The Long-Term Effects of Labor Market Entry in a Recession: Evidence from the Asian Financial Crisis*

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August 27, 2019

Abstract

This paper investigates the long-term effects of initial labor market conditions by comparing cohorts who graduated from college before, during, and after the 1997–1998 Asian financial crisis. We measure the overall welfare impact by examining not only labor market activities but also family formation and wealth accumulation. Using data from 20 waves of the Korean Labor and Income Panel Study, we find a substantial and persistent reduction in employment, earnings, marriage, fertility, and financial assets among men who graduated in a bad economy. For women, limited job opportunities at graduation result in an increase in childbearing.

JEL Codes: E32, J13, E21, J21
Keywords: recession, financial crisis, long-term effects, college graduates

1 Introduction

Since the Great Recession, there have been growing discussions in academic and policy circles on the long-term effects of labor market entry in a deep recession. In spite of its important policy implications, especially for the young population, the scope of research has been limited because of the relatively recent occurrence of this major economic crisis. Previous studies focusing on regular business cycles may not be able to provide an accurate prediction on the impact of the Great Recession—the longest and deepest recession of the post-World War II era. Recent evidence suggests that the disadvantage of graduating during the Great Recession might be more severe, but the study is so far limited to the short- and medium-run labor market outcomes.[1]

This paper aims to shed light on the long-term consequences of entering the labor market in a deep economic downturn by studying the 1997–1998 Asian financial crisis, which created a historic economic meltdown in the region. In particular, we investigate the case of South Korea, which had entered a sharp and deep recession, triggered by the Asian financial crisis, in November 1997. Macroeconomic statistics indicate that the Asian financial crisis in South Korea was comparable to the Great Recession in the United States or Europe in terms of the magnitude and duration. As shown in Figure 1, the GDP growth rate in South Korea fell precipitously from 5.8 to −5.5 percent and the unemployment rate soared from 2.6 to 7.0 percent during the period of 1997–1998. The economic recovery took about three years.

[Figure 1 here]

To the best of our knowledge, this is the first work to examine the long-term effects of labor market entry conditions using the 1997–1998 Asian financial crisis as a natural experiment. Given that the timing of the crisis was unexpected and the magnitude of the shock was substantially large, the incidence of the Asian financial crisis provides a useful source of identification. Specifically, we exploit sharp deviations in economic conditions at labor market entry from its smooth trend by comparing cohorts who graduated from college before, during, and after the crisis.

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[1]Altonji et al. (2016) find a disproportionately larger reduction in early-career earnings among college graduates who entered the labor market in the Great Recession relative to those who graduated in past recessions.

We examine a comprehensive set of outcomes on work, family, and household finance to measure the overall impact of labor market entry conditions on individuals' welfare. As more than 20 years have passed since the occurrence of the Asian financial crisis, we can measure the long-term impact on outcomes beyond early career status by tracking the crisis cohorts up to their mid-40s. In particular, having a sufficient amount of time between the severe economic downturn and today enables us to distinguish a permanent change from temporary adjustments in marriage, fertility, or asset building.

We use data from the Korean Labor and Income Panel Study (KLIPS), an annual longitudinal study of a representative sample of South Korean households (and individuals therein) in urban areas. Pooling all 20 waves of the KLIPS spanning 1998–2017, we construct our analysis sample of men and women who graduated from college between 1989 and 2010. We followed this sample for up to 19 years after graduation. We estimate a regression model exploiting across-cohort variation in the national or regional unemployment rates at college graduation. Various robustness checks show that our estimates are unaffected by endogenous selection into the timing of college graduation, alternative measures of labor market conditions, functional form assumptions, or sample restrictions.

Our results suggest that labor market entry conditions have a substantial long-term impact on work, family, and financial outcomes. Also, the effects are very different for men and women who face different choice sets and constraints in work and life. For men, we find a large and persistent reduction in employment and earnings for nine years of labor market experience among those who graduated from college during the Asian financial crisis. The deterioration in career outcomes leads to a permanent decline in the marriage and childbearing rate and a substantial delay in financial asset building. For women, on the other hand, the penalty in the labor market disappears in two years, and consumption and asset holdings are mostly unaffected. Instead, women respond to limited job opportunities at college graduation by substituting into motherhood and having more children.

Although there is a large literature on significant and persistent earnings losses among those

2

starting their career in adverse economic conditions relative to their luckier peers (such adverse conditions and their results are also known as a *scarring effect*), the impacts of labor market entry conditions on other aspects of life, such as family formation and asset holdings, are understudied.[2] Kawaguchi and Kondo (forthcoming) is the only existing study that measures the overall welfare consequences on the scarred cohorts.[3]

There are a growing but still small number of studies on the long-term effects of initial labor market conditions on marriage and fertility (Hashimoto and Kondo, 2012; Hershbein, 2012; Kondo, 2012; Currie and Schwandt, 2014; Hofmann and Hohmeyer, 2016; Maclean et al., 2016). Given that no consensus has been reached regarding the effect of initial economic conditions on non-labor market outcomes, our study contributes to the literature by illustrating a substantial welfare loss suffered by those starting their careers in a deep recession.

The remainder of the paper is organized as follows. Section 2 outlines the 1997–1998 Asian financial crisis and its impacts on the South Korean economy. Section 3 discusses the empirical strategy to measure the long-term effects of initial labor market conditions. Section 4 describes the KLIPS data and the analysis sample. Section 5 presents estimation results on labor market, family, and financial outcomes. Section 6 includes various robustness checks. Section 7 concludes.

2 Background on the Asian Financial Crisis

Before the occurrence of the Asian financial crisis in 1997, South Korea had sustained a period of high economic growth, with the annual GDP growth rate of more than 5 percent since 1981. For three consecutive years, from 1994 through 1996, the annual GDP growth rate had reached

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[2]Empirical evidence on labor market outcomes is provided by Genda et al. (2010), Kahn (2010), Hershbein (2012), Altonji et al. (2016), and Schwandt and von Wachter (2019) for the United States, Oreopoulos et al. (2012) for Canada, Genda et al. (2010) for Japan, Brunner and Kuhn (2014) for Austria, Cockx and Ghirelli (2016) for Flanders, van den Berge (2018) for the Netherlands, Raaum and Røed (2006) for Norway, and Fernández-Kranz and Rodríguez-Planas (2018) for Spain. CoCkx (2016) provides an overview of the literature on penalties in employment and earnings from labor market entry in economic downturns.

[3]Using a sample of white male college graduates from the National Longitudinal Survey of Youth 1979 Cohort (NLSY79), Kawaguchi and Kondo (forthcoming) find that penalties in the labor market do not affect family formation or asset building, as the scarred cohorts mitigate the reduction in earnings by migrating to places with lower costs of living.

Electronic copy available at: https://ssrn.com/abstract=3431443

7–9 percent. Other economic measures also seemed robust: low inflation with a sound public sector budget (IMF, 2003) and a foreign debt-to-GDP ratio below 30 percent (Kim, 2006). Growth potential continued to remain high in the 1990s before the crisis, when there were large inflows of foreign capital to emerging markets in Asia.

The currency crisis started in Thailand in July 1997 and spread rapidly to other Southeast Asian countries. A sudden reversal of capital flows followed in the East Asian region. Foreign creditors refused to roll over loans, which forced the governments to drain foreign currency reserves to help financial institutions meet short-term obligations. Among the East Asian countries, South Korea was one of the hardest hit by the crisis because most of the foreign debt was short-term.[4] As foreign reserves dried up at a dangerous level, the South Korean government sought help from the International Monetary Fund (IMF) on November 21, 1997. South Korea's currency lost 46 percent of its value, and the stock market index dropped by 50 percent (Goldstein, 1998). The crisis rapidly spread to nonfinancial sectors. Eleven large conglomerates (a.k.a. *chaebols*) collapsed, and 10 more were on the verge of bankruptcy (Lee, 1998).

The crisis was not only severe, but also unexpected. Because of the sound macroeconomic indicators before the crisis, neither credit rating agencies nor the IMF expected South Korea to experience such a rapid deterioration of the economy. Their reports showed optimism in 1996 and even in the first half of 1997 (Radelet and Sachs, 1998). In turn, individuals were largely unprepared for the onset of the crisis.

The Asian financial crisis had an acutely negative impact on the South Korean labor market. About 1.3 million individuals lost their jobs as a result of mass layoffs and business closings, and the number of the unemployed reached a record high at almost 1.5 million in 1998 (Baek, 2017).[5] As shown in Figure 1, the unemployment rate more than doubled from 2.6 in 1997 to 7.0 percent in 1998 and remained high at 6.4 percent in 1999. Younger workers or first-time job seekers were particularly hard hit by the lack of job openings at the onset of the crisis. In 1998 and 1999, the youth unemployment rate for 20-to-29-year-olds was over 10 percent, about 4 percentage points

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[4]Sixty-seven percent of total debt was short-term as of June 1997 (Goldstein, 1998).

[5]The size of the labor force was 22.3 million in 1997 (Source: World Development Indicators, The World Bank).

4

higher than the overall unemployment rate.

3   Empirical Strategy

In this section, we describe the regression models used for measuring the recession effects and elaborate on the identification assumption. To measure the long-term effect of graduating in a recession on various individual outcomes, we estimate a standard regression model in the "scarring effect" literature, exploiting across-cohort variation in the national or regional unemployment rates at college graduation.

The regression specifications vary with the type of outcome variables, considering there is a substantial amount of year-to-year variation in labor market and financial outcomes but much less in family formation. First, we measure the effect of labor market entry conditions on time-varying outcomes, such as employment, earnings, and asset holdings, by estimating the following regression equation:

$$y_{it} = \alpha + \sum_{k=1}^{5} \beta_k (UR_c \times 1[3k-2 \le e \le 3k]) + \beta_6 (UR_c \times 1[e \ge 16]) + \mathbf{X}_i'\gamma + f(c) + \delta_r + \phi_t + \tau_e + \varepsilon_{it}, \quad (1)$$

where y_{it} is the outcome of interest for person i (who graduated from college in year c and region r) in calendar year t.[6] UR_c is the national unemployment rate measured in the year of graduation c. When we use the regional unemployment rate instead of the national rate, UR_c is substituted for by UR_{cr} measured in year c and region r of college graduation. The index e refers to years of potential labor market experience (i.e., years since college graduation, $e \equiv t - c$). We combine years of potential experience into six group-level dummies: 1–3, 4–6, 7–9, 10–12, 13–15, and 16 years or more.[7] A vector of person i's predetermined characteristics $\mathbf{X}_i$, such as father's education level and parents' job status at age 14, controls for baseline ability and family background. $f(c)$ is a cubic function of college graduation year c (i.e., graduation cohort) that captures a smooth

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[6]The region of college graduation is the location of college.

[7]1[·] is an indicator function for the condition inside the brackets.

national cohort trend in economic conditions at labor market entry. The regression also includes fixed effects for region of college graduation (δ_r), calendar year (ϕ_t), and years of potential experience (τ_e).[8] ε_{it} is the error term that represents the remaining unobserved determinants of the outcome. The coefficients β_k's (for $k = 1,...,6$) on the interaction between dummies for potential labor market experience and the initial unemployment rate are parameters of interest. Given the included controls, β_k's measure changes in the experience profile of a time-varying outcome, such as employment, earnings, and asset values, associated with a 1 percentage point increase in the unemployment rate at labor market entry.

When we measure the overall effect instead of heterogeneous effects by years since graduation, equation (1) simplifies to:

$$y_{it} = \alpha + \beta UR_c + \mathbf{X}_i'\boldsymbol{\gamma} + f(c) + \delta_r + \phi_t + \tau_e + \varepsilon_{it}, \tag{2}$$

where β measures the average effect of a 1 percentage point change in the initial unemployment rate on the time-varying outcome over a certain number of years of one's career. We calculate the average effect over the first 5, 10, and 15 years of potential experience in the labor market. Control variables are the same as in equation (1). Standard errors are clustered at the level of graduation year by region.

Second, for family formation outcomes with little year-to-year variation, we focus on the cumulative status rather than yearly changes. We collapse multiple waves of the panel data into a single cross section and estimate the following specification:

$$y_i = \alpha + \beta UR_c + \mathbf{X}_i'\boldsymbol{\gamma} + f(c) + \delta_r + \tau_e + \varepsilon_i. \tag{3}$$

We construct several types of y_i related to family formation status as of the most recent year in

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[8]It is not feasible to control for cohort, calendar year, and years of potential experience in the same regression without imposing a restriction (Deaton, 1997). To avoid the perfect multicollinearity problem, we follow the literature (e.g., Oreopoulos et al., 2012; Cockx and Ghirelli, 2016; Schwandt and von Wachter, 2019) and drop one additional calendar year dummy. This practice implicitly assumes that the magnitude of contemporaneous shocks in the labor market is the same in the two omitted years.

which person *i* participated in the survey. The outcome variables include whether an individual has ever been married, age at first marriage, whether an individual has any children, number of children, and age at first childbirth. τ_e represents fixed effects for years since college graduation as of the most recent survey year.[9] When the dependent variable is age at first marriage or age at first childbirth, we employ censored regressions and duration analyses instead of ordinary least squares (OLS) to account for right-censoring in duration until the initiation of marriage or fertility.

In all regression specifications, the identification relies on sharp deviations from a smooth long-term cohort trend in the unemployment rates mainly driven by the unexpected occurrence of the Asian financial crisis. The key assumption is that this temporal variation in the unemployment rate at labor market entry is not systematically related to the composition of each graduation cohort once a common smooth trend is removed. We examine the validity of this identification assumption and show that our results are not driven by selection in Section 6. The cubic function of college graduation year $f(c)$ controls for any smooth changes across cohorts not only in initial labor market conditions but also in the composition of graduation cohorts or the outcome variables. Examples include possible changes in the average quality of college graduates due to the secular increase in the college enrollment rate and the long-term decline in the fertility rate. $f(c)$ would also capture any spillover effects of a recession distributed smoothly across cohorts.

We use a polynomial function $f(c)$ instead of fixed effects for college graduation year to control for a national cohort trend because there is strong comovement in the unemployment rates across regions in South Korea, unlike the United States or Canada. Correlations between the yearly regional and national unemployment rates in 1989–2014 range from 0.89 to 0.98. In this case, fixed effects for college graduation year would attribute most of variation from business cycles to a secular trend. Studies on the "scarring effect" in a small European country also use a parametric specification for cohort trends (e.g., Cockx and Ghirelli, 2016). The comovement in unemployment rates is presented in Figure 2, where the solid line displays the national unemployment rates and

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[9]By controlling for college graduation year $f(c)$ and years of potential experience τ_e, we effectively control for the survey year in which each person's family formation outcomes are observed.

the various bullet shapes mark the unemployment rates in 16 regions.[10] Panel A shows the original unemployment rates, and panel B shows the residuals after removing a cubic time trend and region fixed effects.

[Figure 2 here]

Although we use both the national and regional unemployment rates in the regression analysis following Kahn (2010), Oreopoulos et al. (2012), and Altonji et al. (2016), we consider the national unemployment rate to be the main treatment variable and report results from the regional rate regressions in the online appendix. Studies on the U.S. labor market point out that the national rather than the local economy is more relevant for college graduates, who have high regional mobility in response to labor market opportunities (Wozniak, 2010; Altonji et al., 2016). Inter-regional mobility among college graduates is expected to be higher in South Korea than in the United States or Canada because South Korea is about the same size as the state of Indiana geographically, and jobs for college graduates are concentrated in and near Seoul, the capital and largest city in the country. About 60 percent of individuals in our analysis sample have moved out of their region of college graduation.

