

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

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Abstract

This study 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 in South Korea. We measure the overall welfare effect by examining their labor market activities, family formation, and household finances. 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 asset building among men who graduated during the recession. For women, limited job opportunities at graduation resulted in an increase in childbearing. We also find evidence that family provides a risk-sharing mechanism for recession graduates. Our results suggest that labor market entry in a large-scale recession has prolonged effects on a young worker's life course even after the penalties in the labor market have disappeared.

JEL Codes: E32, J10, E21, J20, J31

Keywords: recession, financial crisis, long-term effect, college graduate

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1 Introduction

The global economic downturn due to the COVID-19 pandemic, which is projected to be worse than the Great Recession, has reignited a discussion on the aftermath of a deep recession on first-time labor market entrants. Despite well-documented evidence on the substantial loss of income among recession graduates, little is known about how this labor market shock will extend to other aspects of personal welfare, such as family formation and financial decisions. Research shows that the earnings penalty disappears after about 10 years for a typical college graduate, but it is unclear whether this catch-up would also occur outside the labor market. In addition, since most previous research has focused on modest recessions and regular business cycles, the consequences of a large-scale recession have not been fully explored. Evidence from the Great Recession suggests that the disadvantages of graduating during this severe economic downturn may have been more serious than earlier recessions in the 1970s–2000s; however, because this major event occurred only about a decade ago, the scope of research has been limited to short- and medium-term labor market outcomes.¹

This study examines the long-term consequences of labor market entry during a deep recession on career trajectory, family formation, and household finances, by studying the 1997–1998 Asian financial crisis, which created a historic economic meltdown in much of East and Southeast Asia. In particular, we focus on South Korea, which was unexpectedly hit by the financial crisis in the last quarter of 1997 and experienced the worst economic contraction since the 1950–1953 Korean War. The macroeconomic indicators in Figure 1 show that the South Korean economy deteriorated rapidly within a few months from the onset of the crisis. The real GDP growth rate plummeted from 4.4 percent in the fourth quarter of 1997 to –3.4 in the first quarter of 1998, and further to –7.3 in the second quarter of 1998. The unemployment rate more than doubled from 2.7 percent to 6.1 between November 1997 and February 1998. The economy started to pick up from the first quarter of 1999, and it took about three years until full recovery.

¹Altonji et al. (2016) find a disproportionately larger reduction in the early-career earnings of college graduates who entered the labor market during the Great Recession, than in the earnings of those who graduated during previous recessions.

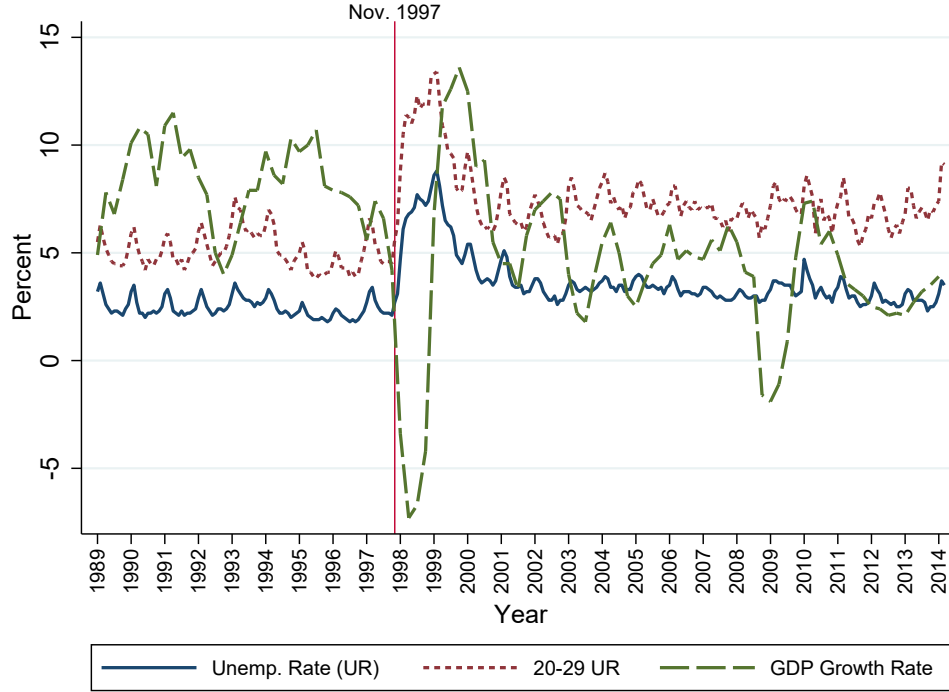


Figure 1: Macroeconomic Statistics

Notes. Monthly unemployment rates are from Statistics Korea. Quarterly real GDP growth rate is from the Bank of Korea, and measures the growth rate compared to the same quarter of the previous year.

