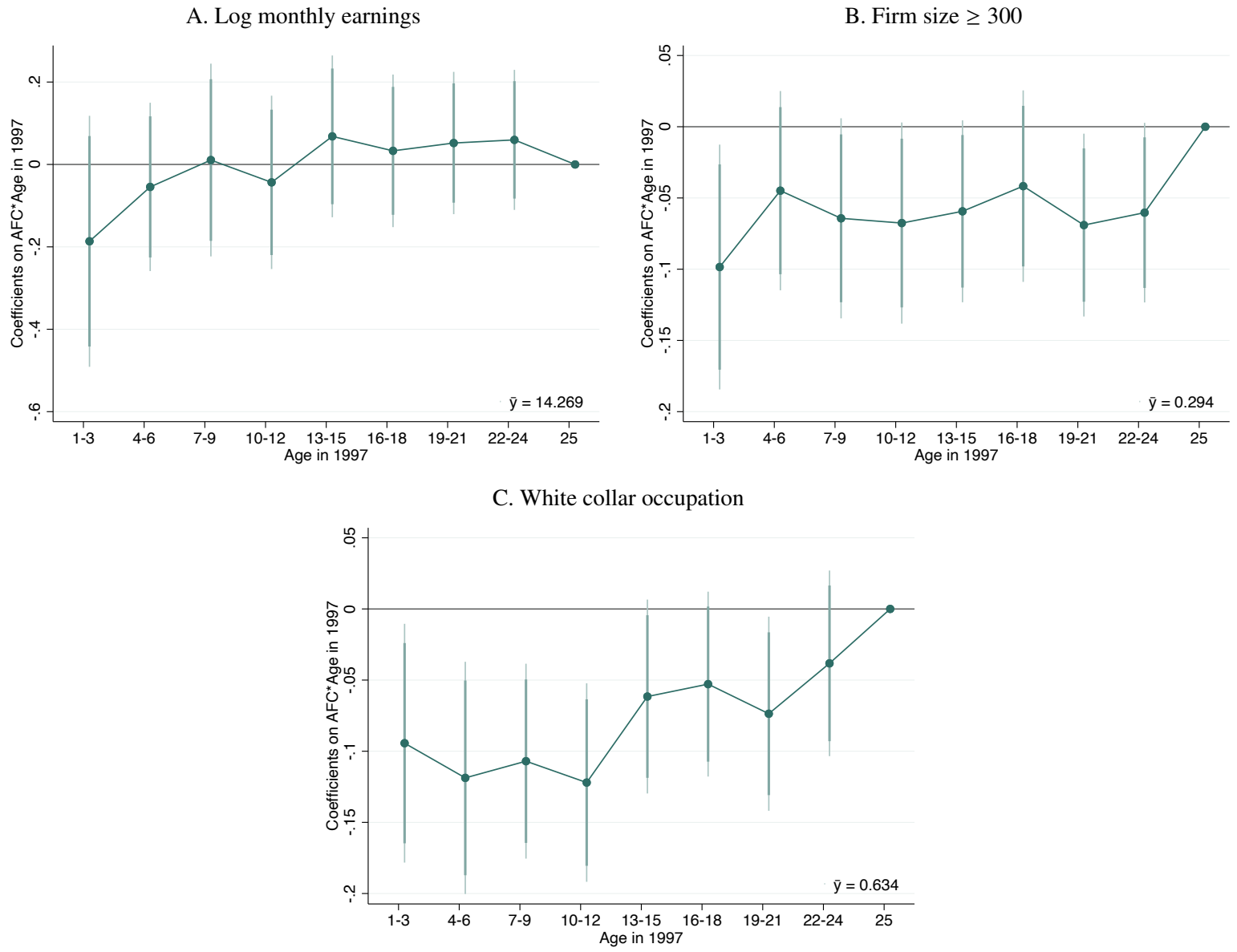


Figure 6: Effects on Quality of First Job (YP)

Notes. Vertical spikes around each point estimate represent the 95% and 90% (marked darker and thicker) confidence intervals, clustered at the level of cohort by region at age 14. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data.

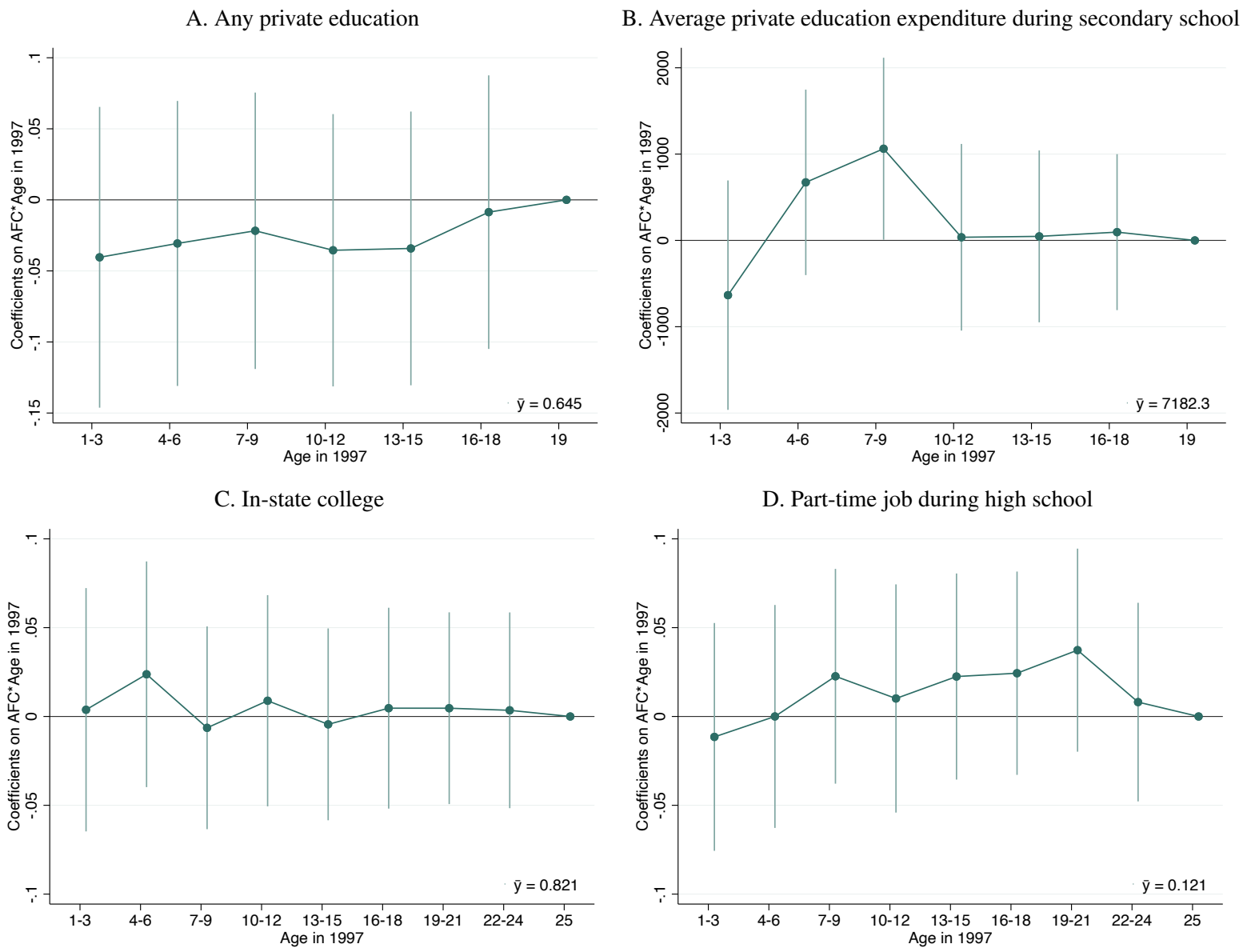


Figure 7: Effects on Monetary Inputs (YP)

Notes. The dependent variable in each panel are as follows: A) whether an individual received any private out-of-school education during middle and high school; B) the amount of spending on private out-of-school education during middle and high school (in 1,000 KRW, including zero values); C) whether an individual attended in-state college; D) whether an individual had a part-time job during high school. Vertical spikes around each point estimate represent the 95% confidence interval, clustered at the level of cohort by region at age 14. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data.

Table 1: Summary Statistics

	Census			YP		
	Mean (1)	**SD** (2)	**N** (3)	**Mean** (4)	**SD** (5)	**N** (6)
A. Treatment variable						
AFC (= ΔUR^{97-99})	3.600	[0.790]	369,816	3.709	[0.746]	13,878
Age in 1997	15.928	[8.466]	369,816	12.857	[6.906]	13,878
B. Background characteristics						
Male	0.511	[0.500]	369,816	0.511	[0.500]	13,878
Father's education						
Less than high school				0.255	[0.436]	13,787
Some high school or high school graduate				0.464	[0.499]	13,787
Some college or more				0.281	[0.450]	13,787
Father's education missing				0.007	[0.085]	13,878
Mother's education						
Less than high school				0.344	[0.475]	13,809
Some high school or high school graduate				0.512	[0.500]	13,809
Some college or more				0.145	[0.352]	13,809
Mother's education missing				0.005	[0.073]	13,878
C. Educational outcomes						
Educational attainment						
Years of education	14.417	[2.100]	369,816			
High school graduate w/o college education	0.275	[0.447]	369,816	0.192	[0.394]	13,877
Ever attended college	0.705	[0.456]	369,816	0.801	[0.399]	13,878
Ever attended 4-year college	0.489	[0.500]	369,816	0.527	[0.499]	13,874
Ever attended 2-year college	0.216	[0.411]	369,816	0.271	[0.445]	13,874
Graduated college	0.626	[0.484]	369,816	0.647	[0.478]	13,877
Graduated 4-year college	0.438	[0.496]	369,816	0.418	[0.493]	13,873
Graduated 2-year college	0.188	[0.391]	369,816	0.230	[0.421]	13,873
College major (among college attendees)						
Humanities & social sciences				0.350	[0.477]	10,976
STEMM				0.478	[0.500]	10,976
D. Labor market outcomes						
Ever employed				0.853	[0.355]	13,878
Quality of first job (among employed)						
Monthly earnings (in 1,000 of 2020 KRW)				1,873.2	[918.3]	11,141
Log monthly earnings				14.269	[1.191]	11,141
Firm size $\geq$ 300				0.294	[0.456]	11,702
White collar occupation				0.634	[0.482]	11,706

Notes. The number of observations varies due to missing values. The analysis samples include 369,816 individuals from the Census and 13,878 individuals from the YP. 1 USD is worth approximately 1,400 KRW. The means and standard deviations are calculated using individual sample weights provided in the Census or YP data.