4   Data and Analysis Sample

We use the yearly unemployment rates from 1989 to 2010 reported by Statistics Korea. The national unemployment rates are available from 1963 onward. The regional unemployment rates are calculated from the labor force statistics on the size of the working age population, number of people in the labor force, and employment-to-population ratio by region. These regional statistics are available from 1989 onward.

We construct our analysis sample using data from the Korean Labor and Income Panel Study (KLIPS). The KLIPS is an annual longitudinal study of a representative sample of South Korean

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[10]"Region" in our sample refers to a major administrative division. South Korea consists of 16 administrative divisions including 9 provinces (Gyeonggi, Gangwon, North Chungcheong, South Chungcheong, North Jeolla, South Jeolla, North Gyeongsang, South Gyeongsang, Jeju) and 7 major cities (Seoul, Busan, Daegu, Incheon, Gwangju, Daejeon, Ulsan).

households (and individuals therein) in urban areas.[11] The Korea Labor Institute has been in charge of collecting, maintaining, and publishing the KLIPS data since 1998. We pool waves 1 through 20 of the KLIPS, spanning 1998–2017. The first wave includes 5,000 households (13,321 individuals aged 15 and over), and the 20th wave includes 7,066 households (14,477 individuals aged 15 and over). In 2009 (the 12th wave), 1,415 households were newly added to the original sample.

Our analysis sample includes individuals who graduated from two- or four-year colleges between 1989 and 2010. We restrict our analysis to those graduating at an age between 20 and 32 to focus on first-time labor market entrants and exclude atypical cases where a college degree is pursued long after completing secondary education. We also exclude individuals who graduated from college outside of South Korea. This leaves a sample of 2,474 men and 2,320 women. The number of observations at the person-year level is 22,856 for males and 20,795 for females.

To construct the treatment, outcome, and control variables, we utilize information from three components of the KLIPS: 1) household survey, 2) person survey, and 3) work history record. The household survey collects demographic information on all household members and household characteristics, such as housing arrangements, income, expenditures, and wealth. The person survey data contains detailed information on work, education, and family formation among household members aged 15 or older. The work history record provides a full employment history of the person survey respondents from their first to most recent jobs.

[Table 1 here]

Table 1 reports summary statistics of variables used in the main analysis. The variables are classified into five categories. Panel A presents the treatment variables, including the national and regional unemployment rates and a dummy variable indicating whether an individual graduated from college in 1998 or 1999 under the direct influence of the Asian financial crisis. Panel B shows time-invariant background characteristics. Labor market, family formation, and asset formation outcomes are described in panels C, D, and E, respectively.

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[11]The KLIPS is comparable to the Panel Study of Income Dynamics (PSID) in the United States with respect to the panel structure and the scope of questions. Thus, both the PSID and the KLIPS are included in the Cross-National Equivalent File, along with household longitudinal studies from several other countries.

The treatment variables in panel A and control variables in panel B are constructed using the person survey data. The year and region of college graduation are merged with the national and regional unemployment rates. An average person in our analysis sample experienced an unemployment rate of around 3.5 percent at college graduation. Background characteristics including father's educational attainment and parents' job status at age 14 are also available from the person survey data.[12]

Panel C reports variables on labor market outcomes. The annual person survey collects information on each individual's current labor market outcomes, including employment status and average monthly earnings, at the time of the survey. Since the KLIPS started in 1998, early career outcomes of those who graduated from college before 1998 are not available in the person survey data. For employment status, this gap can be filled by information on retrospective jobs from the work history record. However, earnings and other characteristics of retrospective jobs recorded in the work history file are mostly missing or too crude for our analysis.[13] For this reason, we use the person survey data for the main analysis and employ the work history record to check if missing information on retrospective jobs biases our results. In the online appendix, we show that our regression results on employment outcomes are robust to including observations from the work history record (see Figures A1 and A2).

Panel D shows marriage and fertility variables from the person and household surveys. In the person survey, respondents report marital status every year but describe fertility history only once when they enter the KLIPS for the first time. Because of this survey structure, the person survey is unable to capture subsequent changes in childbearing. We supplement each respondent's fertility history by matching the person survey respondents with their children in the household survey, utilizing information on household membership.

In panel E, we report variables on household-level consumption and asset-holding behaviors.

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[12]The KLIPS data also include variables on other background characteristics, such as mother's education and socioeconomic status at age 14. We do not use these variables in the main regression analysis because they are added in later waves of the KLIPS and thus missing for 14–25 percent of the individuals in the analysis sample.

[13]For example, the work history file records a single average of monthly earnings from all retrospective jobs that each person had over the entire pre-KLIPS period. Respondents are asked to report working hours, fringe benefits, and establishment characteristics of retrospective jobs, but the response rate is extremely low on these questions.

The consumption level is approximated by average monthly household expenditures per capita.[14] The values of financial assets and debt are measured at the time of the survey. Financial assets include money invested in deposit accounts, stocks, bonds, savings insurance, rotating savings and credit association, or private lending. Total debt is the sum of debt outstanding from financial institutions and nonfinancial agents.

We conduct a separate analysis by gender because men and women are likely to face different choice sets and constraints in work and life. With the deeply rooted Confucian tradition, traditional gender roles are still prevalent in South Korea. Men are considered the breadwinners and bear more of the financial burden at the time of marriage in the form of purchasing a house or at least contributing a much larger share of the housing price. Women carry on the majority of the housework and child care and tend to drop out of the labor force after marriage or childbirth. Notably, only men, unless granted exemption, are required to fulfill a military service obligation, a term of 2–3 years. These gender differences are reflected in the descriptive figures in Table 1. While 80 percent of men are employed, only 59 percent of women are working. Despite the equal likelihood of marriage and childbirth for men and women, there is a two-year gender difference in the age at first marriage and also in the age at first childbirth. On average, men (women) get married at age 30 (28) and have their first child at age 31 (29).

5   Results

5.1   Employment and Earnings

In this section, we measure the impact of initial labor market conditions on employment and earnings by estimating equations (1) and (2). Figures 3 and 4 present estimated changes in the experience profiles of labor market outcomes due to variation in initial unemployment rates for men and women, respectively. In Table 2, we average out the estimated recession effects over short-, medium-, and long-term careers and discuss the size of our estimates compared to those in the

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[14]We divide the average monthly household expenditures by the number of household members.

"scarring effect" literature.

[Figure 3 here]

Panel A of Figure 3 shows that men who graduate from college in a bad economy are less likely to be employed for up to 12 years after graduation. A 1 percentage point higher unemployment rate at college graduation is associated with a 2.2 percentage points lower employment probability in experience years 1–6. The effect decays to −0.8 percentage points in the next six years and becomes statistically indistinguishable from zero thereafter.

In panels B–D of Figures 3, we present the recession effects on the experience profiles of earnings for men. In panel B, we consider monthly earnings (in thousands of 2015 South Korean won (KRW)) assuming nonworkers earn zero amount.[15] In panel C, we take the natural logarithm of monthly earnings (in 2015 KRW) with zero earnings imputed by 1. In panel D, we use log monthly earnings only including observations with positive earnings. Panels B and C show that a high unemployment rate at graduation results in lower earnings both in levels and logs for over nine years since graduation. The negative effect on earnings converges to zero at around the tenth year after graduation, similar to the effect on employment. When we restrict our analysis to workers with positive earnings in panel D, there is no significant difference in the experience profiles of earnings between recession cohorts and their luckier counterparts. These results imply that the earnings penalty for male recession cohorts is mostly from the extensive margin. We also find no evidence of lower job quality for the unlucky cohorts in terms of the probability of being self-employed, hours of work, probability of having a full-time job, or the probability of having a regular job in Figure A3.[16] The absence of deterioration in job quality is possibly because only those with higher earnings potential are hired during a recession, when there are limited job opportunities.

[Figure 4 here]

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[15] 1 U.S. dollar (USD) is worth approximately 1,100 KRW.

[16] Work hours are examined among the employed. The probability of having a full-time or regular job is analyzed for wage workers excluding the self-employed.

12

In Figure 4, we do not find a significant impact of initial labor market conditions on the employment likelihood or earnings for female college graduates. The insignificant results can be partially explained by a high labor force dropout rate after marriage or childbirth among women in South Korea.[17] A typical female college graduate in our sample starts to exit the labor force five years after graduation, which is around age 28. Given that the mean age at marriage and first childbirth among women in our data is 28 and 29, respectively, the average experience profiles of employment and earnings reflect the M-shaped age profile of female labor force participation in South Korea.[18]

[Table 2 here]

In Table 2, we compute the average effect of initial unemployment rates on labor market outcomes over the first 5, 10, and 15 years of potential experience. We find statistically significant effects only for men, and only when the extensive margin effects are at play. Panel A shows our benchmark estimates on labor market penalty for men averaged over 10 years after graduation: a 1 percentage point increase in the unemployment rate at graduation lowers the likelihood of employment by 1.6 percentage points (1.9 percent relative to the sample average of 0.856) and monthly earnings by 52K KRW (2.3 percent relative to the sample average of 2,234K KRW).[19]

Our estimate on male earnings is in line with Kahn (2010), Oreopoulos et al. (2012), and Altonji et al. (2016) with respect to the magnitude and persistence.[20] These studies on male college graduates in the United States and Canada find that a 1 percentage point increase in the initial unemployment rate leads, on average, to a 0.3–5 percent reduction in earnings over the first 10 years of potential experience, and the negative effect persists for up to 9–15 years. In our setting, however, the decline in earnings is mainly through the adjustment in employment as opposed to the

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[17]The female labor force participation rate has gradually increased during the past few decades but is still below 53 percent (source: International Labour Organization, ILOSTAT database).

[18]The experience profiles for females are presented in Figure A4, with similar results.

[19]Given that the earnings penalty mostly comes from nonemployment, it is difficult to interpret the large negative estimates on log earnings in column (3), because they are sensitive to how zero earnings are imputed.

[20]In contrast to our study, Han (2018) finds no effect of initial labor market conditions on employment or earnings among college graduates in South Korea. He focuses on more recent cohorts who graduated in the 2000s and relies on a different identification strategy using cohort fixed effects. Cohort fixed effects can absorb a large portion of meaningful variation in the national-level business cycles, as we point out in Section 3.

13

employment probability being largely unaffected in Kahn (2010) and Oreopoulos et al. (2012). Altonji et al. (2016) finds a much larger and significant decline in employment when their analysis is restricted to cohorts graduating in 2004 or after, suggesting that the Great Recession has extensive margin effects on labor market outcomes, unlike previous recessions.[21] Our results for women are consistent with Kondo (2015) finding no significant effect of initial economic conditions on employment and earnings among white females from the National Longitudinal Survey of Youth 1979 Cohort (NLSY79).

5.2 Marriage and Fertility

Next, we investigate whether and how reduced labor market opportunities in early career would affect family formation behaviors using the regression framework in equation (3). Although it is well established that marriage and childbearing are procyclical in the short run, there is no consensus on the long-term effect of initial labor market conditions on family formation. Only a limited number of studies have examined the long-term consequences, and results from these studies are mixed in terms of the sign and magnitude (Hashimoto and Kondo, 2012; Hershbein, 2012; Kondo, 2012; Currie and Schwandt, 2014; Hofmann and Hohmeyer, 2016; Maclean et al., 2016).[22] As pointed out by Kondo (2016), it is especially challenging to identify a long-term causal relationship between unemployment and fertility, because both variables change gradually and often are confounded with a long-term trend. In this sense, our identifying strategy exploiting a sharp deviation in the unemployment rate from a smooth cohort trend can be particularly useful.

Economic theory suggests that labor market conditions have competing income and substitution effects on family formation. A decrease in income during a recession makes marriage and childbearing less affordable. At the same time, lower potential earnings could facilitate family formation by reducing opportunity costs of housework and children. Among men, the income ef-

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[21]A persistent reduction in employment probability among those graduating during a recession is more commonly observed in countries with more rigid labor market institutions, such as Belgium (Cockx and Ghirelli, 2016), Japan (Genda et al., 2010), Norway (Liu et al., 2016), and Spain (Fernández-Kranz and Rodríguez-Planas, 2018). See Kawaguchi and Murao (2014) for a cross-country comparison among 20 OECD countries.

[22]See Kondo (2016) for an overview of the related literature.

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fect is expected to dominate, considering that they are typically the family breadwinner and less committed to housework and child care. Among women, on the other hand, it is theoretically ambiguous which of the two competing effects would be stronger. The substitution effect would get strengthened when the (potential) spouse earns more or is subject to a better condition at labor market entry, when gender roles in the household are more traditional, or when the labor market is flexible enough so that mothers can easily return to work after childbearing.

We analyze the effect of labor market conditions at college graduation on the timing of marriage and childbirth in Table 3. To account for right censoring in age at first marriage or childbirth, we employ censored regression, exponential survival analysis, and the Cox proportional hazards model. In Table 4 and Figure 5, we further investigate whether the shift in the timing of family formation (i.e., *tempo* effect) would lead to a permanent change in marriage or fertility rates (i.e., *quantum* effect).

[Table 3 here]

In Table 3, panel A provides evidence that men entering the labor market in an economic downturn postpone their marriage and childbirth. A 1 percentage point higher initial unemployment rate is associated with a delay in marriage by 0.3 years (column 1). The estimated effect on the childbearing age is about two-thirds of the effect on marriage (0.2 years in column 4) but is not statistically significant. The results from duration analyses are consistent with the corresponding censored regression estimates. The duration of remaining unmarried or childless increases and the hazard rate decreases for those graduating in a bad economy.

Panel B of Table 3 shows that economic conditions at labor market entry push forward the timing of family formation among female college graduates. Columns (1)–(3) provide suggestive evidence that women graduating from college in a recession tend to get married at a slightly younger age, although the estimated coefficients are not statistically significant. Columns (4)–(6) show that the intertemporal adjustment is more distinct for childbearing. Specifically, a 1 percentage point higher national unemployment rate at college graduation leads to a 0.35 year decrease in age at first childbirth.

15

[Table 4 here]

In Table 4, we examine the effect of the national unemployment rate at labor market entry on the probability of getting married, the propensity of having a child, and the number of children. We find that labor market conditions at college graduation not only shift the timing of family formation but also have a long-term effect on marriage and fertility outcomes. Panel A shows that male college graduates entering the labor market under a 1 percentage point higher unemployment rate are 2.1 percentage points less likely to be married (2.9 percent relative to the sample average of 0.726 in column 1) and 1.6 percentage points less likely to have children (2.5 percent relative to the sample average of 0.639 in column 2). The decline in fertility seems to be almost entirely due to the decline in marriage rates for the following reasons. First, out-of-wedlock births are rare (1–2 percent in the period from 2000 to 2018) in South Korea. Second, labor market entry conditions have little effect on fertility behaviors among married men, as shown in columns (3) and (5). And third, the recession effect on the intensive margin of fertility seems small, given that the estimated effect on the number of children (in column 4) is not much larger than the estimates on the probability of having a child (in column 2).

In panel B of Table 4, we find that weak economic conditions at college graduation do not substantially affect marriage probability but significantly increase long-term fertility among women. Column (1) provides suggestive evidence that women are marginally less likely to be married when they enter the labor market in a bad economy. But, the small magnitude and insignificance of the estimate indicates that the income effect on marriage is mostly muted for women. Columns (2)–(4) show that substitution into childbearing is especially pronounced among married women. Conditional on being married, women who graduate from college in an economic downturn increase fertility both along the extensive and intensive margins (columns 3 and 5). Overall, a 1 percentage point higher unemployment rate at labor market entry is associated with a 4 percent increase in the number of children among women (0.047, compared to the sample average of 1.096 in column 4).