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 the first 20 waves of the KLIPS spanning the period from 1998 to 2017, we construct our analysis sample of men and women who graduated from college between 1989 and 2010. We analyze a comprehensive set of outcomes regarding work, family, household finances, and living arrangements. By tracking the crisis cohorts and their luckier counterparts up to their mid-40s, we can focus on longer-term outcomes beyond early career status. In particular, as more than 20 years have lapsed since the Asian financial crisis, we can distinguish permanent changes from temporary adjustments in marriage, fertility, and asset building.

We estimate a regression model exploiting across-cohort variation in the national unemployment rate at college graduation. Due to the unexpected timing and the historically large magnitude of the shock, the Asian financial crisis induced sharp deviations of the unemployment rate from its smooth national trend, as shown in Figure 1. As the main source of identification, we focus on

nation-wide variation in the unemployment rate rather than region-specific changes because of the almost parallel movement of regional unemployment rates in South Korea. Consequently, we use a polynomial function of graduation year instead of cohort fixed effects, to control for a national cohort trend. The key assumption is that the temporal variation in the unemployment rate at labor market entry is not systematically related to background characteristics of each graduation cohort once the smooth trend is removed. This assumption would be violated if individuals endogenously select into the timing of college graduation. To address this concern, we conduct balance checks on background characteristics and instrumental variables regressions using predicted year of graduation. These exercises confirm that our recession effect estimates are unlikely to be driven by selection. We also show that the estimates are robust to using alternative measures of unemployment conditions, various specifications of the cohort trend, and different sample restrictions.

Our results show that adverse economic conditions at graduation have far-reaching consequences beyond the labor market dimension. In addition, the effects of a recession are heterogeneous by gender, because men and women face different choice sets and constraints when making decisions related to work, family, and household finances. We find that male recession cohorts experience a large and persistent reduction in employment and earnings for up to 12 years after graduation. A 1 percentage point higher unemployment rate at graduation results in a 1.9 percent lower employment probability and 2.5 percent lower earnings during the first 10 years of potential experience. This deterioration in career outcomes leads to a permanent decline in the marriage and childbearing rates. While consumption is insulated from reduced earnings, men who graduate during a recession hold lower levels of financial assets, are less likely to be homeowners, and are more likely to live with their parents.

For women, the recession penalty in the labor market is more subtle than that for men, because even those graduating in a good economy have weak labor force attachment owing to family considerations. Female recession cohorts suffer from sizable reductions in employment and earnings immediately after graduation, but the negative recession effect disappears within 2 years. The limited job opportunities in their early career lead to accelerated childbirth and higher fertility. While

there is a delay in financial asset building, it is not as substantial as that of their male counterparts. As a coping mechanism, female recession cohorts tend to find a spouse from a more advantaged economic background, as opposed to remaining unmarried or living with their parents.

This study is related to three strands of literature. First, a large body of literature seeks to identify labor market penalties for young workers who graduate in adverse economic conditions (e.g., Kahn, 2010; Oreopoulos et al., 2012).² The consequences of such adverse conditions are known as the “scarring effect,” owing to the long-lasting damage on the careers of affected individuals. We add to the literature on scarring effects by showing that a large-scale recession leads to a substantially larger and more persistent reduction in employment probability especially among male college graduates. A large extensive margin effect on earnings is also observed by Altonji et al. (2016) and Rothstein (2019), who examine the impact of the Great Recession; however, the employment reduction is rarely documented in other studies, which focus on more modest variations in regular business cycles. In addition, this study is one of very few works that analyzes men and women separately. We show that the effect of initial labor market conditions on career outcomes lasts much longer for men than that for women, in line with Kondo (2015) and Schwandt and von Wachter (2020).