Table 2: Effects on College Major Choice (YP)

	Humanities & Social sciences			**STEMM**		
	All	**Humanities**	**Social sci.**	**All**	**STEM**	**Medicine**
	(1)	(2)	(3)	(4)	(5)	(6)
$AFC \times 1$[Age in 1997 = 1–12]	−0.094*	−0.070	−0.024	0.055	0.036	0.019
	(0.056)	(0.045)	(0.039)	(0.055)	(0.051)	(0.017)
$AFC \times 1$[Age in 1997 = 13–24]	−0.084	−0.071	−0.013	0.051	0.039	0.012
	(0.055)	(0.044)	(0.038)	(0.052)	(0.049)	(0.014)
Adjusted R^2	0.023	0.033	0.011	0.065	0.107	0.050
N	10,976	10,976	10,976	10,976	10,976	10,976
Dependent variable mean	0.350	0.116	0.234	0.478	0.409	0.069

Notes. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data. Robust standard errors in parentheses are clustered at the level of cohort by region at age 14. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Heterogeneous Effects by Parental Education (YP)

	College education		College major		Ever	Quality of first job		
	Attendance (1)	**Graduation** (2)	**HSS** (3)	**STEMM** (4)	**employed** (5)	**Log earnings** (6)	**Firm size ≥ 300** (7)	**White collar** (8)
$AFC \times 1[\text{Age in 1997} = 1\text{–}12] \times 1[\text{Father with college edu} = 0]$	−0.089*	−0.071	−0.144***	0.035	0.027	−0.111	−0.063	−0.076**
	(0.048)	(0.056)	(0.039)	(0.043)	(0.025)	(0.122)	(0.039)	(0.036)
$AFC \times 1[\text{Age in 1997} = 1\text{–}12] \times 1[\text{Father with college edu} = 1]$	−0.103**	−0.097*	−0.139***	0.018	0.008	−0.065	−0.068**	−0.099***
	(0.046)	(0.053)	(0.033)	(0.038)	(0.020)	(0.097)	(0.032)	(0.030)
$AFC \times 1[\text{Age in 1997} = 13\text{–}24] \times 1[\text{Father with college edu} = 0]$	−0.081*	−0.049	−0.132***	0.037	0.013	0.009	−0.055	−0.027
	(0.046)	(0.053)	(0.036)	(0.039)	(0.021)	(0.095)	(0.035)	(0.032)
$AFC \times 1[\text{Age in 1997} = 13\text{–}24] \times 1[\text{Father with college edu} = 1]$	−0.086*	−0.059	−0.127***	0.020	0.003	0.050	−0.048	−0.049*
	(0.044)	(0.051)	(0.032)	(0.033)	(0.016)	(0.076)	(0.030)	(0.028)
$AFC \times 1[\text{Age in 1997} = 25] \times 1[\text{Father with college edu} = 0]$	−0.019	−0.018	−0.067***	0.042*	0.005	−0.044	0.009	0.035
	(0.017)	(0.022)	(0.023)	(0.023)	(0.016)	(0.063)	(0.022)	(0.030)
Age in 1997 = 1–12: F-statistic for testing AFC effects identical across father's education groups	1.323	2.940	0.077	0.791	1.761	0.617	0.048	1.718
	[0.251]	[0.087]	[0.781]	[0.374]	[0.185]	[0.433]	[0.827]	[0.191]
Age in 1997 = 13–24: F-statistic for testing AFC effects identical across father's education groups	0.136	0.411	0.105	0.748	0.525	0.651	0.132	1.530
	[0.713]	[0.522]	[0.746]	[0.388]	[0.469]	[0.420]	[0.717]	[0.217]
Adjusted R^2	0.100	0.077	0.030	0.052	0.149	0.021	0.020	0.097
N	13,878	13,877	13,486	13,486	13,878	11,141	11,702	11,706
Dependent variable mean	0.801	0.647	0.279	0.380	0.853	14.269	0.294	0.634

Notes. The reference group is individuals who were aged 25 in 1997 and have father with college education. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data. Robust standard errors in parentheses are clustered at the level of cohort by region at age 14. p-values in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Effects on Parents' Health (KNHES)

	Poor health (1)	**Health concerns** (2)	**Stressed** (3)	**Sad or depressed** (4)	**Suicidal thoughts** (5)
$AFC \times 1$[Parent of youngest child age = 1–6]	0.118*	0.125*	0.143**	0.161***	0.073
	(0.066)	(0.070)	(0.055)	(0.052)	(0.049)
$AFC \times 1$[Parent of youngest child age = 7–12]	0.101	0.123*	0.120**	0.179***	0.085*
	(0.065)	(0.069)	(0.054)	(0.049)	(0.046)
$AFC \times 1$[Parent of youngest child age = 13–18]	0.101	0.120*	0.090*	0.136***	0.049
	(0.062)	(0.068)	(0.049)	(0.042)	(0.044)
$AFC \times 1$[Parent of youngest child age = 19–24]	0.083	0.105	0.125***	0.102**	0.053
	(0.063)	(0.068)	(0.048)	(0.043)	(0.041)
Adjusted R^2	0.052	0.037	0.007	0.035	0.023
N	4,280	4,280	4,280	4,280	4,280
Dependent variable mean	0.199	0.175	0.382	0.631	0.220

Notes. Poor health (column 1) is an indicator variable that equals 1 if an individual considers that he/she is "somewhat unhealthy" or "very unhealthy" and 0 if "average," "somewhat healthy" or "very healthy." Health concerns (column 2) is an indicator variable that equals 1 if an individual reports "always concerned" about health and 0 if "occasionally concerned," "rarely concerned," or "not concerned at all." Stressed (column 3) is an indicator variable that equals 1 if usually "feel a great deal of stress" or "feel a lot of stress" and 0 if "feel a little stress" or "hardly feel any stress." Sad or depressed (column 4) is an indicator variable that equals 1 if the individual reported feeling sadness or depression "always" or "sometimes" and 0 if "rarely" or "never." Suicidal thoughts (column 5) is an indicator variable that equals 1 if the individual had suicidal thoughts and 0 otherwise. The reference group is parents whose youngest child is 25 years old in 1997. Regressions include fixed effects for youngest child's age in 1997 (cohort) and region at the time of the survey, as well as region-specific linear cohort trends. Controls for background characteristics include parent's age and its square, the number of children, and dummies for child's gender, parent's gender, and parent's education. Observations are weighted using individual sample weights provided in the KNHES data. Robust standard errors in parentheses are clustered at the level of cohort by region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix Figures and Tables

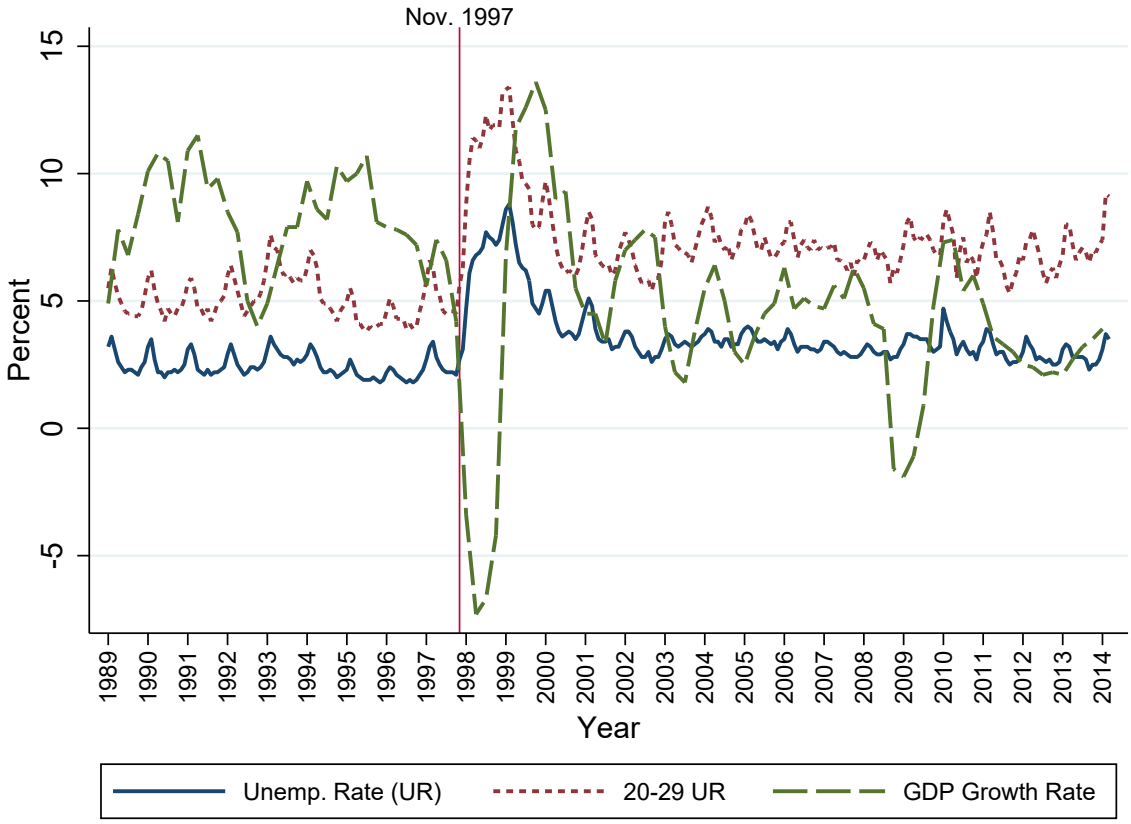


Figure A1: Macroeconomic Statistics

Notes. Taken from Choi et al. (2020) Figure 1. Monthly unemployment rates are from Statistics Korea. Quarterly real GDP growth rates are from the Bank of Korea and represent the growth rate relative to the same quarter of the previous year.