[Figure 5 here]

16

In Figure 5, we estimate the recession effect on the likelihood of getting married, the chance of having any children, and the number of children by age 25, 30, 35, and 40. We do this exercise to address the concern that our estimates in Table 4 may not fully distinguish the short- and long-term effects because we do not observe completed marriage or fertility outcomes for those who exited the KLIPS in their early career. If recession cohorts only shift their timing of marriage and fertility but eventually catch up with luckier cohorts, our estimates would be overestimated in magnitude by capturing some of the large short-term effects, and the bias would be larger in a sample with a higher fraction of young people. To see if this is the case, we compare the recession effect estimates across samples including individuals aged 25 and over, 30 and over, 35 and over, and 40 and over. Figure 5 shows a clear pattern of accumulating effects up to age 40. Both the negative effect on the likelihood of marriage and childbearing for males and the positive effect on the number of children for females are more substantial in an older sample. This result suggests that our estimates in Table 4 are likely attenuated rather than overstated, and that the permanent change in marriage and fertility outcomes due to unfavorable economic conditions at labor market entry could be larger in magnitude than what we find in this study.

5.3 Household Expenditures and Asset Holdings

As the final set of outcomes, we examine whether unlucky cohorts earning less for a substantial period after their labor market entry would have different trajectories of consumption and asset holdings relative to their luckier counterparts by estimating equation (1). Faced with a persistent decline in earnings, individuals with borrowing constraints may reduce asset holdings to protect consumption levels. On the other hand, a fall in asset prices during recessions may facilitate the purchase of financial assets or homes. Thus, the overall impact of bad entry conditions on consumption and wealth formation should be empirically measured. While addressing this question is potentially important for public policy, particularly on retirement preparedness, research on the cohort-specific labor market shocks on asset accumulation is yet very limited, with the only exception being Kawaguchi and Kondo (forthcoming).

17

Table 5 examines the estimated changes in the experience profiles of consumption, various asset holdings, and living arrangements. We first show results for men in panel A. In column (1), we do not find a significant impact of initial labor market conditions on per capita expenditure, implying limited welfare loss in terms of consumption. In column (2), we examine home ownership, as a measure of both consumption and an illiquid asset, and also find no significant effect of adverse economic conditions at job market entry. Our results differ from Kawaguchi and Kondo (forthcoming) who find a weak increase in home ownership using data from the NLSY79. While their results are explained by migration to areas with a lower cost of living, we do not find such migration patterns in our data.[23]

In columns (3)–(6), we investigate whether there is a systematic difference in the amount of debt and financial assets by labor market entry conditions.[24] In column (3), we find no evidence of consumption smoothing by increasing debt, which is unsurprising given that young college graduates are unlikely to have sufficient collateral to obtain debt shortly after their job market entry. In column (4), we report the recession effects on the value of financial assets, as young graduates may obtain liquidity at a lower transaction cost by adjusting financial asset holdings instead of getting a loan. We find large negative coefficients in experience years 1–9. The results indicate that male unlucky cohorts protect consumption levels mainly by adjusting liquid asset holdings.

To examine which type of financial asset is readily adjusted for consumption smoothing, we further divide financial assets into bank deposits and other financial assets excluding deposits, such as stocks, bonds, savings insurance, rotating savings and credit association, and private lending. The former is easily converted to cash, while the latter may take more time to exchange or sell at the desired price. Column (5) shows that those who graduate during a recession have lower values of bank deposits over the first nine years of labor market experience than their luckier counter-

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[23]Results are available upon request.

[24]Financial assets include bank deposits, stocks, bonds, savings insurance, rotating savings and credit association, and private lending.

parts, consistent with the results on earnings. In column (6), we find a negative impact of adverse economic conditions also on the amount of financial assets excluding deposits. The magnitudes of the coefficients are generally larger for bank deposits than for other forms of financial assets, suggesting that young graduates readily adjust more liquid assets in response to cohort-specific income shocks.

Another possible way of protecting consumption for young college graduates is by living with their parents. We explore this possibility in column (7). For a 1 percentage point increase in the national unemployment rate at college graduation, the probability of coresiding with at least one parent increases by 1.6–3.1 percentage points between 4 and 12 years after college graduation. The effect is sizable given that the mean coresidence probability for the sample is 0.261. The result is consistent with findings in Card and Lemieux (2000) and Dettling and Hsu (2018), and it also corroborates our findings in Section 5.2 that men from unlucky cohorts are less likely to be married, thus precluding the formation of an independent household.

In panel B of Table 5, we explore consumption and asset holding behaviors among female college graduates. Columns (1) and (2) show that initial labor market conditions do not affect consumption and home ownership, respectively. The coefficients are precisely zero in most experience groups, and even the significantly negative effect on consumption in experience years 4–6 is very small in magnitude. We also find no statistically significant effect on the amount of liquid assets in columns (3)–(5), with the exception of a negative effect on financial assets excluding deposits in column (6). The effect on the living arrangements is reported in column (7). Unlike men who are more likely to live with their parents well after graduation, we do not observe such a pattern for women. This lack of an increase in the probability of coresidence with their parents is consistent with the findings in Section 5.2 that female unlucky cohorts are not less likely to be married than their luckier counterparts.

Overall, cohorts entering the labor market in a deep recession tend to give up some of their liquid assets to protect consumption from reduced earnings during the first nine years after graduation. The negative impact of initial labor market conditions on asset building is more substantial

19

on males. Men have an additional coping mechanism, which is coresiding with their parents and possibly receiving intrahousehold intergenerational transfers. Our results provide suggestive evidence that a cohort-specific labor market shock can translate into cohort-specific shocks to wealth accumulation. These negative effects on financial assets may prevent households from accumulating sufficient buffer stock for future negative income shocks, which may leave households more vulnerable to financial distress.

6 Robustness Checks

We examine the internal validity of our analysis and verify that our results are not driven by endogenous selection into the timing of graduation, functional form assumptions, or sample restriction.

Selection. A potential threat to the identification assumption is differential selection into college graduation years. People facing adverse labor market conditions might postpone their graduation, and this adjustment behavior might be correlated with their earnings potential. Recession cohorts would be positively selected if those with higher abilities or from wealthier families are less likely to adjust their timing of graduation in response to economic conditions. On the other hand, if those with disadvantaged backgrounds cannot delay college graduation because of credit constraint, recession cohorts would be negatively selected.

We examine whether individuals endogenously select the year of graduation in response to labor market conditions by running the balancing regression as follows:

$$x_i = \alpha + \beta UR_c + f(c) + \delta_r + \tau_e + \varepsilon_i,$$

where x_i is an individual characteristic predetermined at college entry, such as the type of college attended (2- vs. 4-year), years of father's and mother's education, parents' job status at age 14, and socioeconomic status at age 14. We check individual and joint significance of the coefficient on the treatment variable from each balancing regression. Pei et al. (2019) show that this method

provides a more powerful test to detect selection in regression based research designs than an alternative method of checking stability of the coefficient on the treatment variable in the main regression after including background characteristics as additional controls.

[Table 6 here]

Table 6 presents estimates from the balancing regression using the national unemployment rate UR_c on the right-hand side. We find no statistically significant difference between recession cohorts and their luckier peers in any of the background characteristics listed above. The coefficient on UR_c from each of the individual balancing regressions is statistically indistinguishable from zero at any conventional level of significance. Also, the joint test cannot reject the null hypothesis that all the considered characteristics are balanced, with p-value of 0.597 for men and 0.933 for women. These background characteristics are also balanced with respect to alternative measures of economic conditions, including the regional unemployment rate denoted by UR_{cr} and an indicator for 1998 or 1999 graduation cohort denoted by DC (see Tables A1 and A2). These results suggest that recession effects measured by the regression equations (1)–(3) are unlikely driven by selection.

Alternative Measures of Economic Conditions. Besides the national and regional unemployment rates at the year of college graduation, we use an indicator for college graduation in 1998 or 1999 as another treatment variable to measure the direct influence of the Asian financial crisis. We chose 1998 and 1999 because the Hodrick-Prescott (HP) filtered series of the national and regional unemployment rates indicate that the two years during and shortly after the crisis constitute a sharp recession and that the economy recovered quickly thereafter. The recession effects measured by the regional unemployment rates UR_{cr} or the crisis cohorts dummy DC are presented in the online appendix. See Figures A5–A8 for labor market outcomes, Figures A9 and A10 and Tables A3 and A4 for family formation outcomes, and Tables A5 and A6 for financial outcomes.

The estimated effects of the regional unemployment rate UR_{cr} are qualitatively similar but smaller in magnitude than those from the benchmark regressions using the national unemployment rate UR_c. This result is consistent with a substantial degree of geographic relocation after college

graduation, described in Section 3.

From the regressions using the 1998 or 1999 cohort dummy, we find that the estimated coefficients on DC are about four times those on the national unemployment rate UR_c in our regression analyses. Given that the unemployment rates are on average 4 percentage points higher in 1998 and 1999 than the rest of years in the analysis period, the proportionality of the UR_c and DC effect estimates confirms that the sharp downturn in the economy during the Asian financial crisis is the main source of identifying variation.

Alternative Specification for Cohort Trend. To gauge whether our results are driven by the cubic functional form for $f(c)$, we use an alternative way of removing a smooth national trend in the unemployment rates without imposing a functional form assumption. We apply the HP filter to the unemployment rate series as in Hofmann and Hohmeyer (2016). We use the smoothing parameter value of $\lambda = 6.5$ suggested by Ravn and Uhlig (2002) for annual data. Regression results using the HP-filtered data are very similar to our baseline results described in Section 5.[25]

Alternative Sample Restriction. We repeat our analysis in Section 5 using graduating cohorts only up to 2007. Results are robust to excluding those who graduated from college during or shortly after the Great Recession.[26] This is possibly because the Great Recession did not have a substantial impact on the South Korean labor market (Lee, 2017). The national unemployment rate has remained below 4 percent since 2001 and was largely unaffected by the Great Recession.

7   Conclusion

This paper investigates the long-term effect of initial labor market conditions exploiting the across-cohort variation in the unemployment rates induced by the sudden occurrence of the 1997–98 Asian financial crisis. Our analysis of college graduates from the Korean Labor and Income Panel Study finds that labor market entry conditions have a large and lasting impact on individuals' career, fam-

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[25]Results are available upon request.
[26]Again, results are available upon request.

ily, and financial outcomes. Men who graduated from college in a bad economy experience a large and persistent reduction in employment, earnings, and the likelihood of marriage and childbearing. Women who face limited job opportunities at college graduation substitute into childbearing and have more children at a younger age. Neither male nor female college graduates suffer from reductions in consumption, proxied by per capita expenditure, but this is achieved by giving up some liquid asset holdings. We also find evidence that males additionally insure against reduced consumption by living in the parent's household.

The large negative impacts of initial labor market conditions on an individual's welfare well outside the labor market dimension imply that the benefit of increasing job opportunities for young workers will extend far beyond improvements in earnings and ultimately facilitate their family formation and wealth accumulation. In addition, policies aimed at relaxing borrowing constraints or improving access to credit for the unlucky cohorts can enhance their financial well-being, especially in their old age, and can potentially reduce future public spending burden.

Electronic copy available at: https://ssrn.com/abstract=3431443

References

Altonji, Joseph G., 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.

Baek, Seungho, "Seven Surprising Scenes of South Korea undergoing IMF Crisis 20 Years Ago," November 2017. (in Korean).

Brunner, Beatrice and Andreas Kuhn, "The Impact of Labor Market Entry Conditions on Initial Job Assignment and Wages," *Journal of Population Economics*, 07 2014, *27* (3), 705–738.

Card, David and Thomas Lemieux, "Adapting to Circumstances (The Evolution of Work, School, and Living Arrangements among North American Youth)," in "Youth Employment and Joblessness in Advanced Countries" NBER Chapters, National Bureau of Economic Research, Inc, March 2000, pp. 171–214.

CoCkx, Bart, "Do Youths Graduating in a Recession Incur Permanent Losses?," *IZA World of Labor*, 2016.

Cockx, Bart and Corinna Ghirelli, "Scars of Recessions in a Rigid Labor Market," *Labour Economics*, 2016, *41*, 162–176.

Currie, Janet and Hannes Schwandt, "Short- and Long-Term Effects of Unemployment on Fertility," *Proceedings of the National Academy of Sciences*, 2014, *111* (41), 14734–14739.

Deaton, Angus, *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*, Washington, D.C.: The World Bank, 1997.

Dettling, Lisa J. and Joanne W. Hsu, "Returning to the nest: Debt and parental co-residence among young adults," *Labour Economics*, 2018, *54*, 225–236.

Fernández-Kranz, Daniel and Núria Rodríguez-Planas, "The Perfect Storm: Graduating during a Recession in a Segmented Labor Market," *ILR Review*, 2018, *71* (2), 492–524.

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.

Goldstein, Morris, *The Asian Financial Crisis: Causes, Cures, and Systemic Implications*, Vol. 55, Peterson Institute, 1998.

Han, Joseph, "Long-Term Effects of Labour Market Entry Conditions: The Case of Korea," *Global Economic Review*, 2018, *47* (4), 434–463.

Hashimoto, Yuki and Ayako Kondo, "Long-Term Effects of Labor Market Conditions on Family Formation for Japanese Youth," *Journal of the Japanese and International Economies*, 2012, *26* (1), 1–22.

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

Hofmann, Barbara and Katrin Hohmeyer, "The Effect of the Business Cycle at College Graduation on Fertility," *Economics of Education Review*, 2016, *55*, 88–102.

IMF, *The IMF and recent capital account crises: Indonesia, Korea, Brazil; evaluation report*, International Monetary Fund, 2003.

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*, forthcoming.

__ **and Tetsushi Murao**, "Labor-Market Institutions and Long-Term Effects of Youth Unemployment," *Journal of Money, Credit and Banking*, 2014, *46* (S2), 95–116.

Kim, Kiwhan, "The 1997-98 Korean Financial Crisis: Causes, Policy Response, and Lessons," Technical Report 2006.

Kondo, Ayako, "Gender-Specific Labor Market Conditions and Family Formation," *Journal of Population Economics*, 2012, *25* (1), 151–174.

__ , "Differential Effects of Graduating during a Recession across Gender and Race," *IZA Journal of Labor Economics*, 2015, *4* (23).

__ , "The Effects of Recessions on Family Formation," *IZA World of Labor*, 2016.

Lee, Jungmin, "The Labor Market in South Korea, 2000–2016," *IZA World of Labor*, 2017.

Lee, Keun, "Financial Crisis in Korean and Imf: Analysis and Perspectives," Technical Report 1998.

Liu, Kai, Kjell G. Salvanes, and Erik Ø. Sørensen, "Good Skills in Bad Times: Cyclical Skill Mismatch and the Long-Term Effects of Graduating in a Recession," *European Economic Review*, 2016, *84*, 3–17.

Maclean, Johanna Catherine, Reginald Covington, and Asia Sikora Kessler, "Labor Market Conditions at School-Leaving: Long-Run Effects on Marriage and Fertility," *Contemporary Economic Policy*, 2016, *34* (1), 63–88.

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.

Pei, Zhuan, Jörn-Steffen Pischke, and Hannes Schwandt, "Poorly Measured Confounders are More Useful on the Left than on the Right," *Journal of Business & Economic Statistics*, 2019, *37* (2), 205–216.

Raaum, Oddbjørn and Knut Røed, "Do Business Cycle Conditions at the Time of Labor Market Entry Affect Future Employment Prospects?," *The Review of Economics and Statistics*, 2006, *88* (2), 193–210.

Radelet, Steven and Jeffrey Sachs, "The Onset of the East Asian Financial Crisis," Technical Report, National Bureau of Economic Research 1998.

Ravn, Morten O. and Harald Uhlig, "On Adjusting the Hodrick-Prescott Filter for the Frequency of Observations," *The Review of Economics and Statistics*, 2002, *84* (2), 371–376.