Second, we add to a small but growing literature on the long-term effects of initial labor market conditions on family formation. Prior results are mixed in terms of the sign and magnitude of the effect (Hashimoto and Kondo, 2012; Hershbein, 2012; Kondo, 2012; Currie and Schwandt, 2014; Hofmann and Hohmeyer, 2016; Maclean et al., 2016; Schwandt and von Wachter, 2020). Our study contributes to the literature by showing that reduced labor market opportunities early in a career can lead to a permanent change in marriage probability and fertility, especially in the case of a large-scale recession. Furthermore, we find that labor market entry conditions may affect women’s choice of spouse. This result fills a gap in the literature, where previous studies have

²CoCkx (2016) provides an overview of the literature on losses in employment and earnings experienced by those entering the labor market in economic downturns. Well-known studies include 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 Belgium, Van den Berge (2018) for the Netherlands, Raaum and Røed (2006) for Norway, and Fernández-Kranz and Rodríguez-Planas (2018) for Spain.

noted a sizable response in fertility, despite the short-lived reduction in own earnings among female recession cohorts (Kondo, 2015; Maclean et al., 2016; Schwandt and von Wachter, 2020).

Lastly, our results on the financial outcomes of scarred cohorts are closely related to Kawaguchi and Kondo (2020), the only existing study, to our knowledge, on the effects of labor market entry conditions on asset holdings and living arrangements.³ Kawaguchi and Kondo (2020) suggest that migration of recession graduates to areas with low cost-of-living limits the effect of initial labor market conditions on family net worth. We show that recession graduates' asset accumulation is substantially delayed in our case, in which such a migration pattern is absent. Our result complements evidence in the unemployment insurance and the development literature that asset holdings buffer consumption decline when a negative income shock occurs (e.g., Rosenzweig and Wolpin, 1993; Fafchamps et al., 1998; Frankenberg et al., 2003; Kolsrud et al., 2018; Ganong and Noel, 2019). In addition, we provide evidence that recession cohorts also rely on their parents or spouses to protect their living conditions against the initial negative shock.

The remainder of the paper is organized as follows. Section 2 presents an overview of the 1997–1998 Asian financial crisis and its impacts on the South Korean economy. Section 3 describes the KLIPS data and the analysis sample. Section 4 explains the empirical strategy used to measure the recession effects and examines the internal validity of the identification assumption. Section 5 presents the estimation results on labor market, family, and financial outcomes. Section 6 discusses the mechanisms and implications of our findings. Section 7 concludes.

2 Background on the Asian Financial Crisis in South Korea

The Asian financial crisis triggered the worst recession in South Korean history since the Korean War in the 1950s. Up to the onset of the currency crisis in Thailand in July 1997, South Korea and other East Asian countries with high growth potential attracted strong inflows of foreign funds

³Kawaguchi and Kondo (2020) find that penalties in the labor market do not affect living arrangements or asset holdings, using a sample of white male college graduates from the National Longitudinal Survey of Youth 1979 Cohort (NLSY79).

throughout the 1990s (Radelet and Sachs, 2000). The sudden reversal of capital flows led to a sharp and deep downturn that had a devastating impact on the South Korean economy.

Among countries affected by the crisis, South Korea was one of the hardest hit, owing to its high proportion of short-term debt.⁴ With plummeting investor confidence, foreign creditors refused to roll over loans, which forced the government to draw down foreign currency reserves to help financial institutions meet their short-term obligations. With the exhaustion of foreign reserves, the South Korean government requested financial assistance, agreeing to a bailout package worth 60 billion U.S. dollars (USD) from the International Monetary Fund (IMF) on November 21, 1997.

The shock to the economy was substantial. South Korea's currency lost 46 percent of its value, and the stock market index dropped by 50 percent in the second half of 1997. The crisis spread rapidly beyond the financial sector—11 large conglomerates (i.e., *chaebols*) collapsed, and ten more were on the verge of bankruptcy (Lee, 1998). The crisis was particularly devastating for small and medium-sized enterprises (SMEs), which had no access to credit during the peak of the crisis. As a result, the number of SMEs filing for bankruptcy roughly doubled from 11,600 in 1996 to 22,800 in 1998 (Gregory et al., 2002).