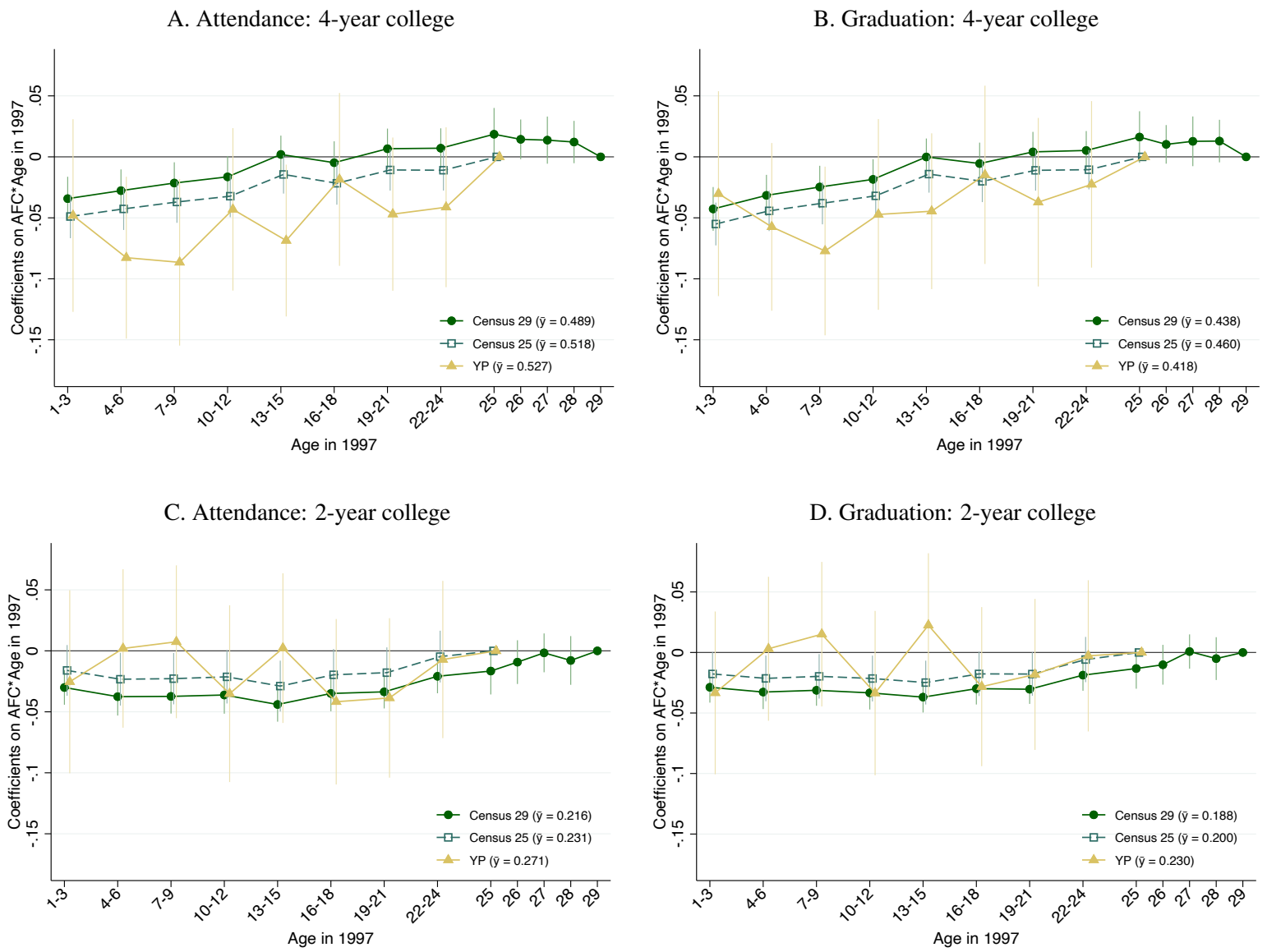


Figure A2: Effects on College Education, by College Type (Census and YP)

Notes. Vertical spikes around each point estimate represent the 95% confidence interval, clustered at the level of cohort by birth region (Census) or region at age 14 (YP). Regressions include fixed effects for age in 1997 and birth region (Census) or region at age 14 (YP), as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male (Census and YP) and father's and mother's education (YP). Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the Census or YP data.

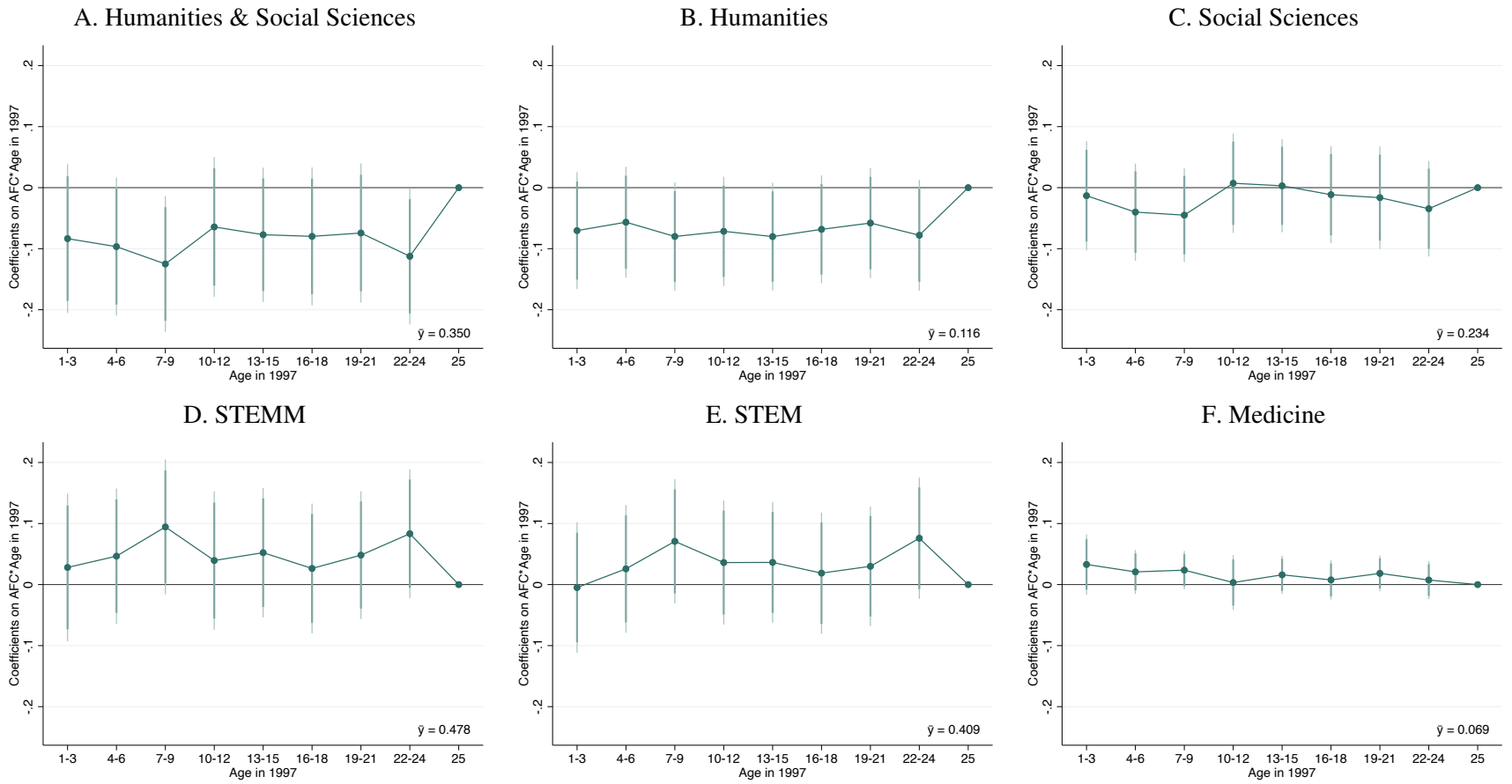
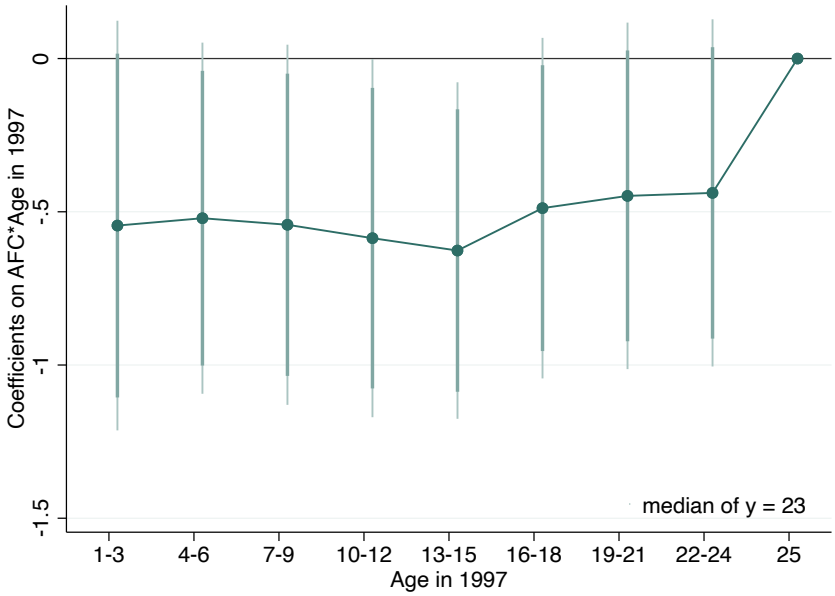