Schwandt, Hannes and Till von Wachter, "Unlucky Cohorts: Estimating the Long-Term Effects of Entering the Labor Market in a Recession in Large Cross-Sectional Data Sets," *Journal of Labor Economics*, 2019, *37* (S1), S161–S198.

van den Berge, Wiljan, "Bad Start, Bad Match? The Early Career Effects of Graduating in a Recession for Vocational and Academic Graduates," *Labour Economics*, 2018, *53*, 75–96.

Wozniak, Abigail, "Are College Graduates More Responsive to Distant Labor Market Opportunities?," *The Journal of Human Resources*, 2010, *45* (4), 944–970.
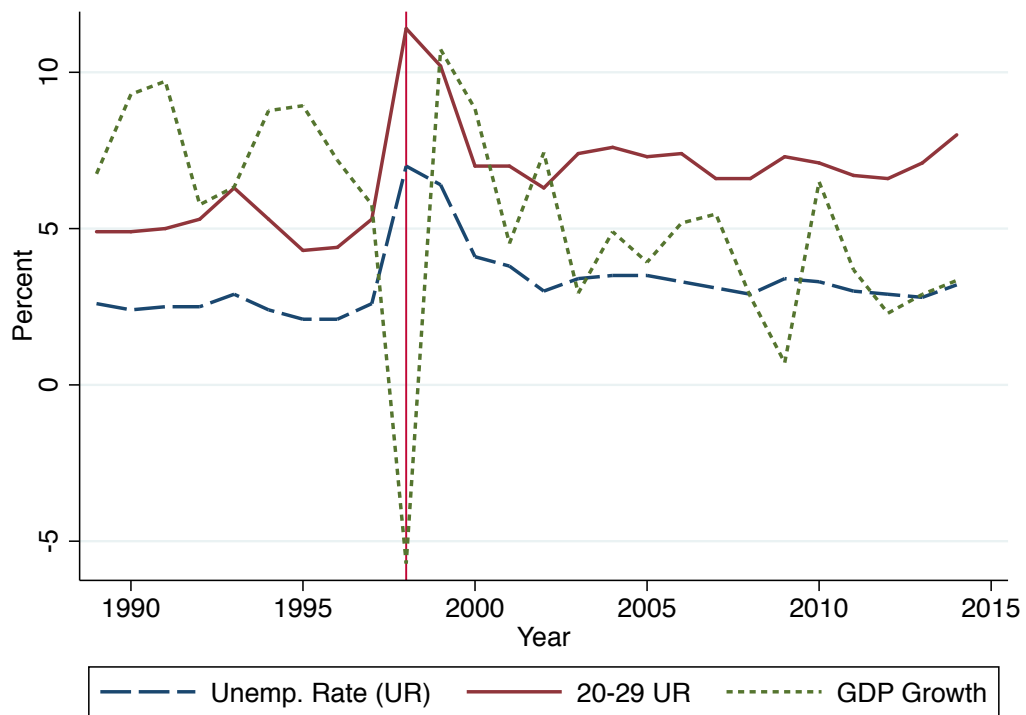
Figure 1: Macroeconomic Statistics

Source. Statistics of Korea

27

A. Raw

B. Detrended
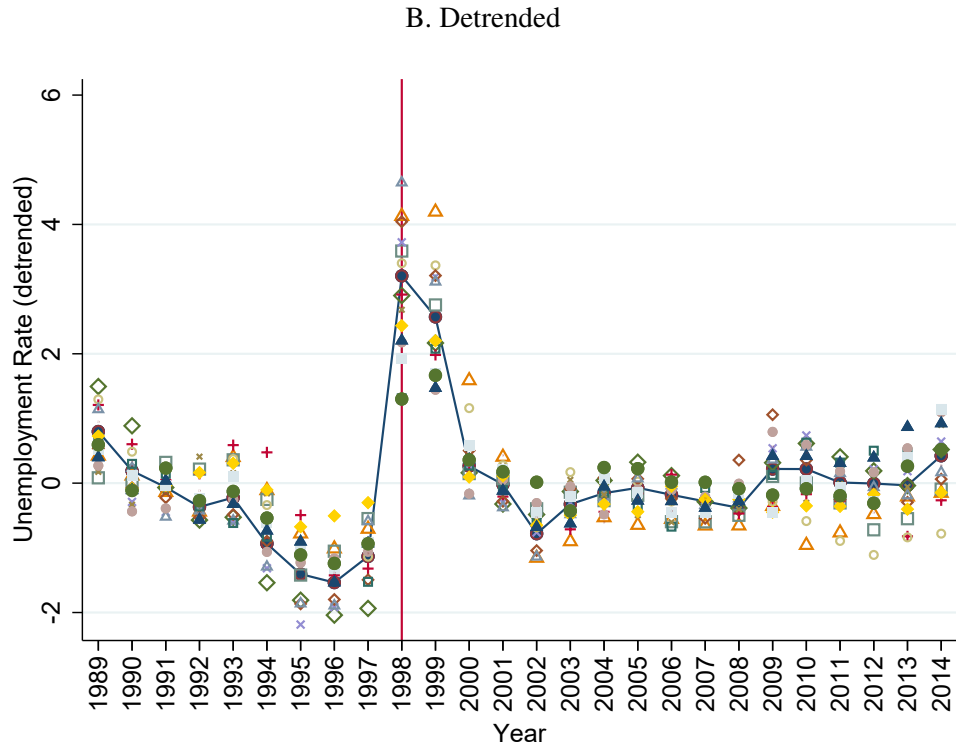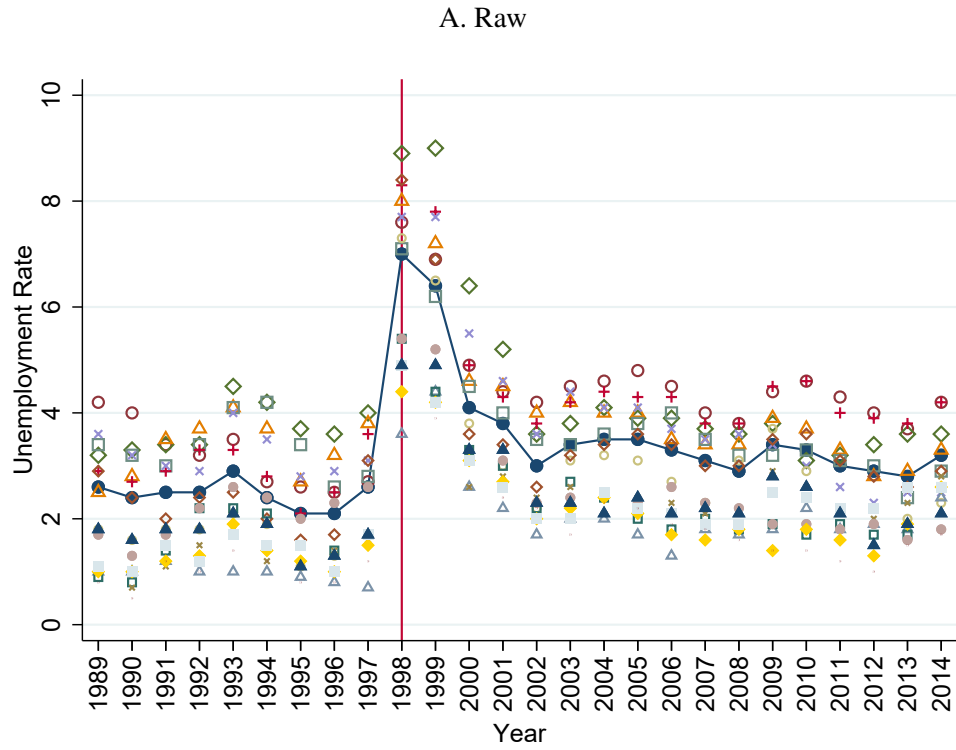
Figure 2: National and Regional Unemployment Rates

Notes. The solid line displays the national unemployment rates, and the various bullet shapes mark the regional unemployment rates. Regions refer to major administrative divisions, which include 9 provinces (Gyeonggi, Gangwon, North Chungcheong, South Chungcheong, North Jeolla, South Jeolla, North Gyeongsang, South Gyeongsang, and Jeju) and 7 major cities (Seoul, Busan, Daegu, Incheon, Gwangju, Daejeon, and Ulsan). The detrended series in panel B are residuals from a regression controlling for a cubic function of years and region fixed effects.

28

A. Employment

B. Earnings[a]

C. Log earnings (imputed)[b]

D. Log earnings

Figure 3: Effects of National Unemployment Rate at Graduation on Employment and Earnings for Males

Notes. Each dot represents the coefficient estimate on an interaction term between the national UR and a potential experience dummy. Vertical spikes around each point estimate represent the 95% confidence interval, constructed using robust standard errors clustered at the level of graduation year by region. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Monthly earnings are inflation-adjusted to 2015 values.

[a] In thousands of 2015 KRW. 1 USD is worth approximately 1,100 KRW.

[b] We impute zero earnings with 1 KRW before taking the logarithm. This is equivalent to using zero log earnings for individuals who are unemployed or not in the labor force in the regression analysis.

A. Employment

B. Earnings[a]

C. Log earnings (imputed)[b]

D. Log earnings

Figure 4: Effects of National Unemployment Rate at Graduation on Employment and Earnings for Females

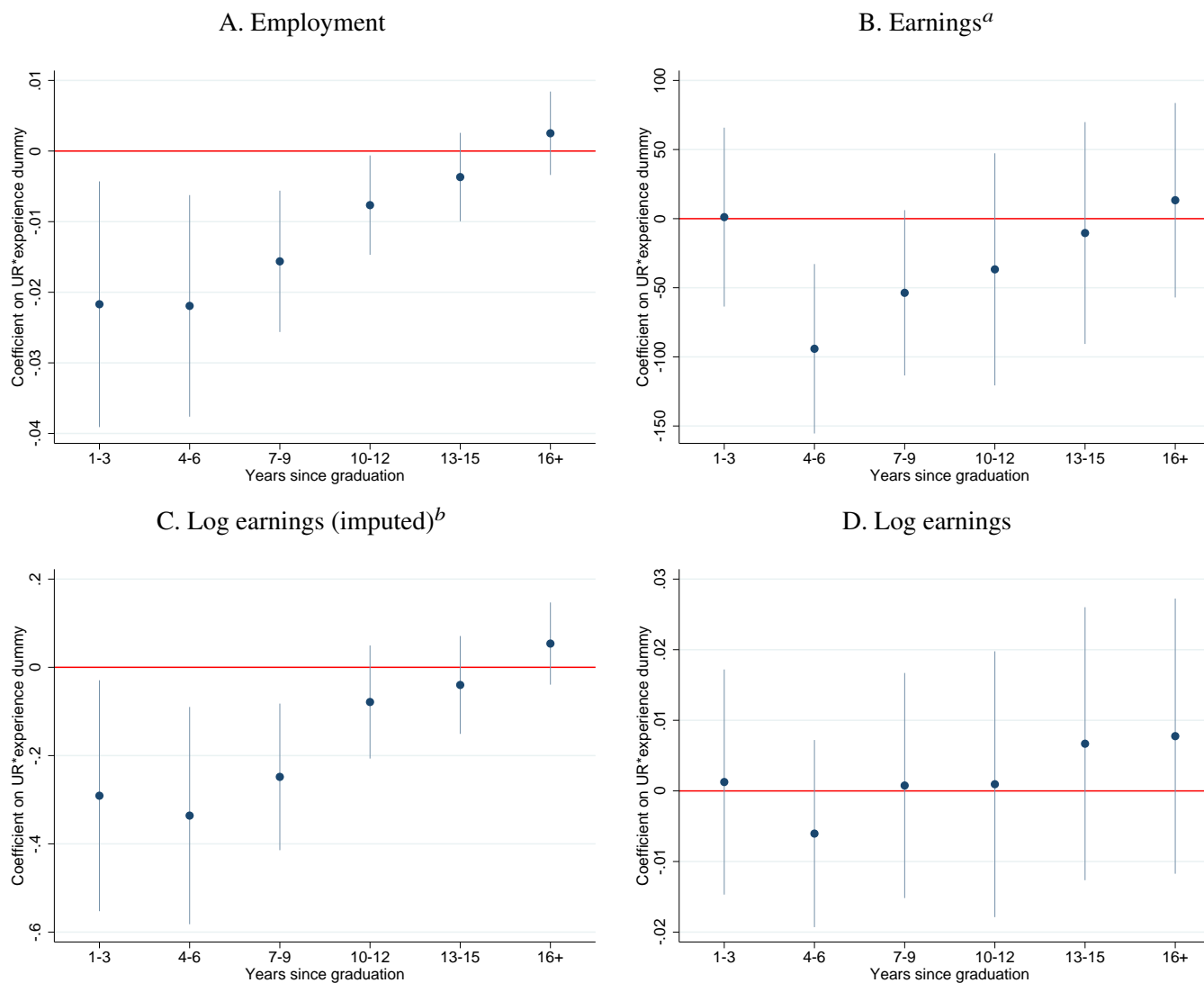*Notes.* Each dot represents the coefficient estimate on an interaction term between the national UR and a potential experience dummy. Vertical spikes around each point estimate represent the 95% confidence interval constructed using robust standard errors clustered at the level of graduation year by region. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Monthly earnings are inflation-adjusted to 2015 values.
[a] In thousands of 2015 KRW. 1 USD is worth approximately 1,100 KRW.
[b] We impute zero earnings with 1 KRW before taking the logarithm. This is equivalent to using zero log earnings for individuals who are unemployed or not in the labor force in the regression analysis.

A. Male

B. Female

Figure 5: Effects of National Unemployment Rate at Graduation on Family Formation by a Certain Age

Notes. Each bullet shape represents the coefficient estimate on the national *UR* from a separate regression estimating equation (3). Vertical spikes around each point estimate represent the 95% confidence interval constructed using robust standard errors clustered at the level of graduation year by region. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for.

31

Table 1: Summary Statistics

	Male			Female		
	Mean	**SD**	**Obs.**	**Mean**	**SD**	**Obs.**
A. Treatment variables						
Year of graduation	2,000	[5.958]	2,474	2,000	[5.526]	2,320
National unemployment rate at graduation	3.476	[1.379]	2,474	3.587	[1.426]	2,320
Regional unemployment rate at graduation	3.544	[1.633]	2,474	3.667	[1.709]	2,320
Graduation in 1998 or 1999	0.127	[0.333]	2,474	0.144	[0.351]	2,320
B. Background characteristics						
Father's years of education	10.32	[3.780]	2,426	11.11	[3.463]	2,292
Father's education missing	0.019	[0.138]	2,474	0.012	[0.109]	2,320
Parents' job status at age 14						
Regular wage worker	0.410	[0.492]	2,401	0.446	[0.497]	2,262
Irregular wage worker	0.072	[0.259]	2,401	0.069	[0.253]	2,262
Business owner (with employees)	0.125	[0.330]	2,401	0.145	[0.353]	2,262
Business owner (no employee)	0.376	[0.485]	2,401	0.326	[0.469]	2,262
Parents' job status at age 14 missing	0.030	[0.169]	2,474	0.025	[0.156]	2,320
C. Labor market outcomes						
Employed	0.897	[0.304]	22,856	0.578	[0.494]	20,795
Real monthly earnings[a]	2,871	[2,277]	22,617	1,145	[1,350]	20,686
Log real earnings (imputed)[b]	13.17	[4.736]	22,617	8.037	[7.160]	20,686
Log real earnings	14.86	[0.505]	20,051	14.40	[0.538]	11,549
D. Family formation outcomes						
Ever married	0.726	[0.446]	2,474	0.714	[0.452]	2,320
Age at first marriage	30.00	[3.584]	1,715	27.85	[3.359]	1,589
Any children	0.639	[0.480]	2,474	0.625	[0.484]	2,320
Any children (given married)	0.880	[0.325]	1,796	0.876	[0.330]	1,656
Number of children	1.126	[0.981]	2,474	1.096	[0.985]	2,320
Number of children (given married)	1.551	[0.817]	1,796	1.535	[0.828]	1,656
Age at first childbirth	31.31	[3.518]	1,581	29.18	[3.394]	1,450
E. Asset formation outcomes						
Log expenditure per capita	13.57	[0.495]	20,706	13.56	[0.482]	18,808
Own current residence	0.573	[0.495]	22,843	0.587	[0.492]	20,783
Log debt[b]	9.205	[8.845]	22,847	9.292	[8.887]	20,783
Log financial asset[b]	12.97	[7.012]	22,267	13.22	[6.865]	20,302
Log deposit[b]	11.11	[7.726]	22,089	11.36	[7.648]	20,128
Log financial asset excluding deposit[b]	6.681	[8.012]	22,266	6.827	[8.036]	20,302

Notes. The number of observations varies due to missing values. The analysis sample includes 2,474 men and 2,320 women. The number of observations at the person-year level is 22,856 for males and 20,795 for females. Standard deviations in brackets.