The crisis was not only severe, but also unexpected. The macroeconomic indicators before the crisis were sound; as a result, neither credit rating agencies nor the IMF expected such a rapid deterioration of the South Korean economy. From 1981 up to the crisis, South Korea had enjoyed a sustained period of high economic growth, with a real GDP growth rate of more than 5 percent per year. From 1994 to 1996, the annual GDP growth rate reached 7–9 percent. Other economic measures were also robust: the inflation rate was stable at around 5 percent per year, the public sector budget was sound (Barnes et al., 2003), and the foreign debt-to-GDP ratio remained below 30 percent (Kim, 2006). Reports on the South Korean economy showed optimism even in the first half of 1997 (Radelet and Sachs, 2000). As a result, individuals were largely unprepared for the crisis.

The Asian financial crisis had an acute impact on the South Korean labor market. Employee

⁴As of June 1997, 67 percent of total debt was short term (Goldstein, 1998).

downsizing was widespread, and massive layoffs occurred. As a result, about 1.8 million workers (8.6 percent of all workers) lost their jobs (Lee, 2000). The unemployment rate nearly tripled from 2.6 percent in 1997 to 7.0 in 1998, and remained high at 6.4 in 1999. Young workers and first-time job seekers were particularly hard hit due to the lack of job openings during the crisis. In 1998 and 1999, the unemployment rate for those aged 20–29 years was over 10 percent, about 4 percentage points higher than the overall unemployment rate.

3 Data and Analysis Sample

We use the yearly unemployment rates from 1989 to 2010, compiled from the Economically Active Population Survey (EAPS) by Statistics Korea.⁵ 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, employment-to-population ratio and, number of people in the labor force, by region. These regional statistics are also constructed from the EAPS by Statistics Korea, and are available from 1989 onward.

We construct our analysis sample using 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.⁶ The Korea Labor Institute has collected, maintained, and published the KLIPS data since 1998. We pool waves 1 to 20 of the KLIPS, spanning 1998–2017. The first wave includes 5,000 households (13,321 individuals aged 15 years and over), and the 20th wave includes 7,066 households (14,477 individuals aged 15 years and over). New members who enter a KLIPS household through birth or marriage are added to the survey in each wave. In 2009 (12th wave), 1,415 households were newly added to the original sample.

Our analysis sample includes individuals who graduated from 2- or 4-year colleges between 1989 and 2010. We restrict our analysis to those who graduated between the ages of 20 and 32

⁵The EAPS is comparable to the Current Population Survey in the United States.

⁶The KLIPS is comparable to the Panel Study of Income Dynamics (PSID) in the United States with respect to its panel structure and the scope of questions. Both the PSID and the KLIPS are included in the Cross-National Equivalent File, along with household longitudinal studies from several other countries.

years to focus on first-time labor market entrants, and to exclude atypical cases in which 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 men and 20,795 for women. Using the year and region of college graduation, the analysis sample from the KLIPS is merged to the yearly national and regional unemployment rates.

To construct the treatment, outcome, and control variables, we use information from the household and person surveys of the KLIPS. The household survey collects household characteristics, such as income, expenditure, wealth, and housing arrangements, and demographic information on all household members. The person survey asks household members aged 15 years or above about their work, education, and family formation status as well as socioeconomic and other background characteristics. In the online appendix, we describe how we construct the key variables, and report summary statistics for the analysis sample (see Section S1 and Table S1).

4 Empirical Strategy

In this section, we describe the regression model used to measure the recession effects, and examine the internal validity of the identification assumption.

4.1 Regression Specifications

We estimate the effect of labor market entry conditions on time-varying outcomes (e.g., employment, earnings, expenditure, and asset holdings) using the following regression equation:

$$y_{it} = \alpha + \beta_e UR_c + \mathbf{X}'_i \boldsymbol{\gamma} + f(c) + \delta_r + \tau_e + \phi_t + \varepsilon_{it}, \quad (1)$$

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 .⁷ UR_c is the national unemployment rate, measured in the year of graduation

⁷The region in which a person graduates from college is based on the location of the college.

c . Index e denotes years of potential labor market experience (i.e., years since college graduation, $e \equiv t - c$). A vector of person i 's predetermined characteristics $\mathbf{X}_i$, such as father's education level, parents' job status at age 14, and the type of college attended (2- vs. 4-year), controls for baseline ability and family background. $f(c)$ is a cubic function of college graduation year c (i.e., graduation cohort), which captures a smooth national cohort trend in the economic conditions at labor market entry. The regression also includes fixed effects for region of college graduation (δ_r), years of potential experience (τ_e), and calendar year (ϕ_t).⁸ ε_{it} is the error term representing the remaining unobserved determinants of the outcome.