Figure A3: Effects on College Major Choice (YP)

Notes. Vertical spikes around each point estimate represent the 95% and 90% (marked darker and thicker) confidence intervals, clustered at the level of cohort by region at age 14. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data.

A. Age of Initial Employment



B. Probability of Having a First Job by a Certain Age

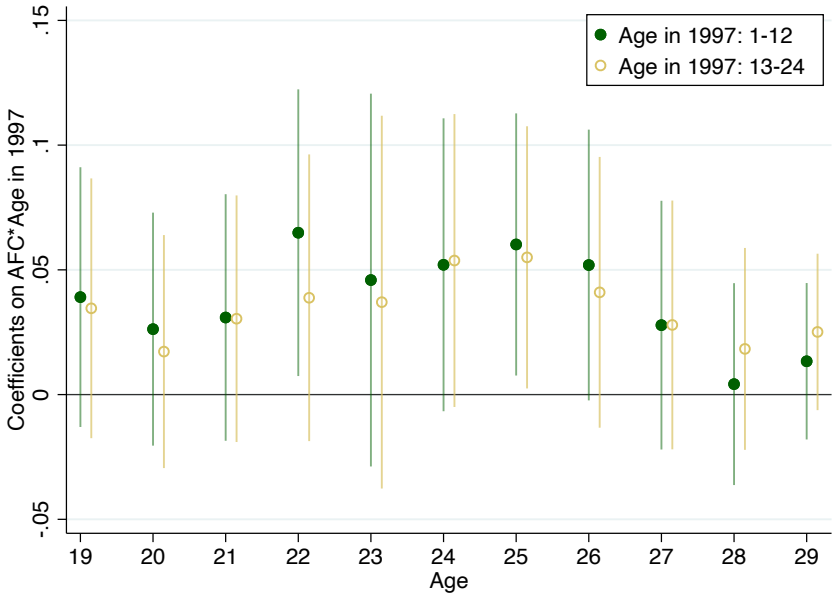


Figure A4: Effects on Age of Employment (YP)

Notes. Panel A presents coefficient estimates from a censored regression. Panel B presents coefficient estimates from separate regressions where the outcome variable indicates whether an individual had their first job by a specific age, ranging from 19 to 29. Each regression yields two estimates: one for individuals exposed to the AFC at younger ages (1–12), represented by solid dots, and another for those exposed at older ages (13–24), represented by hollow dots. Vertical spikes around each point estimate represent the 95% and 90% (marked darker and thicker) confidence intervals, clustered at the level of cohort by region at age 14. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data.

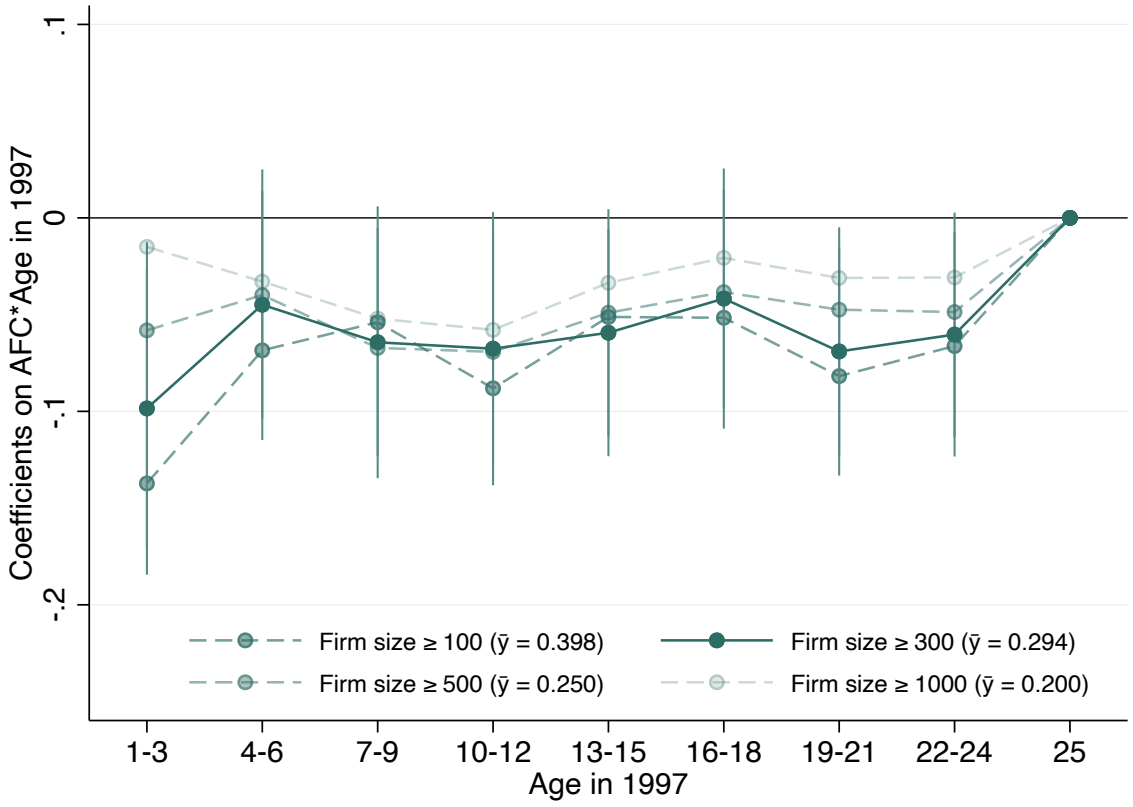
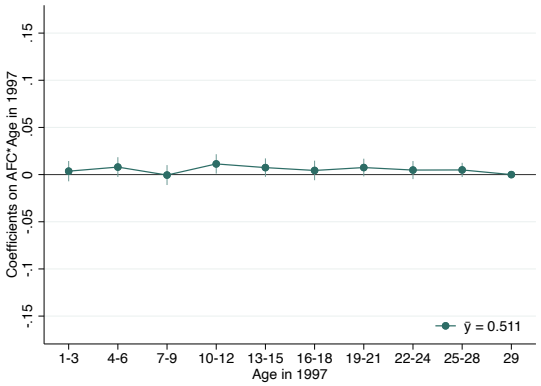


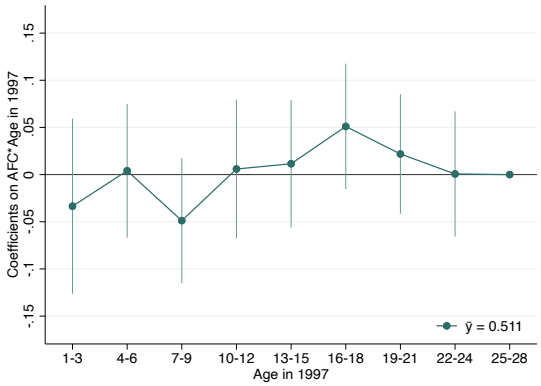
Figure A5: Effects on Firm Size at First Job (YP)

Notes. Vertical spikes around each point estimate represent the 95% confidence interval, clustered at the level of cohort by region at age 14. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data.