[a] In thousands of 2015 KRW. 1 USD is worth approximately 1,100 KRW.

[b] Before taking the logarithm, the values are inflation-adjusted to 2015 KRW and zeros are imputed with 1 KRW.

Table 2: Average Effects of National Unemployment Rate at Graduation on Employment and Earnings

	Employment	Earnings[a]	Log earnings (imputed)[b]	Log earnings
	(1)	(2)	(3)	(4)
A. Male				
Effect over 1−5 years	−0.020**	−21.9	−0.257**	0.008
	(0.008)	(23.4)	(0.122)	(0.007)
Adjusted R^2	0.066	0.130	0.070	0.157
Observations	5,056	4,994	4,994	3,831
Mean of Y	0.779	1,686.0	11.136	14.516
Effect over 1−10 years	−0.016***	−52.0**	−0.240***	−0.000
	(0.005)	(21.6)	(0.077)	(0.006)
Adjusted R^2	0.078	0.149	0.087	0.199
Observations	11,954	11,807	11,807	9,976
Mean of Y	0.856	2,234.0	12.408	14.685
Effect over 1−15 years	−0.012***	−40.5	−0.165***	0.001
	(0.004)	(25.6)	(0.061)	(0.007)
Adjusted R^2	0.080	0.139	0.091	0.216
Observations	17,510	17,306	17,306	15,111
Mean of Y	0.883	2,592.3	12.909	14.784
B. Female				
Effect over 1−5 years	−0.006	−15.8	−0.111	−0.007
	(0.008)	(16.2)	(0.112)	(0.008)
Adjusted R^2	0.009	0.047	0.014	0.136
Observations	5,114	5,085	5,085	3,336
Mean of Y	0.664	1,078.4	9.336	14.231
Effect over 1−10 years	0.006	6.6	0.052	0.000
	(0.007)	(17.3)	(0.096)	(0.009)
Adjusted R^2	0.027	0.032	0.031	0.118
Observations	11,339	11,278	11,278	6,665
Mean of Y	0.602	1,086.2	8.464	14.322
Effect over 1−15 years	0.007	8.0	0.065	0.002
	(0.007)	(18.1)	(0.094)	(0.009)
Adjusted R^2	0.026	0.024	0.029	0.102
Observations	16,386	16,298	16,298	9,184
Mean of Y	0.578	1,106.3	8.097	14.368

Notes. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year by region. Monthly earnings are inflation-adjusted to 2015 values. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
[a] In thousands of 2015 KRW. 1 USD is worth approximately 1,100 KRW.
[b] We impute zero earnings with 1 KRW before taking the logarithm. This is equivalent to using zero log earnings for individuals who are unemployed or not in the labor force in the regression analysis.

Table 3: Effects of National Unemployment Rate at Graduation on Age of Family Formation

	Age at first marriage			Age at first childbirth		
	Censored reg. (1)	**Acc. fail. time** (2)	**Cox PH** (3)	**Censored reg.** (4)	**Acc. fail. time** (5)	**Cox PH** (6)
A. Male						
National *UR*	0.340**	0.048**	−0.059*	0.189	0.034*	−0.041
	(0.149)	(0.021)	(0.031)	(0.155)	(0.020)	(0.031)
Log likelihood	−5,875	−2,253	−12,094	−5,645	−2,216	−11,216
Observations	2,393	2,393	2,393	2,474	2,474	2,474
Median of *Y*	30.0	30.0	30.0	32.0	32.0	32.0
B. Female						
National *UR*	−0.160	0.001	0.037	−0.350**	−0.033	0.074**
	(0.173)	(0.022)	(0.033)	(0.175)	(0.024)	(0.033)
Log likelihood	−5,322	−2,069	−11,049	−5,067	−2,003	−10,117
Observations	2,253	2,253	2,253	2,320	2,320	2,320
Median of *Y*	28.0	28.0	28.0	29.0	29.0	29.0

Notes. Regressions include a cubic function of college graduation year and fixed effects for the region of graduation and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year by region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Long-Term Effects of National Unemployment Rate at Graduation on Marriage and Fertility

	Ever married (1)	Any children (2)	Any children (married) (3)	N of children (4)	N of children (married) (5)
A. Male					
National UR	−0.021**	−0.016*	−0.003	−0.027	−0.014
	(0.011)	(0.010)	(0.013)	(0.020)	(0.027)
Adjusted R^2	0.264	0.272	0.083	0.283	0.141
Observations	2,474	2,474	1,796	2,474	1,796
Mean of Y	0.726	0.639	0.880	1.126	1.551
B. Female					
National UR	−0.009	0.010	0.030***	0.047***	0.095***
	(0.010)	(0.010)	(0.010)	(0.018)	(0.021)
Adjusted R^2	0.336	0.348	0.128	0.344	0.182
Observations	2,320	2,320	1,656	2,320	1,656
Mean of Y	0.714	0.625	0.876	1.096	1.535

Notes. Regressions include a cubic function of college graduation year and fixed effects for the region of graduation and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year by region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Effects of National Unemployment Rate at Graduation on Consumption and Asset Holdings

	Log expenditure per capita[a] (1)	Home ownership (2)	Log debt[a] (3)	Log financial asset[a] (4)	Log deposit[a] (5)	Log fin. asset (excl. deposit)[a] (6)	Coresidence with parents (7)
A. Male							
$UR \times 1$[Yrs since grad = 1 − 3]	0.011	−0.003	0.032	−0.224	−0.323**	−0.033	−0.005
	(0.008)	(0.010)	(0.150)	(0.138)	(0.150)	(0.158)	(0.008)
$UR \times 1$[Yrs since grad = 4 − 6]	0.005	−0.005	0.090	−0.116	−0.198	−0.053	0.016*
	(0.008)	(0.009)	(0.167)	(0.145)	(0.136)	(0.150)	(0.010)
$UR \times 1$[Yrs since grad = 7 − 9]	0.000	0.000	0.079	−0.301**	−0.227	−0.327***	0.031***
	(0.007)	(0.007)	(0.132)	(0.122)	(0.140)	(0.107)	(0.009)
$UR \times 1$[Yrs since grad = 10 − 12]	−0.002	−0.005	0.059	0.035	0.103	−0.066	0.016**
	(0.007)	(0.009)	(0.151)	(0.131)	(0.141)	(0.125)	(0.007)
$UR \times 1$[Yrs since grad = 13 − 15]	−0.005	−0.013	0.106	−0.133	−0.039	−0.142	0.003
	(0.007)	(0.009)	(0.165)	(0.095)	(0.106)	(0.136)	(0.006)
$UR \times 1$[Yrs since grad = 16+]	−0.001	−0.007	0.126	−0.021	−0.029	−0.021	−0.001
	(0.007)	(0.009)	(0.122)	(0.100)	(0.122)	(0.104)	(0.006)
Adjusted R^2	0.149	0.023	0.026	0.026	0.013	0.104	0.231
Observations	20,706	22,843	22,847	22,267	22,089	22,266	22,856
Mean of Y	13.574	0.573	9.205	12.967	11.107	6.681	0.261
B. Female							
$UR \times 1$[Yrs since grad = 1 − 3]	−0.006	0.007	−0.039	−0.192	−0.182	−0.146	−0.002
	(0.010)	(0.009)	(0.200)	(0.134)	(0.162)	(0.162)	(0.008)
$UR \times 1$[Yrs since grad = 4 − 6]	−0.018**	0.009	0.145	−0.024	0.006	−0.165	0.001
	(0.007)	(0.008)	(0.148)	(0.119)	(0.113)	(0.115)	(0.008)
$UR \times 1$[Yrs since grad = 7 − 9]	−0.002	0.002	−0.043	−0.141	−0.197	−0.195*	−0.005
	(0.006)	(0.010)	(0.176)	(0.113)	(0.124)	(0.115)	(0.007)
$UR \times 1$[Yrs since grad = 10 − 12]	−0.011	−0.007	0.071	0.035	0.042	−0.074	0.011*
	(0.007)	(0.009)	(0.135)	(0.112)	(0.129)	(0.114)	(0.006)
$UR \times 1$[Yrs since grad = 13 − 15]	−0.004	−0.006	0.229*	0.093	0.150	−0.052	0.008
	(0.007)	(0.010)	(0.118)	(0.111)	(0.130)	(0.122)	(0.005)
$UR \times 1$[Yrs since grad = 16+]	−0.001	0.001	0.013	0.150*	0.051	0.175	0.011
	(0.007)	(0.009)	(0.137)	(0.086)	(0.150)	(0.121)	(0.013)
Adjusted R^2	0.172	0.025	0.030	0.027	0.013	0.111	0.289
Observations	18,808	20,783	20,783	20,302	20,128	20,302	20,795
Mean of Y	13.558	0.587	9.292	13.216	11.362	6.827	0.291

Notes. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year by region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
[a] Available from the second wave. Before taking the logarithm, the values are inflation-adjusted to 2015 KRW and zeros are imputed with 1 KRW. 1 USD is worth approximately 1,100 KRW.

Table 6: Balance Check on Baseline Characteristics, by National Unemployment Rate at Graduation

	Male				Female			
A. Individual balance test:	Coeff. on national *UR*	SE	Mean	Obs.	Coeff. on national *UR*	SE	Mean	Obs.
Attended 4-year college	0.006	(0.014)	0.644	2,059	0.013	(0.014)	0.531	1,928
Father's years of education	0.086	(0.083)	10.32	2,426	0.013	(0.077)	11.11	2,292
Mother's years of education	0.088	(0.093)	8.524	1,988	0.072	(0.086)	9.409	1,994
Parents' job status at age 14								
Regular wage worker	0.016	(0.011)	0.410	2,401	−0.010	(0.011)	0.446	2,262
Irregular wage worker	−0.005	(0.006)	0.072	2,401	0.002	(0.006)	0.069	2,262
Business owner (with employees)	−0.003	(0.008)	0.125	2,401	0.006	(0.008)	0.145	2,262
Business owner (no employee)	−0.006	(0.011)	0.376	2,401	0.000	(0.011)	0.326	2,262
Socioeconomic status at age 14								
Above average	−0.010	(0.011)	0.156	1,863	0.009	(0.012)	0.176	1,836
About average	0.018	(0.015)	0.582	1,863	−0.009	(0.015)	0.620	1,836
Below average	−0.007	(0.013)	0.262	1,863	0.000	(0.012)	0.203	1,836
B. Joint balance test:	χ^2-**statistic**	*p*-**value**			χ^2-**statistic**	*p*-**value**		
	7.382	[0.597]			3.650	[0.933]		

Notes. The analysis sample includes 2,474 men and 2,320 women, but the number of observations for each variable varies because of missing values. Regressions include a cubic function of college graduation year and fixed effects for the region of graduation and years of potential experience. Robust standard errors in parentheses are clustered at the level of graduation year by region. *p*-values in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Online Appendix of
"The Long-Term Effects of Labor Market Entry in a Recession:
Evidence from the Asian Financial Crisis"

Eleanor Jawon Choi   Jaewoo Choi   Hyelim Son
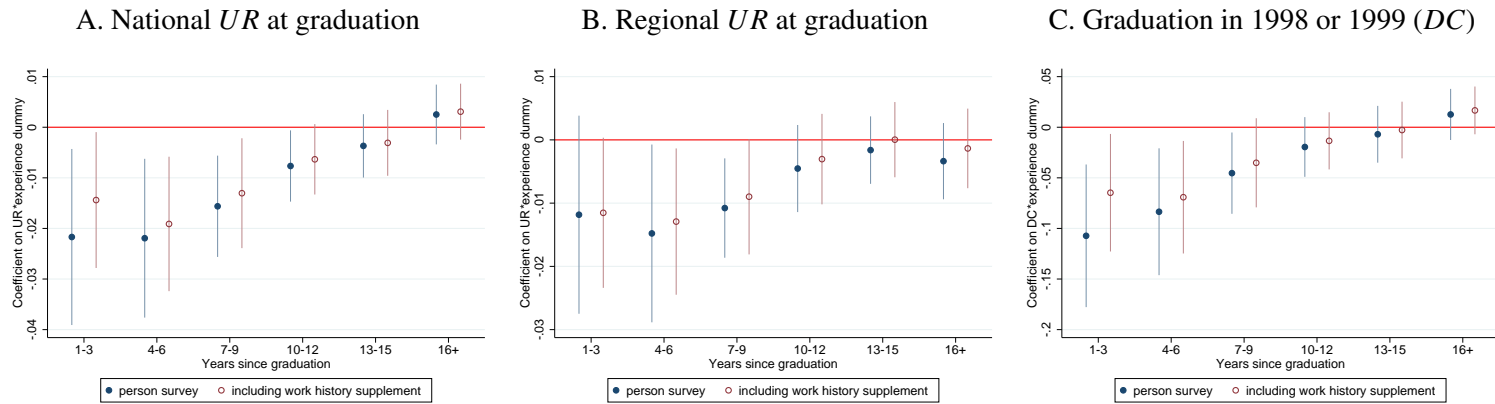Hanyang University   KDI   University of Seoul

A. National *UR* at graduation   B. Regional *UR* at graduation   C. Graduation in 1998 or 1999 (*DC*)

Figure A1: Effects of Labor Market Conditions at Graduation on Employment for Males, by Data Source

A. National *UR* at graduation   B. Regional *UR* at graduation   C. Graduation in 1998 or 1999 (*DC*)
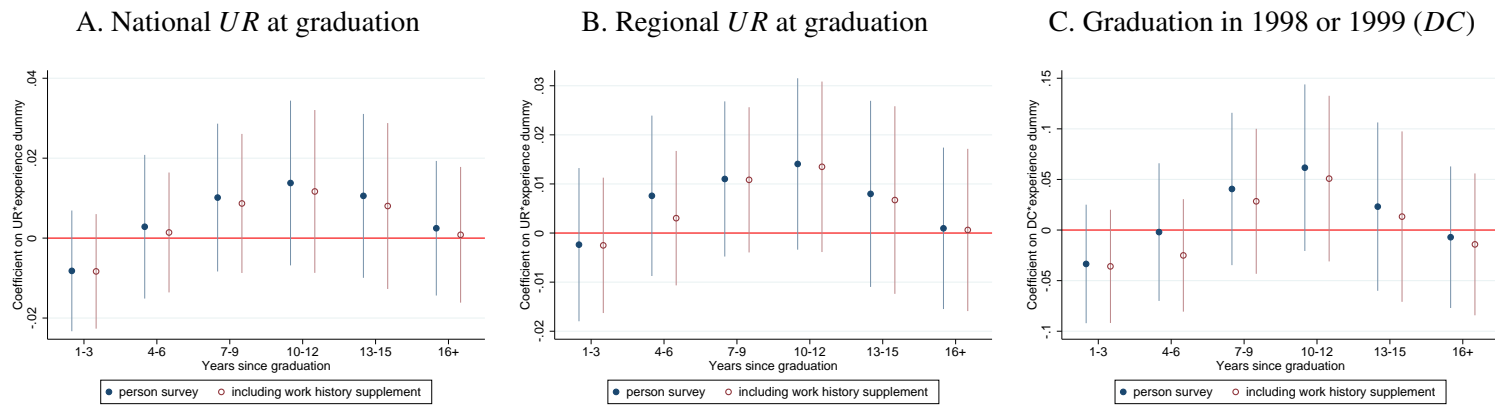

Figure A2: Effects of Labor Market Conditions at Graduation on Employment for Females, by Data Source

Notes. Each dot represents the coefficient estimate on an interaction term between *UR* (or *DC*) and a potential experience dummy. Vertical spikes around each point estimate represent the 95% confidence interval constructed using robust standard errors clustered at the level of graduation year by region. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled.