In equation (1), we allow for the effect of initial labor market conditions to be heterogeneous with potential experience by interacting the initial unemployment rate with indicator variables for years since college graduation. β_e represents a set of coefficients on these interaction terms. Given the included controls, β_e measures changes in the experience profile of a time-varying outcome associated with a 1 percentage point increase in the unemployment rate at labor market entry. When we measure the average effect over the first 10 years of potential experience, the unemployment rate is not interacted with potential experience dummies, and thus, β_e simplifies to β .

When we analyze marital and childbirth outcomes, we focus on the cumulative status rather than on yearly changes, as these variables exhibit little year-to-year variation after an individual reaches a certain age. We collapse multiple waves of the panel data into a single cross-section and estimate the following specification:

$$y_i = \alpha + \beta UR_c + \mathbf{X}_i' \boldsymbol{\gamma} + f(c) + \delta_r + \tau_e + \varepsilon_i. \quad (2)$$

We examine several types of y_i related to family formation status, as of the most recent year in which person i participated in the survey. The outcome variables include whether an individual has ever been married, whether an individual has any children, number of children, age at first

⁸It 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 exclude one additional calendar year dummy. This practice implicitly assumes that the magnitudes of the contemporaneous shocks in the labor market are the same in the two omitted years. The results are robust to dropping calendar year fixed effects.

marriage, and age at first childbirth.⁹ τ_e represents fixed effects for years since college graduation, as of the most recent year of survey participation.¹⁰

In both specifications (1) and (2), standard errors are clustered at the level of college graduation year, which corresponds to the level of variation in the main treatment variable UR_c . There are 22 cohorts in the analysis sample. To address over-rejection of the null in Wald tests based on standard errors clustered over a small number of groups, we also report p -values or confidence intervals computed by wild cluster bootstrap, following Cameron et al. (2008) and Cameron and Miller (2015).¹¹

Equations (1) and (2) modify the standard regression model in the scarring effect literature (e.g., Kahn, 2010; Oreopoulos et al., 2012; Altonji et al., 2016) by using the national unemployment rate UR_c , rather than the regional rate UR_{cr} , as the main treatment variable. Thus, we focus on nationwide variation instead of region-specific deviations from national changes. To control for a cohort trend, we use a polynomial function $f(c)$, instead of fixed effects for graduation year, which would wash out UR_c . $f(c)$ captures any smooth national-level changes across cohorts, not only in initial labor market conditions, but also in the composition of graduation cohorts and in the outcome variables.¹²

Our empirical strategy takes into account that the national rather than the local economy is more relevant in our setting. South Korea is relatively small (geographically, about the same size as the state of Indiana in the United States), and jobs for college graduates are concentrated in and near Seoul, the capital and largest city in the country. As a result, college graduates in South Korea

⁹When the dependent variable is age at first marriage or age at first childbirth, we employ the Tobit model, exponential survival analysis, and Cox proportional hazards model instead of the ordinary least squares method, to account for right-censoring in duration until the initiation of marriage or childbirth.

¹⁰By 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 outcome is observed. The results are robust to controlling for fixed effects for the most recent year of survey participation, which are equivalent to the calendar year fixed effects in equation (1).

¹¹We use the STATA command `boottest` by Roodman et al. (2019) to calculate the wild bootstrapped p -values and confidence intervals.

¹²Examples include changes in the average quality of college graduates due to a secular increase in college enrollment rate and a long-term decline in the fertility rate. $f(c)$ would also capture any spillover effects of a recession, distributed smoothly across cohorts. A few studies in the scarring effect literature also employ a parametric specification for a cohort trend. Cockx and Ghirelli (2016) use a linear spline for the case of Belgium. Oreopoulos et al. (2012) use a linear or quadratic function when they focus on national-level variation in Canada.

exhibit higher regional mobility than in the United States or Canada.¹³ Another consequence is a strong comovement in regional unemployment rates (see Figure A1). The correlations between the regional and national unemployment rates range from 0.91 to 0.99 between 1989 and 2010.