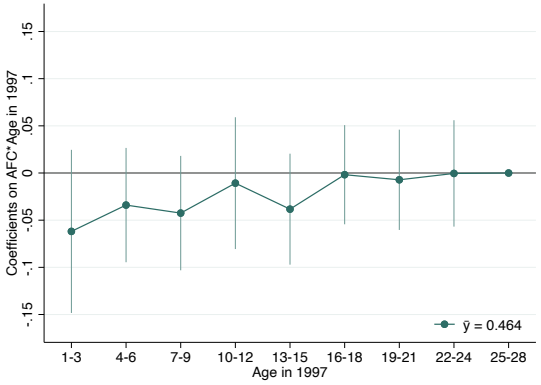
A. Male (Census)



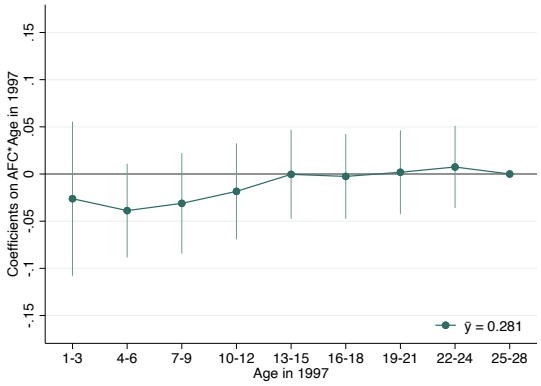
B. Male (YP)



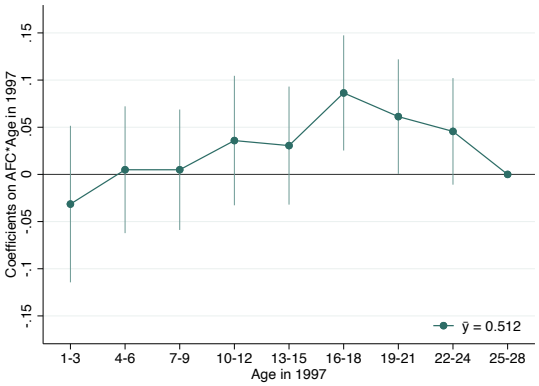
C. Father's education: some high school or high school graduate (YP)



D. Father's education: some college or more (YP)



E. Mother's education: some high school or high school graduate (YP)



F. Mother's education: some college or more (YP)

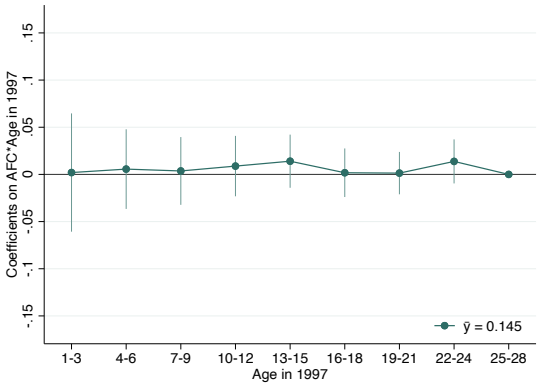


Figure A6: Baseline Characteristics Balance Check

Notes. Vertical spikes around each point estimate represent the 95% confidence interval, clustered at the level of cohort by birth region (Census) or region at age 14 (YP). Regressions include fixed effects for age in 1997 and birth region (Census) or region at age 14 (YP), as well as area-specific linear cohort trends. Observations are weighted using individual sample weights provided in the Census or YP data.

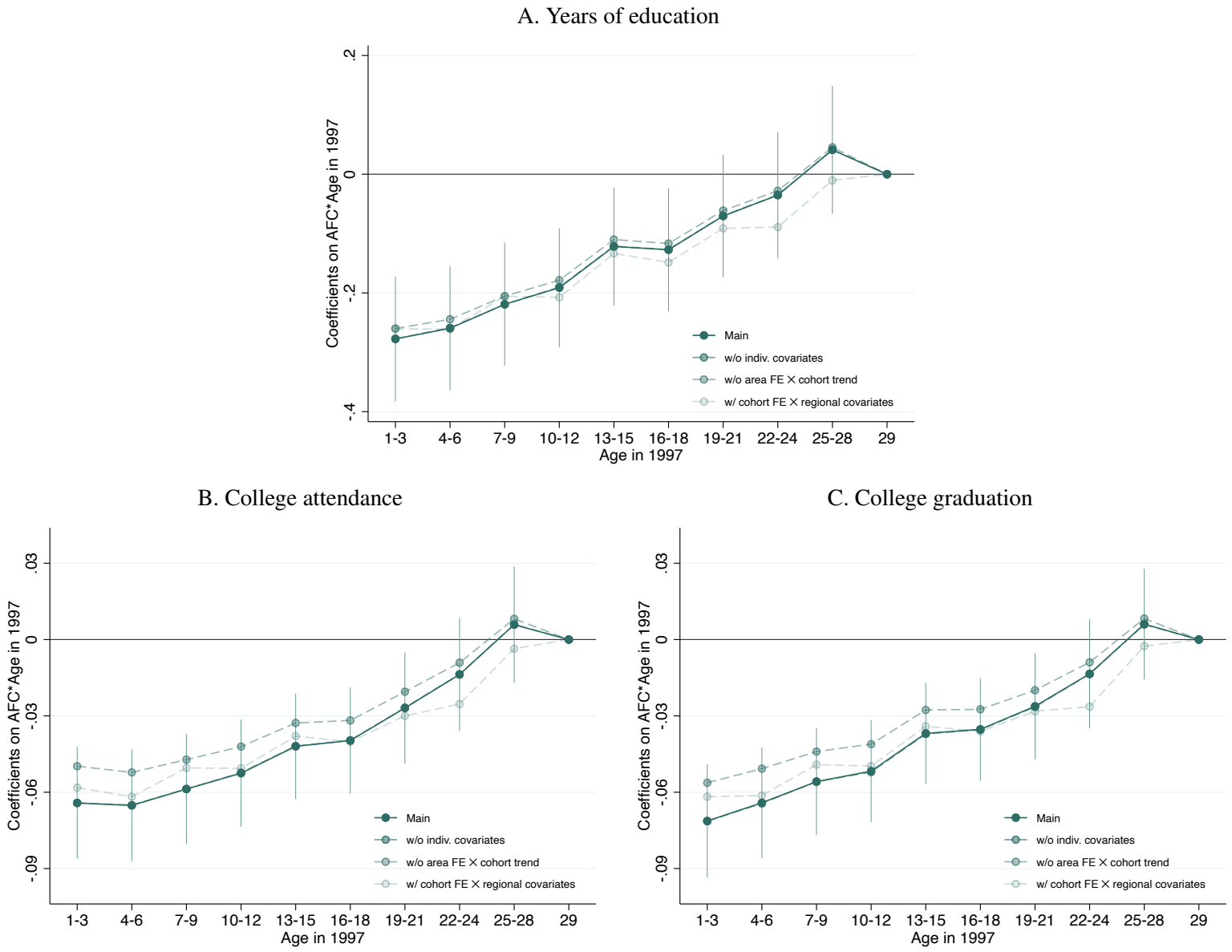


Figure A7: Alternative Specifications: Effects on Educational Attainment (Census)

Notes. Vertical spikes around each point estimate represent the 95% confidence interval, clustered at the level of cohort by birth region. Regressions include the male dummy variable and fixed effects for age in 1997 and birth region, as well as area-specific linear cohort trends. Observations are weighted using individual sample weights provided in the Census data.

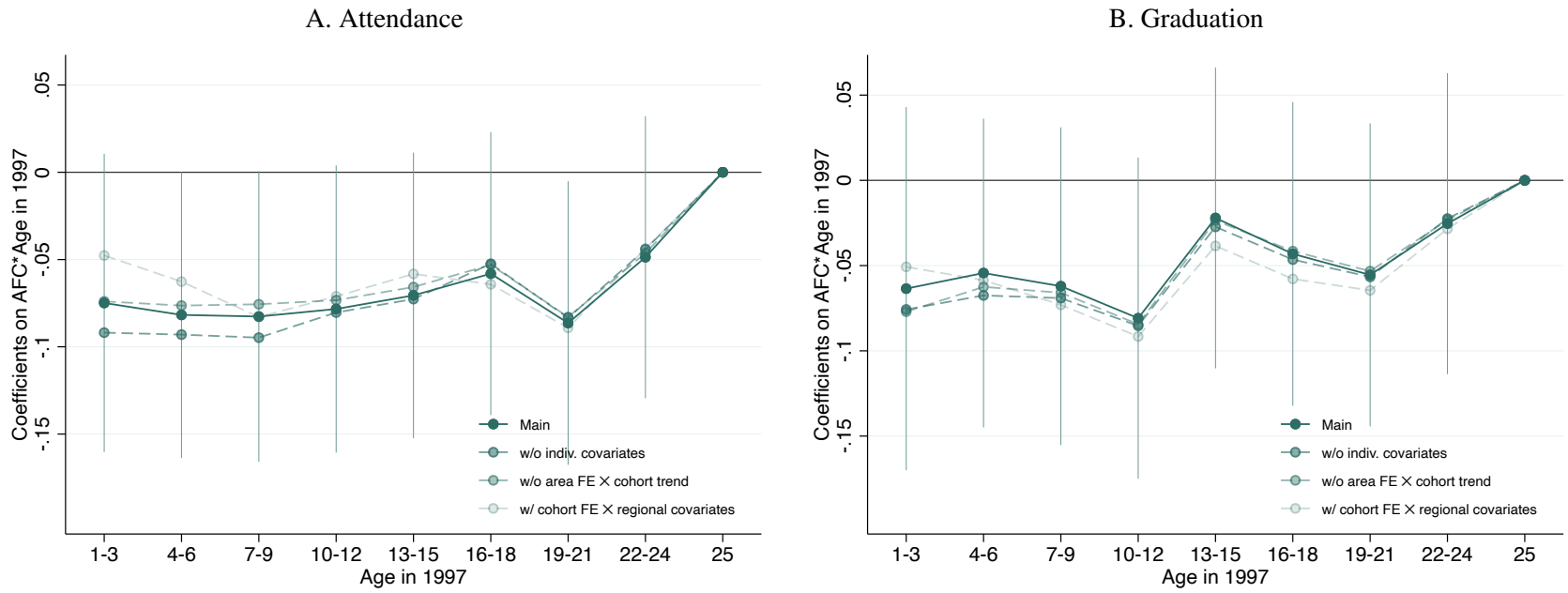


Figure A8: Alternative Specifications: Effects on College Education (YP)

Notes. Vertical spikes around each point estimate represent the 95% confidence interval, clustered at the level of cohort by region at age 14. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data.