A. Self-employment

B. Work hours[a]

C. Full-time job[b]

D. Regular job[b]

2

Figure A3: Effects of National Unemployment Rate at Graduation on Job Quality for Males

Notes. Each dot represents the coefficient estimate on an interaction term between the national UR and a potential experience dummy. Vertical spikes around each point estimate represent the 95% confidence interval constructed using robust standard errors clustered at the level of graduation year by region. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for.
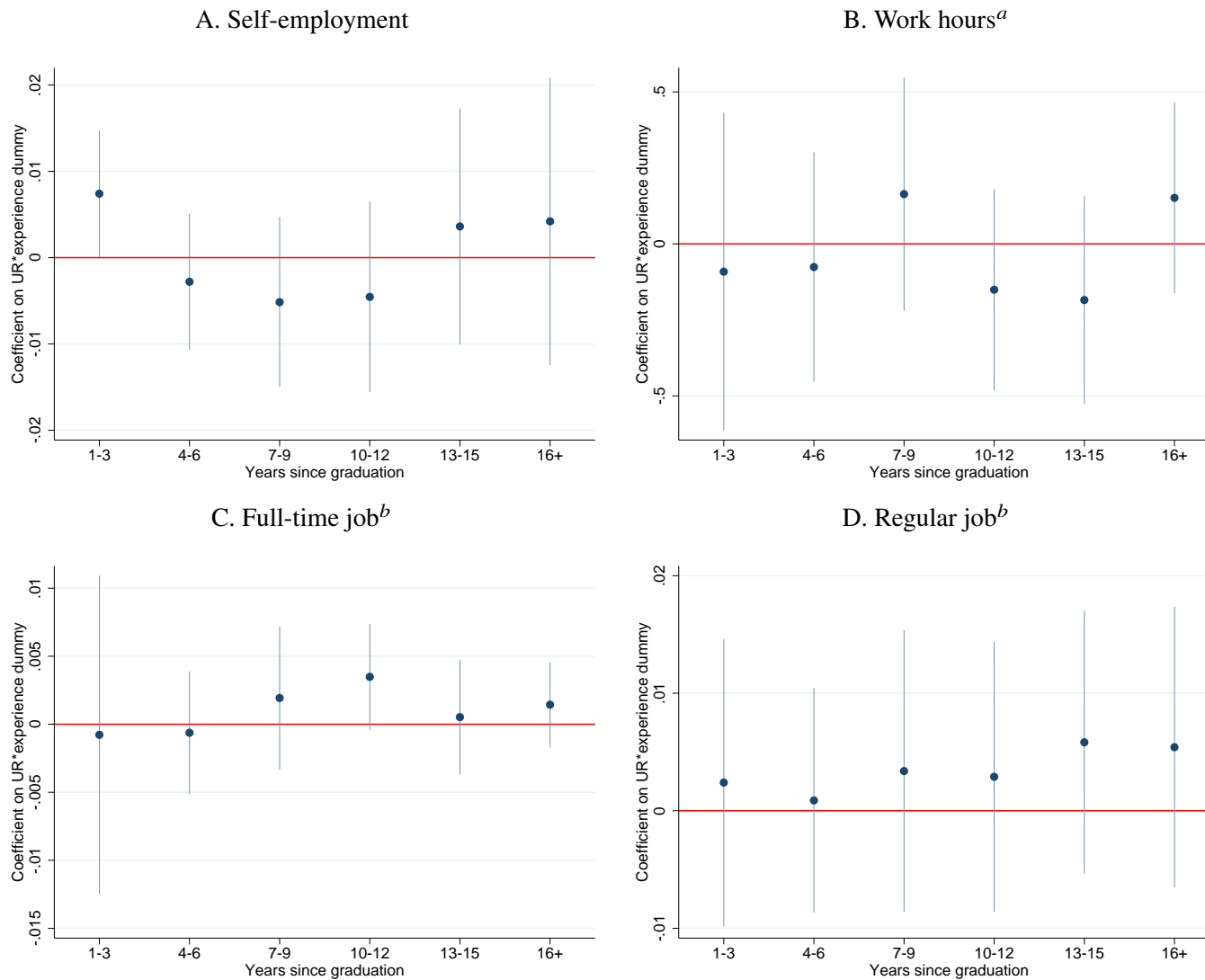
[a] Conditional on being employed.

[b] Conditional on being a wage worker.

A. Self-employment

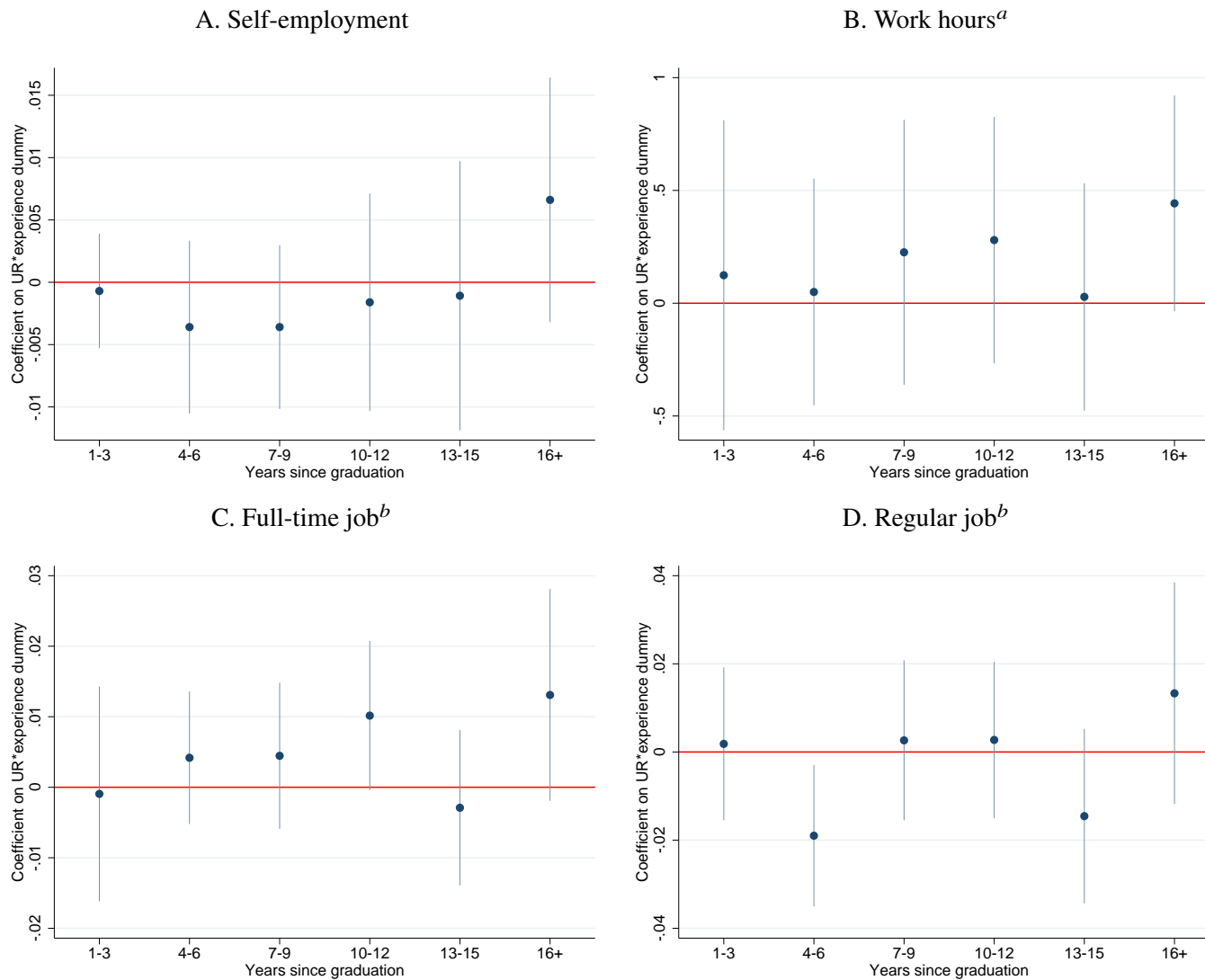B. Work hours[a]

C. Full-time job[b]

D. Regular job[b]

Figure A4: Effects of National Unemployment Rate at Graduation on Job Quality for Females

Notes. Each dot represents the coefficient estimate on an interaction term between the national UR and a potential experience dummy. Vertical spikes around each point estimate represent the 95% confidence interval constructed using robust standard errors clustered at the level of graduation year by region. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for.

[a] Conditional on being employed.

[b] Conditional on being a wage worker.

A. Employment

B. Earnings[a]

C. Log earnings (imputed)[b]

D. Log earnings

Figure A5: Effects of Regional Unemployment Rate at Graduation on Employment and Earnings for Males

Notes. Each dot represents the coefficient estimate on an interaction term between the regional UR and a potential experience dummy. Vertical spikes around each point estimate represent the 95% confidence interval constructed using robust standard errors clustered at the level of graduation year by region. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Monthly earnings are inflation-adjusted to 2015 values.

[a] In thousands of 2015 KRW. 1 USD is worth approximately 1,100 KRW.

[b] We impute zero earnings with 1 KRW before taking the logarithm. This is equivalent to using zero log earnings for individuals who are unemployed or not in the labor force in the regression analysis.

A. Employment

B. Earnings[a]

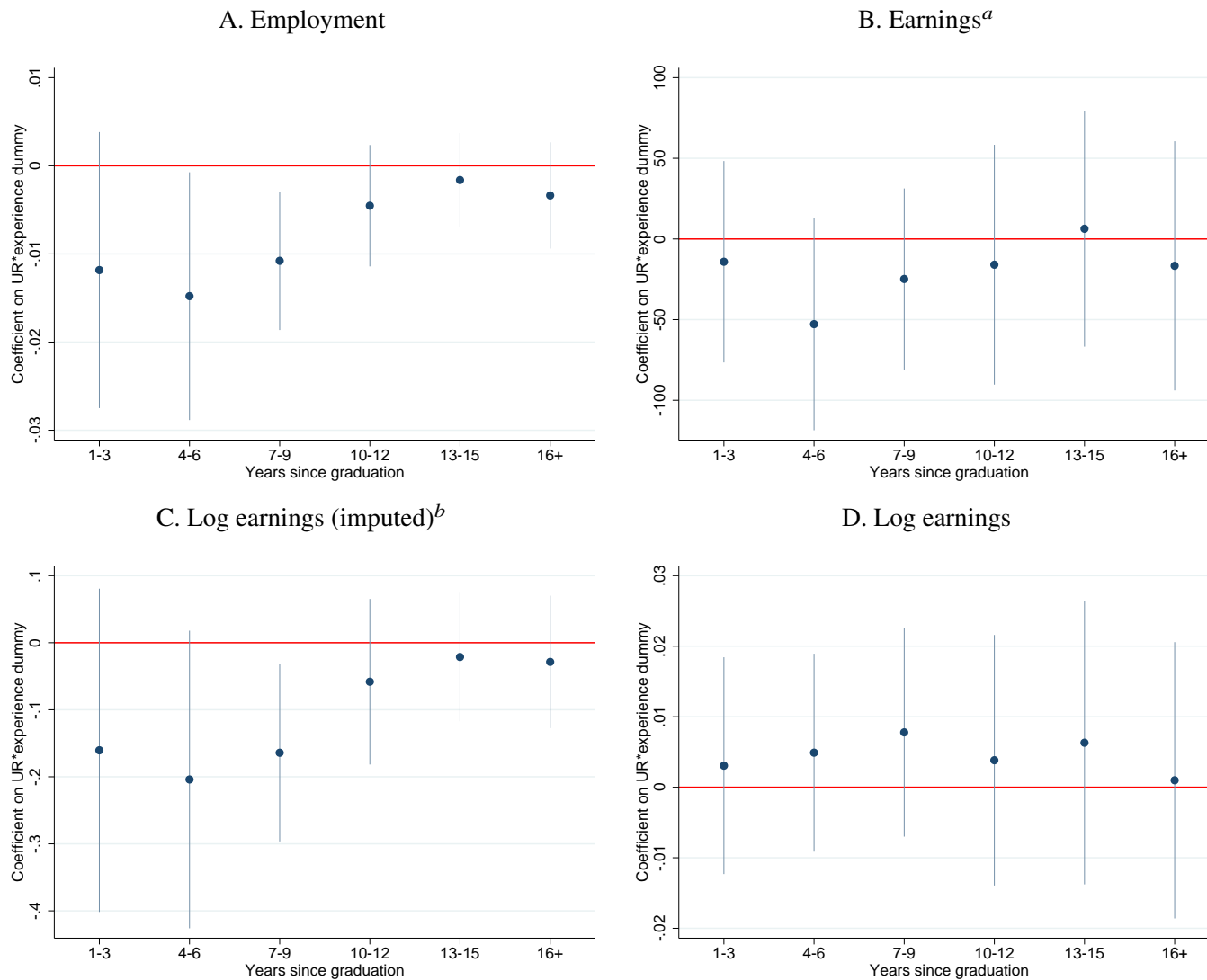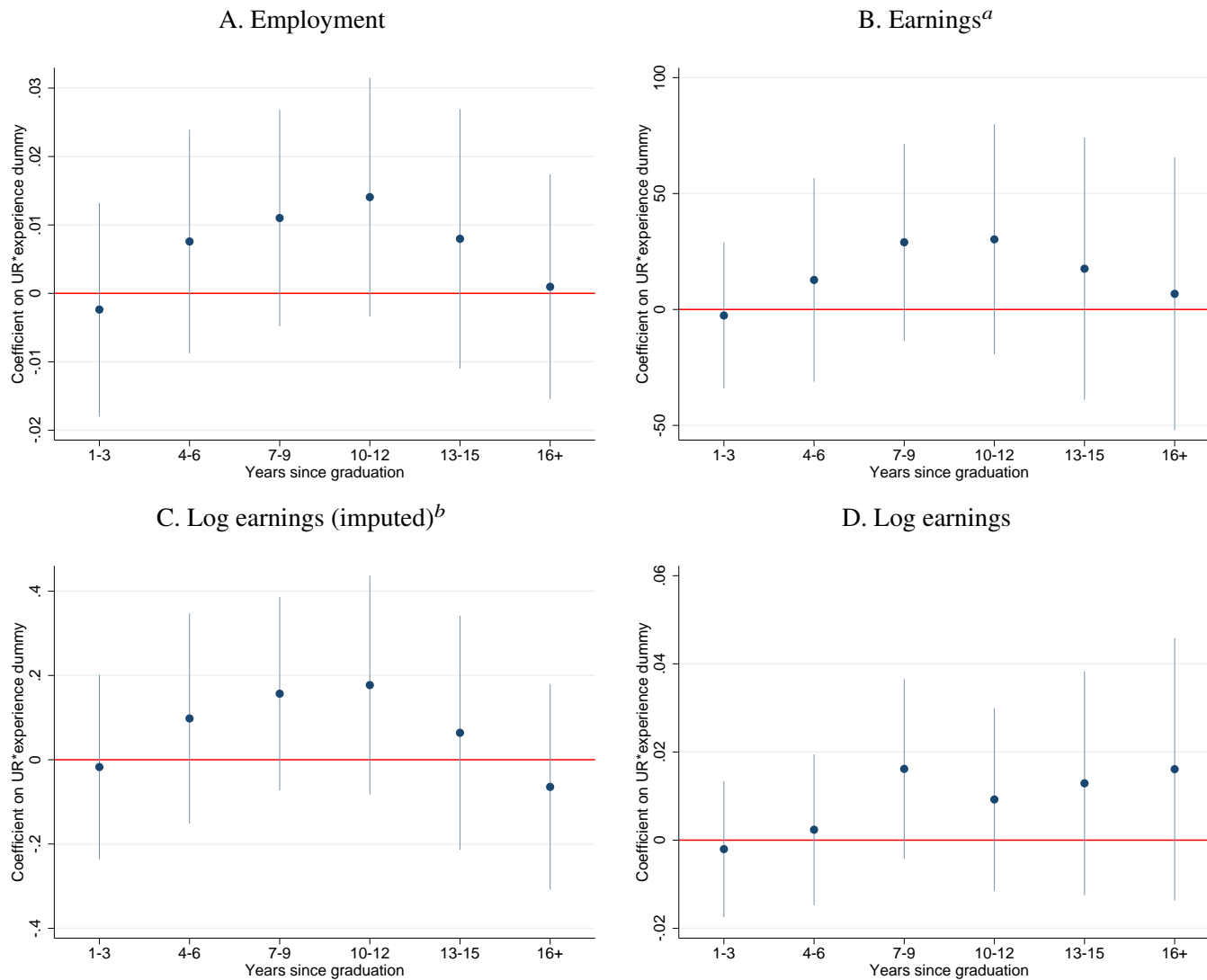C. Log earnings (imputed)[b]