When we replace UR_c with UR_{cr} in our regression specifications controlling for $f(c)$, we obtain qualitatively similar but weaker estimates (see Table S2). Because of the almost parallel movement of the regional unemployment rates, graduation year fixed effects would attribute most of business cycles to a secular trend, absorbing much of meaningful variation even in UR_{cr} . Thus, regional regressions controlling for graduation year fixed effects are likely to yield spurious results in our setting.

4.2 Identification of Causal Effects

In regression specifications (1) and (2), causal effects of initial unemployment conditions are identified exploiting sharp deviations from a smooth long-term cohort trend in the national unemployment rate, driven mainly 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 background characteristics of each graduation cohort once the smooth trend is removed.

A major threat to identification is differential selection into the timing of college graduation.¹⁴ Individuals may postpone their graduation during a recession to avoid adverse labor market conditions, or may graduate early in a boom to take advantage of favorable labor market conditions. Furthermore, this adjustment behavior may be correlated with their earnings potential. On the one

¹³About 60 percent of individuals in our analysis sample moved to a different region after college graduation, whereas only 37 percent moved out of state in the NLSY79 sample used by Kawaguchi and Kondo (2020). Oreopoulos et al. (2012) point out that college graduates in Canada exhibit even lower regional mobility than those in the United States.

¹⁴Many previous studies point out that the location of college graduation may also be endogenous. These studies use residential location in the year of graduation, which partly reflects the relocation choice immediately after graduation in response to different job perspectives across regions. However, our results are unlikely to be subject to this problem for two reasons. First, when we control for the region of college graduation, we use the location of the college, which is predetermined at college entry, and thus, is unlikely to be endogenous with respect to labor market conditions at college graduation. Second, our main treatment variable is the national unemployment rate, which is orthogonal to endogenous sorting across regions, unlike the regional unemployment rate.

hand, recession cohorts would be positively selected if those with higher abilities or from wealthier families were less likely to adjust their timing of graduation in response to economic conditions. On the other hand, if those from disadvantaged backgrounds were unable to delay their college graduation because of credit constraints, recession cohorts would be negatively selected.

In Table 1, we examine whether individuals endogenously select their graduation year in response to labor market conditions, using the following balancing regression:

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

where x_i is an individual characteristic predetermined at college entry, such as years of father's and mother's education, parents' job status and socioeconomic status at age 14, and the type of college attended (2- vs. 4-year).¹⁵ Except for father's education level in the male sample and the type of college attended in the female sample, the coefficient on UR_c from each of the individual balancing regressions is close to zero and statistically insignificant at the 10 percent level. In addition, the joint test cannot reject the null hypothesis that all the characteristics considered are balanced, with a wild bootstrapped p -value of 0.458 for men and 0.130 for women. These results make it unlikely that the recession effects measured by regression equations (1) and (2) are driven by selection.

Although the baseline covariates are, in general, well balanced across recession and non-recession cohorts, there may be a remaining concern about selection on unobservables. Recession cohorts seems to be positively selected (if at all), given that paternal education or the fraction graduating from a 4-year institution is slightly higher among recession graduates. Then, even if there is differential selection into graduation years, recession effects would likely be understated, and the estimates in Section 5 could be viewed as a lower bound in magnitude.

To explore the potential selection bias further, we employ an instrumental variables (IV) strategy, similar to that of Kahn (2010). We use the unemployment rate in the predicted year of college

¹⁵Pei et al. (2019) show that this method provides a more powerful test for detecting selection in regression-based research designs than the alternative method; in which, the stability of the estimated coefficient on the treatment variable is examined in the main regression with and without controlling for background characteristics.

Table 1: Balance Check on Baseline Characteristics by National Unemployment Rate at Graduation