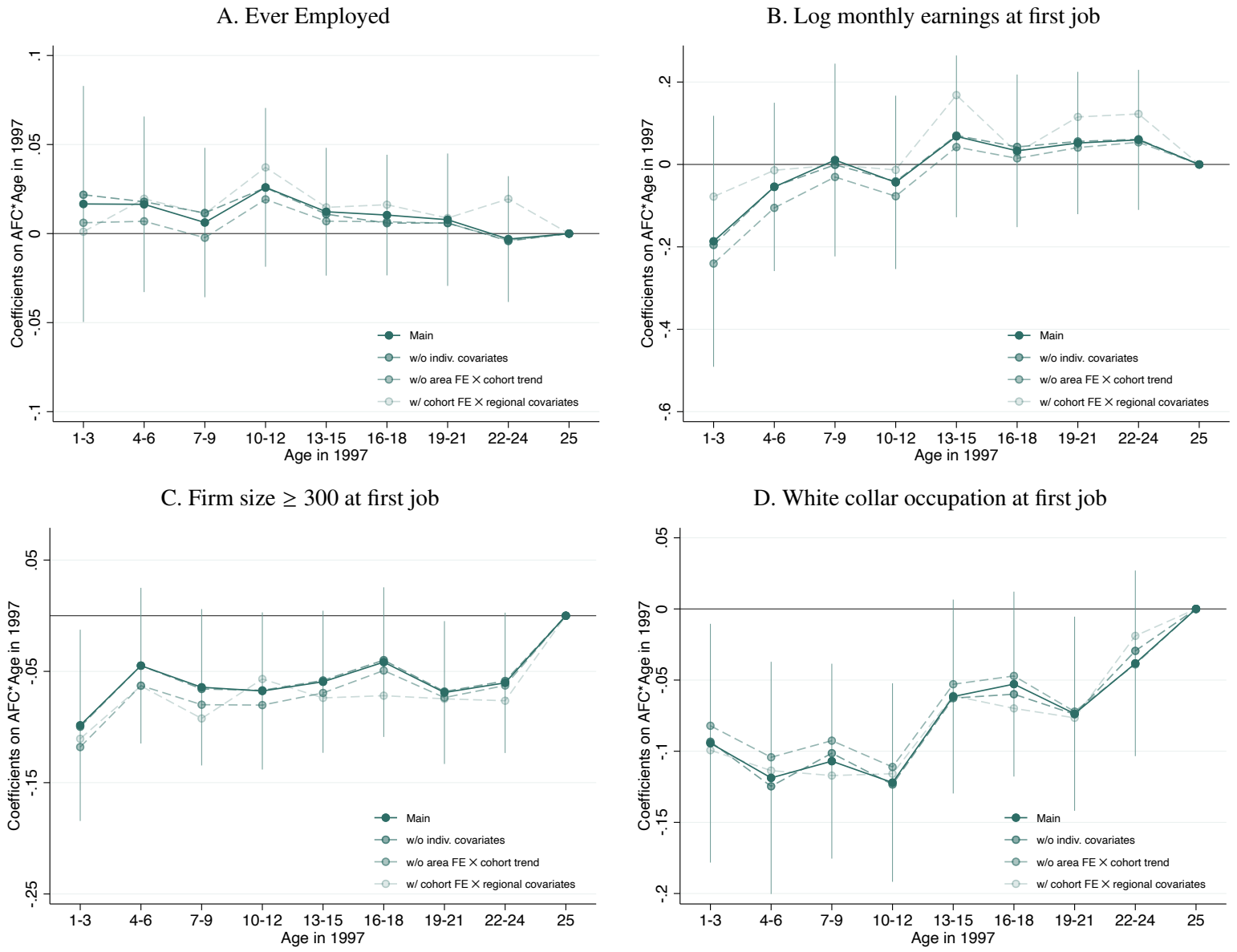


Figure A9: Alternative Specifications: Early Labor Market Outcomes (YP)

Notes. Vertical spikes around each point estimate represent the 95% confidence interval, clustered at the level of cohort by region at age 14. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data.

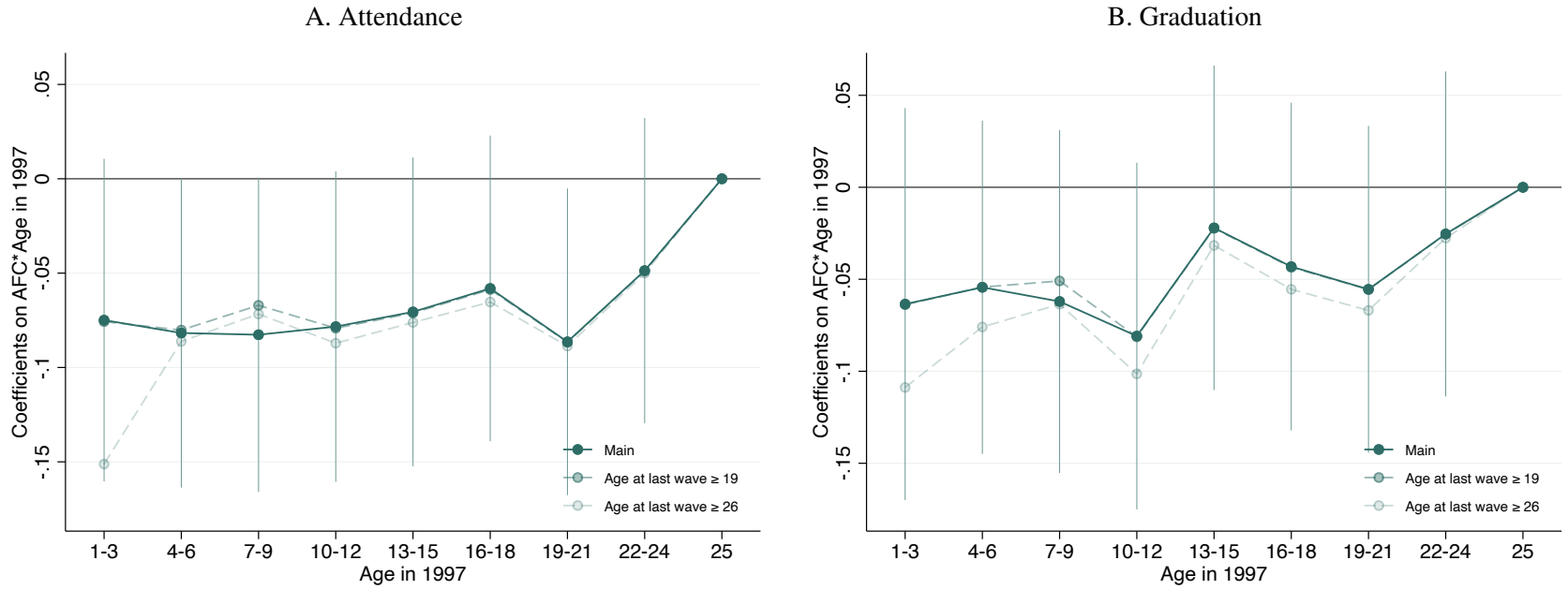


Figure A10: Alternative Sample Restrictions: Effects on College Education (YP)

Notes. Vertical spikes around each point estimate represent the 95% confidence interval, clustered at the level of cohort by region at age 14. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data.