D. Log earnings

Figure A6: Effects of Regional Unemployment Rate at Graduation on Employment and Earnings for Females

Notes. Each dot represents the coefficient estimate on an interaction term between the regional UR and a potential experience dummy. Vertical spikes around each point estimate represent the 95% confidence interval constructed using robust standard errors clustered at the level of graduation year by region. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Monthly earnings are inflation-adjusted to 2015 values.
[a] In thousands of 2015 KRW. 1 USD is worth approximately 1,100 KRW.
[b] We impute zero earnings with 1 KRW before taking the logarithm. This is equivalent to using zero log earnings for individuals who are unemployed or not in the labor force in the regression analysis.

A. Employment

B. Earnings[a]

C. Log earnings (imputed)[b]

D. Log earnings

Figure A7: Effects of Graduation in 1998 or 1999 on Employment and Earnings for Males

Notes. Each dot represents the coefficient estimate on an interaction term between *DC* and a potential experience dummy. Vertical spikes around each point estimate represent the 95% confidence interval constructed using robust standard errors clustered at the level of graduation year by region. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Monthly earnings are inflation-adjusted to 2015 values.

[a] In thousands of 2015 KRW. 1 USD is worth approximately 1,100 KRW.

[b] We impute zero earnings with 1 KRW before taking the logarithm. This is equivalent to using zero log earnings for individuals who are unemployed or not in the labor force in the regression analysis.
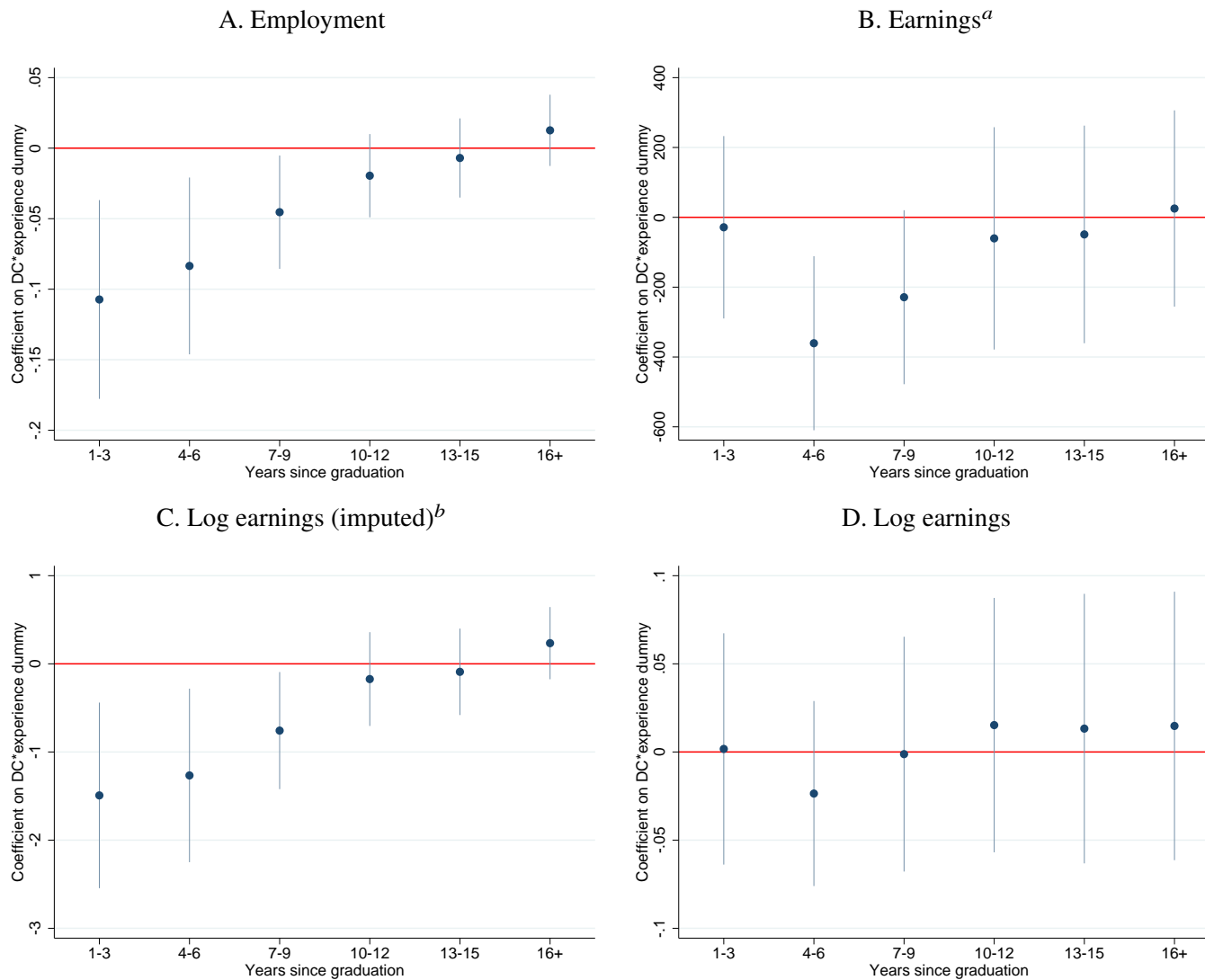
A. Employment

B. Earnings[a]

C. Log earnings (imputed)[b]

D. Log earnings

Figure A8: Effects of Graduation in 1998 or 1999 on Employment and Earnings for Females

Notes. Each dot represents the coefficient estimate on an interaction term between *DC* and a potential experience dummy. Vertical spikes around each point estimate represent the 95% confidence interval constructed using robust standard errors clustered at the level of graduation year by region. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Monthly earnings are inflation-adjusted to 2015 values.

[a] In thousands of 2015 KRW. 1 USD is worth approximately 1,100 KRW.

[b] We impute zero earnings with 1 KRW before taking the logarithm. This is equivalent to using zero log earnings for individuals who are unemployed or not in the labor force in the regression analysis.
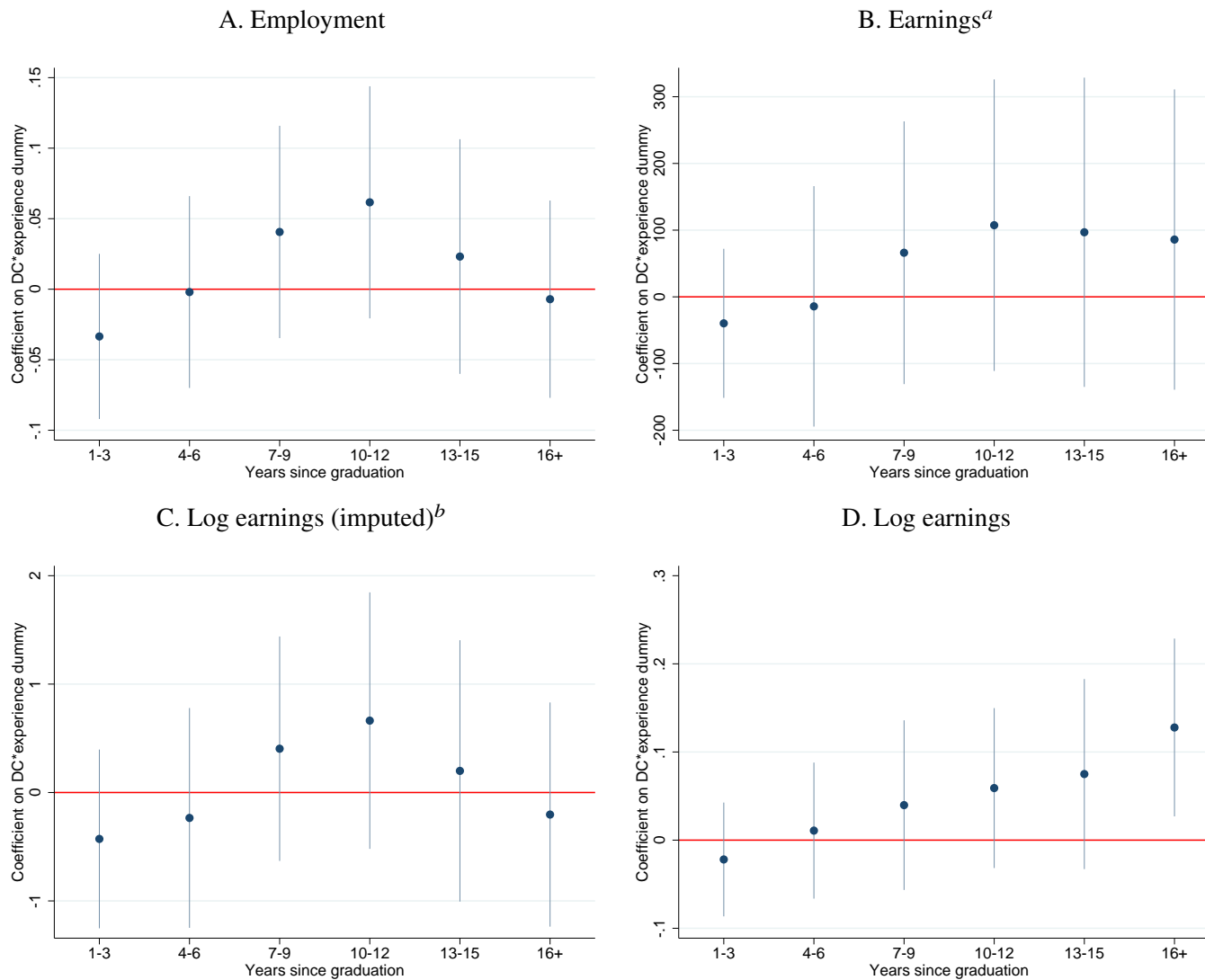
A. Male

B. Female

Figure A9: Effects of Regional Unemployment Rate at Graduation on Family Formation by a Certain Age

Notes. Each bullet shape represents the coefficient estimate on the regional *UR* from a separate regression estimating equation (3). Vertical spikes around each point estimate represent the 95% confidence interval constructed using robust standard errors clustered at the level of graduation year by region. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled.

8

A. Male

B. Female

Figure A10: Effects of Graduation in 1998 or 1999 on Family Formation by a Certain Age

Notes. Each bullet shape represents the coefficient estimate on *DC* from a separate regression estimating equation (3). Vertical spikes around each point estimate represent the 95% confidence interval constructed using robust standard errors clustered at the level of graduation year by region. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for.
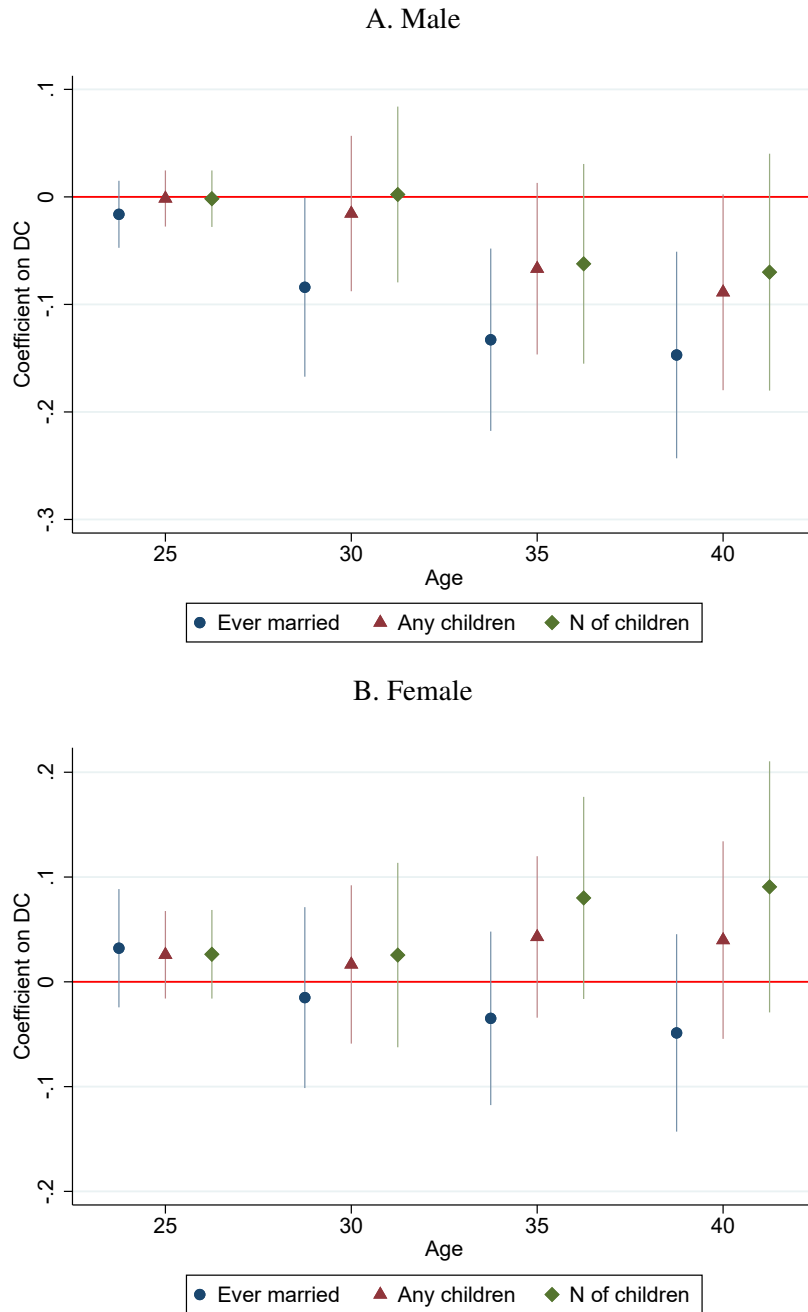
Table A1: Balance Check on Baseline Characteristics, by Regional Unemployment Rate at Graduation