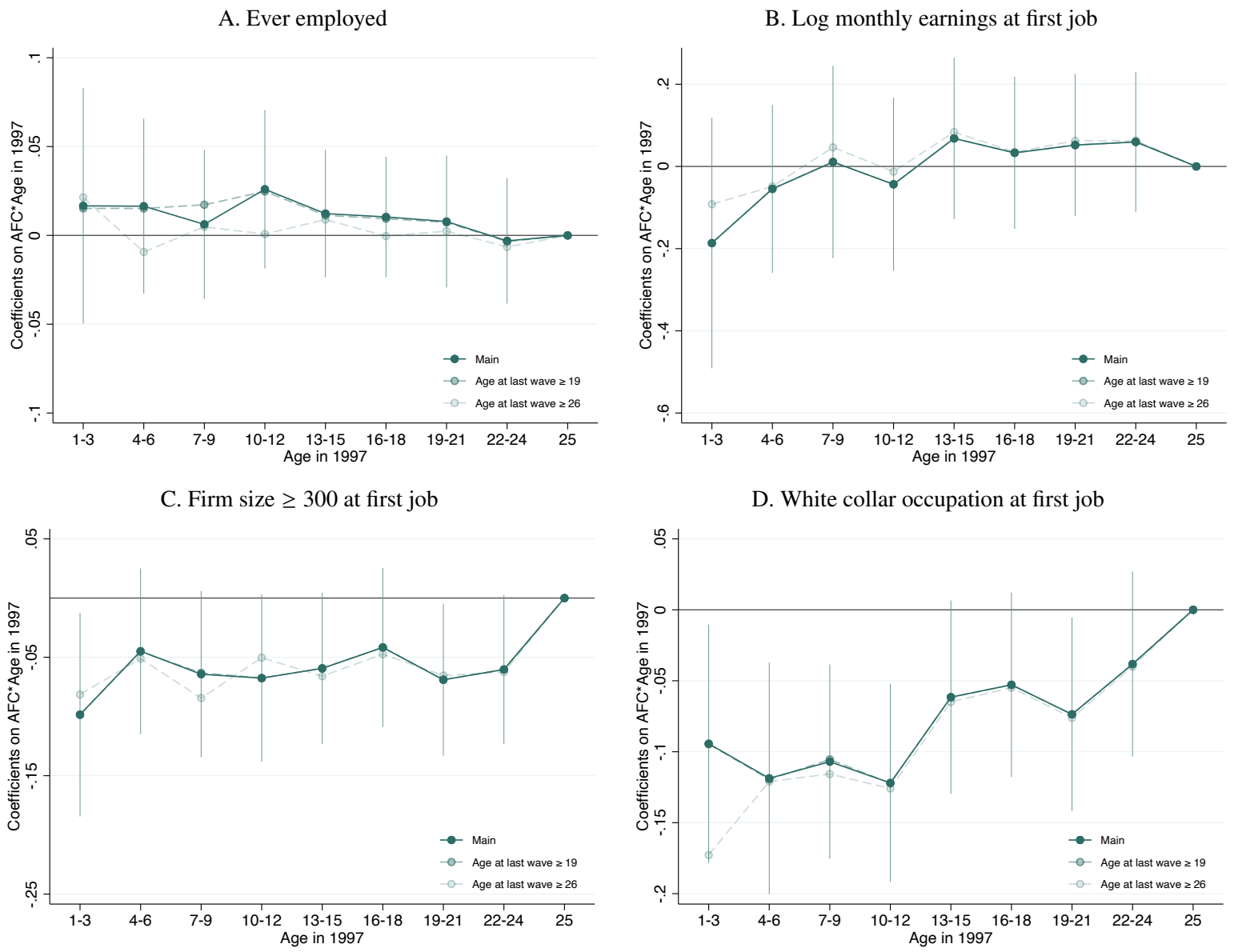
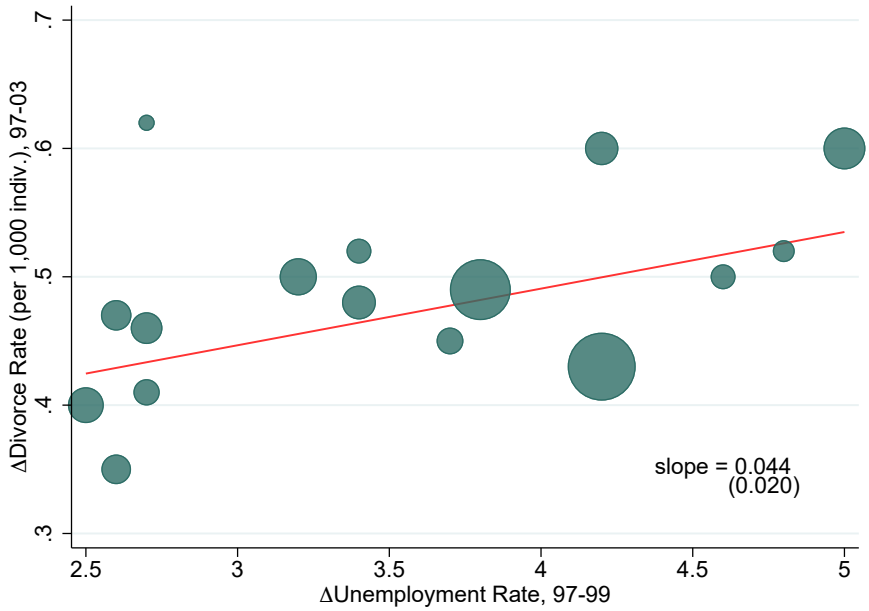


Figure A11: Alternative Sample Restrictions: Early Labor Market Outcomes (YP)

Notes. Vertical spikes around each point estimate represent the 95% confidence interval, clustered at the level of cohort by region at age 14. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data.

A. Divorce due to financial reasons



B. Education expenditure per capita

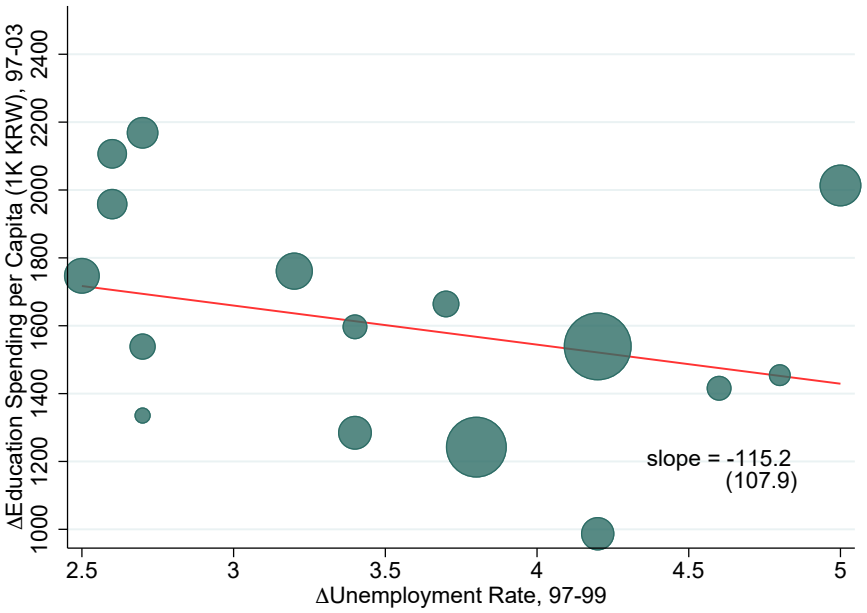


Figure A12: Change in Divorce Rate and Education Spending by Region

Notes. Panel A shows the correlation between the change in the regional unemployment rate (1997–1999) and the change in the regional divorce rate due to financial reasons (1997–2003). Divorce data come from the Civil Registration and Vital Statistics. Panel B shows the correlation between the change in the regional unemployment rate (1997–1999) and the change in the regional education spending per capita (1997–2003). Data on education spending comes from the Statistical Yearbook of Education published by the Korean Educational Statistics Service. Per capita expenditure is computed by dividing the total expenditure on kindergarten, primary and secondary schools by the number of students in those grades. Expenditure is inflation-adjusted using 2020 as the base year. Regressions are population weighted.

Table A1: Confounding Local Labor Market Shocks: Effects on Educational Attainment (Census)

	Years of education			College attendance			College graduation		
	Main	**Alt. AFC measure**	**Emp. share controls**	**Main**	**Alt. AFC measure**	**Emp. share controls**	**Main**	**Alt. AFC measure**	**Emp. share controls**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$AFC \times 1$[Age in 1997 = 1–3]	−0.277***	−0.165***	−0.342***	−0.064***	−0.038***	−0.081***	−0.071***	−0.037***	−0.087***
	(0.053)	(0.029)	(0.048)	(0.011)	(0.007)	(0.010)	(0.011)	(0.007)	(0.010)
$AFC \times 1$[Age in 1997 = 4–6]	−0.259***	−0.157***	−0.329***	−0.065***	−0.037***	−0.084***	−0.064***	−0.036***	−0.082***
	(0.053)	(0.029)	(0.047)	(0.011)	(0.007)	(0.010)	(0.011)	(0.007)	(0.010)
$AFC \times 1$[Age in 1997 = 7–9]	−0.219***	−0.131***	−0.282***	−0.059***	−0.033***	−0.077***	−0.056***	−0.031***	−0.071***
	(0.053)	(0.027)	(0.044)	(0.011)	(0.006)	(0.010)	(0.011)	(0.006)	(0.009)
$AFC \times 1$[Age in 1997 = 10–12]	−0.191***	−0.139***	−0.272***	−0.053***	−0.034***	−0.073***	−0.052***	−0.032***	−0.070***
	(0.051)	(0.027)	(0.044)	(0.011)	(0.006)	(0.010)	(0.010)	(0.006)	(0.009)
$AFC \times 1$[Age in 1997 = 13–15]	−0.122**	−0.092***	−0.198***	−0.042***	−0.027***	−0.061***	−0.037***	−0.023***	−0.055***
	(0.050)	(0.026)	(0.042)	(0.011)	(0.006)	(0.010)	(0.010)	(0.006)	(0.009)
$AFC \times 1$[Age in 1997 = 16–18]	−0.127**	−0.091***	−0.179***	−0.040***	−0.027***	−0.053***	−0.035***	−0.023***	−0.048***
	(0.053)	(0.026)	(0.045)	(0.011)	(0.006)	(0.010)	(0.010)	(0.006)	(0.009)
$AFC \times 1$[Age in 1997 = 19–21]	−0.070	−0.055**	−0.094**	−0.027**	−0.018***	−0.036***	−0.026**	−0.014**	−0.033***
	(0.052)	(0.027)	(0.043)	(0.011)	(0.006)	(0.010)	(0.011)	(0.006)	(0.009)
$AFC \times 1$[Age in 1997 = 22–24]	−0.035	−0.033	−0.076*	−0.014	−0.010*	−0.024**	−0.013	−0.009	−0.021**
	(0.054)	(0.027)	(0.043)	(0.011)	(0.006)	(0.010)	(0.011)	(0.006)	(0.009)
$AFC \times 1$[Age in 1997 = 25–28]	0.041	0.004	0.019	0.006	−0.000	−0.002	0.006	0.001	0.001
	(0.055)	(0.028)	(0.044)	(0.012)	(0.006)	(0.010)	(0.011)	(0.006)	(0.009)
Adjusted R^2	0.064	0.064	0.065	0.101	0.101	0.102	0.066	0.066	0.067
N	369,816	369,816	369,816	369,816	369,816	369,816	369,816	369,816	369,816
Dependent variable mean	14.417	14.417	14.417	0.705	0.705	0.705	0.626	0.626	0.626