	Male				Female			
A. Individual balance test:	Coeff. on regional UR	SE	Mean	Obs.	Coeff. on regional UR	SE	Mean	Obs.
Attended 4-year college	−0.012	(0.012)	0.644	2,059	0.005	(0.013)	0.531	1,928
Father's years of education	0.026	(0.074)	10.32	2,426	0.047	(0.070)	11.11	2,292
Mother's years of education	0.114	(0.083)	8.524	1,988	0.063	(0.077)	9.409	1,994
Parents' job status at age 14								
Regular wage worker	0.016	(0.010)	0.410	2,401	−0.003	(0.010)	0.446	2,262
Irregular wage worker	−0.003	(0.005)	0.072	2,401	−0.001	(0.005)	0.069	2,262
Business owner (with employees)	−0.006	(0.007)	0.125	2,401	0.004	(0.007)	0.145	2,262
Business owner (no employee)	−0.004	(0.010)	0.376	2,401	−0.003	(0.010)	0.326	2,262
Socioeconomic status at age 14								
Above average	−0.013	(0.009)	0.156	1,863	0.007	(0.010)	0.176	1,836
About average	0.017	(0.013)	0.582	1,863	−0.002	(0.013)	0.620	1,836
Below average	−0.005	(0.011)	0.262	1,863	−0.005	(0.011)	0.203	1,836
B. Joint balance test:	χ^2**-statistic**	*p*-**value**			χ^2**-statistic**	*p*-**value**		
	12.411	[0.191]			4.120	[0.903]		

Notes. The analysis sample includes 2,474 men and 2,320 women, but the number of observations for each variable varies because of missing values. Regressions include a cubic function of college graduation year and fixed effects for the region of graduation and years of potential experience. Robust standard errors in parentheses are clustered at the level of graduation year by region. *p*-values in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A2: Balance Check on Baseline Characteristics, by Year of Graduation (1998 or 1999 vs. other years)

A. Individual balance test:	Male				Female			
	Coeff. on DC	SE	Mean	Obs.	Coeff. on DC	SE	Mean	Obs.
Attended 4-year college	0.007	(0.054)	0.644	2,059	0.052	(0.057)	0.531	1,928
Father's years of education	0.307	(0.336)	10.32	2,426	−0.050	(0.315)	11.11	2,292
Mother's years of education	0.303	(0.365)	8.524	1,988	0.287	(0.343)	9.409	1,994
Parents' job status at age 14								
Regular wage worker	0.065	(0.045)	0.410	2,401	−0.064	(0.046)	0.446	2,262
Irregular wage worker	−0.010	(0.024)	0.072	2,401	0.019	(0.024)	0.069	2,262
Business owner (with employees)	−0.027	(0.031)	0.125	2,401	0.017	(0.033)	0.145	2,262
Business owner (no employee)	−0.018	(0.044)	0.376	2,401	0.022	(0.043)	0.326	2,262
Socioeconomic status at age 14								
Above average	−0.069	(0.044)	0.156	1,863	0.007	(0.048)	0.176	1,836
About average	0.070	(0.060)	0.582	1,863	−0.016	(0.061)	0.620	1,836
Below average	−0.001	(0.054)	0.262	1,863	0.009	(0.051)	0.203	1,836
B. Joint balance test:	χ^2-statistic	p-value			χ^2-statistic	p-value		
	10.953	[0.279]			4.924	[0.841]		

Notes. The analysis sample includes 2,474 men and 2,320 women, but the number of observations for each variable varies because of missing values. Regressions include a cubic function of college graduation year and fixed effects for the region of graduation and years of potential experience. Robust standard errors in parentheses are clustered at the level of graduation year by region. *p*-values in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3: Effects of Labor Market Conditions at Graduation on Age of Family Formation

	Age at first marriage			Age at first childbirth		
	Censored reg. (1)	Acc. fail. time (2)	Cox PH (3)	Censored reg. (4)	Acc. fail. time (5)	Cox PH (6)
A. Male						
Regional *UR*	0.181	0.029*	−0.027	0.012	0.016	−0.006
	(0.121)	(0.017)	(0.025)	(0.118)	(0.015)	(0.023)
Log likelihood	−5,877	−2,254	−12,096	−5,646	−2,217	−11,217
DC	1.566***	0.212**	−0.274**	0.875	0.150*	−0.192
	(0.591)	(0.082)	(0.119)	(0.626)	(0.082)	(0.120)
Log likelihood	−5,874	−2,253	−12,094	−5,645	−2,216	−11,216
Observations	2,393	2,393	2,393	2,474	2,474	2,474
Median of *Y*	30.0	30.0	30.0	32.0	32.0	32.0
B. Female						
Regional *UR*	−0.041	0.014	0.012	−0.163	−0.005	0.033
	(0.147)	(0.018)	(0.028)	(0.157)	(0.020)	(0.030)
Log likelihood	−5,323	−2,069	−11,050	−5,069	−2,004	−10,119
DC	−0.427	0.035	0.112	−1.104*	−0.095	0.248*
	(0.666)	(0.090)	(0.136)	(0.661)	(0.092)	(0.132)
Log likelihood	−5,323	−2,069	−11,050	−5,068	−2,004	−10,118
Observations	2,253	2,253	2,253	2,320	2,320	2,320
Median of *Y*	28.0	28.0	28.0	29.0	29.0	29.0

Notes. Regressions include a cubic function of college graduation year and fixed effects for the region of graduation and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year by region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A4: Long-Term Effects of Labor Market Conditions at Graduation on Marriage and Fertility

	Ever married (1)	Any children (2)	Any children (married) (3)	N of children (4)	N of children (married) (5)
A. Male					
Regional *UR*	−0.013	−0.010	−0.002	−0.012	−0.003
	(0.009)	(0.007)	(0.010)	(0.015)	(0.020)
Adjusted R^2	0.263	0.272	0.083	0.283	0.141
DC	−0.092**	−0.072*	−0.008	−0.112	−0.026
	(0.042)	(0.039)	(0.049)	(0.081)	(0.110)
Adjusted R^2	0.265	0.273	0.083	0.283	0.141
Observations	2,474	2,474	1,796	2,474	1,796
Mean of *Y*	0.726	0.639	0.880	1.126	1.551
B. Female					
Regional *UR*	−0.014*	−0.001	0.014	0.016	0.041*
	(0.008)	(0.008)	(0.010)	(0.017)	(0.023)
Adjusted R^2	0.337	0.348	0.125	0.342	0.176
DC	−0.050	0.022	0.103***	0.139**	0.312***
	(0.042)	(0.039)	(0.040)	(0.068)	(0.086)
Adjusted R^2	0.336	0.348	0.127	0.343	0.179
Observations	2,320	2,320	1,656	2,320	1,656
Mean of *Y*	0.714	0.625	0.876	1.096	1.535

Notes. Regressions include a cubic function of college graduation year and fixed effects for the region of graduation and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year by region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

13

Table A5: Effects of Regional Unemployment Rate at Graduation on Consumption and Asset Holdings

	Log expenditure per capita[a] (1)	Home ownership (2)	Log debt[a] (3)	Log financial asset[a] (4)	Log deposit[a] (5)	Log fin. asset (excl. deposit)[a] (6)	Coresidence with parents (7)
A. Male							
$UR \times 1$[Yrs since grad = 1 − 3]	0.008	−0.010	0.173	−0.163	−0.175	0.008	−0.005
	(0.007)	(0.010)	(0.137)	(0.132)	(0.127)	(0.148)	(0.008)
$UR \times 1$[Yrs since grad = 4 − 6]	0.003	−0.012	0.164	−0.212	−0.258**	−0.025	0.004
	(0.007)	(0.009)	(0.150)	(0.134)	(0.120)	(0.140)	(0.009)
$UR \times 1$[Yrs since grad = 7 − 9]	0.003	−0.008	0.193	−0.264**	−0.214*	−0.188**	0.015**
	(0.007)	(0.007)	(0.124)	(0.112)	(0.125)	(0.091)	(0.007)
$UR \times 1$[Yrs since grad = 10 − 12]	−0.001	−0.010	0.050	0.031	0.080	−0.039	0.012**
	(0.006)	(0.007)	(0.129)	(0.129)	(0.130)	(0.115)	(0.006)
$UR \times 1$[Yrs since grad = 13 − 15]	−0.005	−0.013*	0.042	−0.075	−0.040	−0.031	0.008
	(0.006)	(0.008)	(0.145)	(0.087)	(0.095)	(0.138)	(0.006)
$UR \times 1$[Yrs since grad = 16+]	−0.012*	−0.004	−0.020	−0.088	−0.154	−0.041	0.004
	(0.007)	(0.008)	(0.120)	(0.084)	(0.107)	(0.104)	(0.007)
Adjusted R^2	0.150	0.023	0.026	0.026	0.013	0.104	0.230
Observations	20,706	22,843	22,847	22,267	22,089	22,266	22,856
Mean of Y	13.574	0.573	9.205	12.967	11.107	6.681	0.261
B. Female							
$UR \times 1$[Yrs since grad = 1 − 3]	0.005	−0.003	−0.127	−0.232**	−0.150	−0.253**	0.000
	(0.007)	(0.007)	(0.139)	(0.109)	(0.118)	(0.126)	(0.007)
$UR \times 1$[Yrs since grad = 4 − 6]	−0.013*	0.010	0.071	−0.082	−0.079	−0.208**	0.009
	(0.006)	(0.007)	(0.122)	(0.100)	(0.093)	(0.091)	(0.007)
$UR \times 1$[Yrs since grad = 7 − 9]	0.001	0.008	0.087	−0.096	−0.109	−0.174*	0.003
	(0.006)	(0.008)	(0.138)	(0.103)	(0.117)	(0.097)	(0.006)
$UR \times 1$[Yrs since grad = 10 − 12]	−0.007	0.003	0.091	0.037	0.060	−0.081	0.010*
	(0.007)	(0.007)	(0.118)	(0.103)	(0.125)	(0.095)	(0.005)
$UR \times 1$[Yrs since grad = 13 − 15]	−0.000	0.002	0.133	0.125	0.141	−0.023	0.005
	(0.007)	(0.008)	(0.104)	(0.106)	(0.132)	(0.117)	(0.005)
$UR \times 1$[Yrs since grad = 16+]	−0.003	−0.001	−0.031	0.151	0.046	0.168	−0.003
	(0.008)	(0.008)	(0.131)	(0.092)	(0.134)	(0.114)	(0.005)
Adjusted R^2	0.172	0.025	0.030	0.027	0.013	0.111	0.290
Observations	18,808	20,783	20,783	20,302	20,128	20,302	20,795
Mean of Y	13.558	0.587	9.292	13.216	11.362	6.827	0.291

Notes. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year by region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[a] Available from the second wave. Before taking the logarithm, the values are inflation-adjusted to 2015 KRW and zeros are imputed with 1 KRW. 1 USD is worth approximately 1,100 KRW.

Table A6: Effects of Graduation in 1998 or 1999 on Consumption and Asset Holdings

	Log expenditure per capita[a] (1)	Home ownership (2)	Log debt[a] (3)	Log financial asset[a] (4)	Log deposit[a] (5)	Log fin. asset (excl. deposit)[a] (6)	Coresidence with parents (7)
A. Male							
$DC \times 1$[Yrs since grad = 1 − 3]	0.052*	−0.010	−0.259	−0.840	−1.239**	−0.264	−0.003
	(0.031)	(0.040)	(0.595)	(0.535)	(0.581)	(0.614)	(0.033)
$DC \times 1$[Yrs since grad = 4 − 6]	−0.007	−0.026	0.241	−0.801	−0.993*	−0.310	0.083**
	(0.028)	(0.039)	(0.703)	(0.574)	(0.547)	(0.562)	(0.039)
$DC \times 1$[Yrs since grad = 7 − 9]	−0.002	−0.020	0.216	−1.303**	−0.955	−1.447***	0.126***
	(0.030)	(0.033)	(0.543)	(0.511)	(0.595)	(0.443)	(0.035)
$DC \times 1$[Yrs since grad = 10 − 12]	−0.012	−0.001	0.159	0.232	0.355	−0.163	0.056***
	(0.028)	(0.034)	(0.598)	(0.540)	(0.594)	(0.497)	(0.025)
$DC \times 1$[Yrs since grad = 13 − 15]	−0.016	−0.030	0.308	−0.688*	−0.236	−0.720	0.019
	(0.028)	(0.038)	(0.697)	(0.382)	(0.454)	(0.572)	(0.022)
$DC \times 1$[Yrs since grad = 16+]	−0.009	−0.023	0.413	−0.268	−0.467	−0.081	−0.005
	(0.028)	(0.036)	(0.503)	(0.409)	(0.510)	(0.423)	(0.025)
Adjusted R^2	0.149	0.023	0.026	0.027	0.013	0.104	0.231
Observations	20,706	22,843	22847	22,267	22,089	22,266	22,856
Mean of Y	13.574	0.573	9.205	12.967	11.107	6.681	0.261
B. Female							
$DC \times 1$[Yrs since grad = 1 − 3]	−0.027	0.044	−0.188	−0.454	−0.522	−0.217	−0.012
	(0.036)	(0.034)	(0.728)	(0.498)	(0.582)	(0.609)	(0.035)
$DC \times 1$[Yrs since grad = 4 − 6]	−0.061**	0.020	0.617	0.241	0.192	−0.403	−0.026
	(0.029)	(0.032)	(0.573)	(0.483)	(0.461)	(0.442)	(0.031)
$DC \times 1$[Yrs since grad = 7 − 9]	−0.016	0.009	−0.082	−0.579	−0.931*	−0.535	−0.022
	(0.025)	(0.040)	(0.682)	(0.437)	(0.495)	(0.445)	(0.027)
$DC \times 1$[Yrs since grad = 10 − 12]	−0.041	−0.046	0.200	0.105	0.235	−0.212	0.038*
	(0.029)	(0.036)	(0.547)	(0.447)	(0.514)	(0.468)	(0.023)
$DC \times 1$[Yrs since grad = 13 − 15]	−0.009	−0.039	0.921*	0.515	0.618	−0.164	0.017
	(0.028)	(0.040)	(0.500)	(0.460)	(0.555)	(0.514)	(0.019)
$DC \times 1$[Yrs since grad = 16+]	0.003	−0.005	−0.094	0.555	0.121	0.797	−0.015
	(0.029)	(0.039)	(0.556)	(0.362)	(0.632)	(0.528)	(0.020)
Adjusted R^2	0.172	0.025	0.030	0.027	0.014	0.111	0.289
Observations	18,808	20,783	20,783	20,302	20,128	20,302	20,795
Mean of Y	13.558	0.587	9.292	13.216	11.362	6.827	0.291

Notes. Regressions include a cubic function of graduation year and fixed effects for the region of college graduation, calendar year, and years of potential experience. Controls for background characteristics include father's years of education, years of education squared, and dummies for parents' job status at age 14 (regular wage worker, irregular wage worker, business owner hiring employees, business owner without an employee). Missing values in background covariates are imputed with mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year by region. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
[a] Available from the second wave. Before taking the logarithm, the values are inflation-adjusted to 2015 KRW and zeros are imputed with 1 KRW. 1 USD is worth approximately 1,100 KRW.