Notes. Columns (1), (4), and (7) reproduce estimates from the baseline specification in equation (1). Columns (2), (5), and (8) use the magnitude of the decrease in the regional employment-population ratio between 1997 and 1999 ($-\Delta EPOP_r^{97-99}$), as an alternative measure of AFC_r. Columns (3), (6), and (9) add to the baseline specification the interactions between cohort fixed effects and the initial share of regional employment in manufacturing in 1995 ($MS_r^{95} \times \delta_c$). Regressions include the male dummy variable and fixed effects for age in 1997 and birth region, as well as area-specific linear cohort trends. Observations are weighted using individual sample weights provided in the Census data. Robust standard errors in parentheses are clustered at the level of cohort by birth region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A2: Confounding Local Labor Market Shocks: Effects on College Education (YP)

	College attendance			College graduation		
	Main	**Alt. AFC measure**	**Emp. share controls**	**Main**	**Alt. AFC measure**	**Emp. share controls**
	(1)	(2)	(3)	(4)	(5)	(6)
$AFC \times 1[\text{Age in 1997} = 1\text{–}3]$	−0.075*	−0.055***	−0.078	−0.064	−0.054**	−0.073
	(0.043)	(0.019)	(0.049)	(0.054)	(0.025)	(0.059)
$AFC \times 1[\text{Age in 1997} = 4\text{–}6]$	−0.082*	−0.063***	−0.085*	−0.054	−0.059***	−0.066
	(0.042)	(0.016)	(0.047)	(0.046)	(0.019)	(0.051)
$AFC \times 1[\text{Age in 1997} = 7\text{–}9]$	−0.083*	−0.071***	−0.090*	−0.062	−0.062***	−0.068
	(0.042)	(0.017)	(0.048)	(0.047)	(0.020)	(0.053)
$AFC \times 1[\text{Age in 1997} = 10\text{–}12]$	−0.078*	−0.068***	−0.084*	−0.081*	−0.069***	−0.096*
	(0.042)	(0.017)	(0.048)	(0.048)	(0.020)	(0.054)
$AFC \times 1[\text{Age in 1997} = 13\text{–}15]$	−0.071*	−0.068***	−0.070	−0.022	−0.052***	−0.026
	(0.042)	(0.017)	(0.048)	(0.045)	(0.019)	(0.051)
$AFC \times 1[\text{Age in 1997} = 16\text{–}18]$	−0.058	−0.059***	−0.071	−0.043	−0.055***	−0.070
	(0.041)	(0.017)	(0.048)	(0.045)	(0.019)	(0.051)
$AFC \times 1[\text{Age in 1997} = 19\text{–}21]$	−0.086**	−0.074***	−0.092*	−0.055	−0.060***	−0.064
	(0.041)	(0.017)	(0.049)	(0.045)	(0.019)	(0.052)
$AFC \times 1[\text{Age in 1997} = 22\text{–}24]$	−0.049	−0.050***	−0.041	−0.025	−0.040**	−0.020
	(0.041)	(0.017)	(0.048)	(0.045)	(0.018)	(0.052)
Adjusted R^2	0.098	0.099	0.098	0.074	0.074	0.075
N	13,878	13,878	13,878	13,877	13,877	13,877
Dependent variable mean	0.801	0.801	0.801	0.647	0.647	0.647

Notes. Columns (1) and (4) reproduce estimates from the baseline specification in equation (1). Columns (2) and (5) use the magnitude of the decrease in the regional employment-population ratio between 1997 and 1999 ($-\Delta EPOP_r^{97-99}$), as an alternative measure of AFC_r. Columns (3) and (6) add to the baseline specification the interactions between cohort fixed effects and the initial share of regional employment in manufacturing in 1995 ($MS_r^{95} \times \delta_c$). Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data. Robust standard errors in parentheses are clustered at the level of cohort by region at age 14. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3: Confounding Local Labor Market Shocks: Effects on Early Labor Market Outcomes (YP)

	Ever employed			Log earnings			Firm size ≥ 300			White collar		
	Main	**Alt. AFC measure**	**Emp. share controls**	**Main**	**Alt. AFC measure**	**Emp. share controls**	**Main**	**Alt. AFC measure**	**Emp. share controls**	**Main**	**Alt. AFC measure**	**Emp. share controls**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$AFC \times 1$[Age in 1997 = 1–3]	0.017	−0.000	−0.003	−0.187	−0.053	−0.102	−0.098**	−0.016	−0.083*	−0.094**	−0.060***	−0.122**
	(0.034)	(0.020)	(0.030)	(0.155)	(0.076)	(0.152)	(0.044)	(0.024)	(0.046)	(0.043)	(0.020)	(0.048)
$AFC \times 1$[Age in 1997 = 4–6]	0.016	0.001	−0.007	−0.055	0.020	−0.021	−0.045	−0.014	−0.039	−0.119***	−0.074***	−0.118**
	(0.025)	(0.015)	(0.022)	(0.104)	(0.042)	(0.107)	(0.036)	(0.018)	(0.039)	(0.042)	(0.019)	(0.046)
$AFC \times 1$[Age in 1997 = 7–9]	0.006	−0.001	0.004	0.011	−0.001	0.051	−0.064*	−0.020	−0.059	−0.107***	−0.072***	−0.116***
	(0.021)	(0.012)	(0.018)	(0.119)	(0.044)	(0.117)	(0.036)	(0.019)	(0.040)	(0.035)	(0.016)	(0.040)
$AFC \times 1$[Age in 1997 = 10–12]	0.026	0.014	0.001	−0.043	0.032	0.030	−0.068*	−0.020	−0.060	−0.122***	−0.080***	−0.134***
	(0.023)	(0.014)	(0.020)	(0.107)	(0.049)	(0.114)	(0.036)	(0.019)	(0.040)	(0.035)	(0.015)	(0.042)
$AFC \times 1$[Age in 1997 = 13–15]	0.012	−0.002	−0.011	0.068	0.104**	0.131	−0.059*	−0.009	−0.038	−0.062*	−0.039**	−0.063
	(0.018)	(0.011)	(0.015)	(0.100)	(0.046)	(0.107)	(0.032)	(0.017)	(0.038)	(0.035)	(0.016)	(0.040)
$AFC \times 1$[Age in 1997 = 16–18]	0.010	0.000	−0.016	0.033	0.052	0.091	−0.042	−0.015	−0.023	−0.053	−0.043***	−0.073*
	(0.017)	(0.010)	(0.014)	(0.094)	(0.040)	(0.105)	(0.034)	(0.019)	(0.040)	(0.033)	(0.015)	(0.040)
$AFC \times 1$[Age in 1997 = 19–21]	0.008	0.003	−0.010	0.052	0.059	0.114	−0.069**	−0.017	−0.064	−0.074**	−0.041**	−0.108**
	(0.019)	(0.011)	(0.018)	(0.088)	(0.036)	(0.099)	(0.033)	(0.018)	(0.039)	(0.035)	(0.018)	(0.042)
$AFC \times 1$[Age in 1997 = 22–24]	−0.003	−0.006	−0.017	0.060	0.059*	0.138	−0.060*	−0.012	−0.044	−0.038	−0.030**	−0.037
	(0.018)	(0.010)	(0.016)	(0.086)	(0.036)	(0.099)	(0.032)	(0.017)	(0.039)	(0.033)	(0.015)	(0.041)
Adjusted R^2	0.148	0.148	0.150	0.021	0.022	0.024	0.020	0.019	0.021	0.097	0.097	0.097
N	13,878	13,878	13,878	11,141	11,141	11,141	11,702	11,702	11,702	11,706	11,706	11,706
Dependent variable mean	0.853	0.853	0.853	14.269	14.269	14.269	0.294	0.294	0.294	0.634	0.634	0.634

Notes. Columns (1), (4), (7), and (10) reproduce estimates from the baseline specification in equation (1). Columns (2), (5), (8), and (11) use the magnitude of the decrease in the regional employment-population ratio between 1997 and 1999 ($-\Delta EPOP_r^{97-99}$), as an alternative measure of AFC_r. Columns (3), (6), (9), and (12) add to the baseline specification the interactions between cohort fixed effects and the initial share of regional employment in manufacturing in 1995 ($MS_r^{95} \times \delta_c$). Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data. Robust standard errors in parentheses are clustered at the level of cohort by region at age 14. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A4: Effects on Life Events (YP)

	Death of parent (1)	**Death of family member** (2)	**Parental divorce** (3)
$AFC \times 1[\text{Age in 1997} = 4\text{–}6]$	0.001	0.019**	0.004
	(0.005)	(0.008)	(0.006)
$AFC \times 1[\text{Age in 1997} = 7\text{–}9]$	0.002	0.009	−0.003
	(0.003)	(0.006)	(0.004)
$AFC \times 1[\text{Age in 1997} = 10\text{–}12]$	−0.002	0.006	0.003
	(0.003)	(0.005)	(0.003)
$AFC \times 1[\text{Age in 1997} = 13\text{–}15]$	−0.002	0.002	0.004**
	(0.002)	(0.003)	(0.002)
Adjusted R^2	0.014	0.088	0.014
N	10,178	10,178	10,178
Dependent variable mean	0.007	0.026	0.010

Notes. The dependent variable is whether an individual experienced a life event between his/her age in 1997 and age 15. Death of family member excludes parental death. The reference group is individuals who were aged 16–19 in 1997. Regressions include fixed effects for age in 1997 and region at age 14, as well as area-specific linear cohort trends. Controls for background characteristics include dummies for male and father's and mother's education. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Observations are weighted using individual sample weights provided in the YP data. Robust standard errors in parentheses are clustered at the level of cohort by region at age 14. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$