	Men					Women				
	Coeff. on <i>UR</i>	SE	Bootst. <i>p</i> -val.	Mean	Obs.	Coeff. on <i>UR</i>	SE	Bootst. <i>p</i> -val.	Mean	Obs.
A. Individual balance test:										
Attended 4-year college	0.009	(0.009)	[0.378]	0.656	2,474	0.027***	(0.008)	[0.001]	0.546	2,320
Father's years of education	0.091**	(0.039)	[0.072]	10.324	2,426	0.012	(0.061)	[0.893]	11.113	2,292
Mother's years of education	0.090	(0.069)	[0.202]	8.524	1,988	0.069	(0.067)	[0.402]	9.409	1,994
Parents' job status at age 14										
No job or helping fam. busin.	-0.002	(0.002)	[0.282]	0.017	2,401	0.001	(0.002)	[0.711]	0.014	2,262
Regular wage worker	0.016	(0.010)	[0.185]	0.410	2,401	-0.010	(0.008)	[0.279]	0.446	2,262
Irregular wage worker	-0.004	(0.006)	[0.607]	0.072	2,401	0.003	(0.006)	[0.665]	0.069	2,262
Busin. owner (with employees)	-0.002	(0.008)	[0.812]	0.125	2,401	0.006	(0.005)	[0.353]	0.145	2,262
Business owner (no employee)	-0.007	(0.007)	[0.364]	0.376	2,401	0.000	(0.010)	[0.960]	0.326	2,262
Socioeconomic status at age 14										
Above average	-0.010	(0.009)	[0.277]	0.156	1,863	0.008	(0.011)	[0.527]	0.176	1,836
About average	0.018	(0.012)	[0.186]	0.582	1,863	-0.008	(0.017)	[0.728]	0.620	1,836
Below average	-0.009	(0.013)	[0.549]	0.262	1,863	-0.000	(0.014)	[0.981]	0.203	1,836
B. Joint balance test:	F-stat.	Bootst. <i>p</i>-val.				F-stat.	Bootst. <i>p</i>-val.			
	2.467	[0.458]				6.698	[0.130]			

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 college graduation and years since graduation. Robust standard errors in parentheses are clustered at the level of graduation year. Wild bootstrapped *p*-values in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

graduation as an instrument for the unemployment rate in the actual year of graduation.¹⁶ The predicted year of college graduation is constructed by computing the year an individual reached the typical college graduation age, which differs by college type and sex in South Korea. The typical age at college graduation is 26 years for male 4-year college graduates, 24 for male 2-year college graduates, 23 for female 4-year college graduates, and 21 for female 2-year college graduates. The 3-year gender difference in the typical age at college graduation is due to compulsory military service for men. We perform the IV estimation of both regression specifications (1) and (2) for the main outcome variables, and present the results in the online appendix. Compared with the corresponding ordinary least squares (OLS) estimates, the IV estimates are, in general, in the same direction with similar statistical significance, but larger in magnitude (see Tables S3, S4, and S5). This corroborates the results from the balance check exercise.

In addition, there was no confounding change in education policy that could have differentially affected the adjacent non-recession and recession cohorts—especially 1997 versus 1998 graduates.

¹⁶In the IV estimation, a cubic function of college graduation year and fixed effects for years since graduation are instrumented with a cubic function of predicted college graduation year and fixed effects for years since the predicted year of graduation. Standard errors are clustered at the level of predicted graduation year.

For example, high school curricula changed little throughout the 1990s (Ministry of Education, Science, and Technology, 2008). Given that each graduation cohort corresponds to multiple entry cohorts, yearly updates in college admissions policy are unlikely to produce a discrete change in the characteristics of graduation cohorts.¹⁷ This is reflected in Figure S1 showing no discontinuous jump in the number of college graduates or in the number of college entrants between 1989 and 2010 nationwide.

The internal validity of our analysis is further investigated in the online appendix. In Section S2, we show that our estimates are robust to 1) using alternative measures of unemployment conditions, such as the regional unemployment rate and an indicator for college graduation in 1998 or 1999; 2) relaxing the polynomial functional form assumption for the cohort trend $f(c)$; 3) additionally controlling for region-specific cohort trends; 4) allowing a structural break in the cohort trend $f(c)$; 5) excluding 2008–2010 cohorts who graduated from college under the direct influence of the Great Recession; and 6) using a larger dataset from the EAPS or the Census (see Figures S2, S3, and S4 and Table S6).

5 Results

5.1 Employment and Earnings

We begin by examining the effects of labor market entry conditions on employment and earnings. During a recession, new labor market entrants experience prolonged unemployment or placement in lower quality or mismatched jobs. The scarring effect literature shows that earnings losses resulting from limited job opportunities at the beginning of an individual’s career can last for a decade. Although our main focus is on longer-term social and financial outcomes, such as marriage, child-bearing, consumption, and asset accumulation, it is important to first compare our results on labor market outcomes with those of previous studies.

Figure 2 measures changes in the experience profiles of employment and earnings due to vari-

¹⁷Kang (2007) outlines year-to-year changes in South Korea’s college admissions policy from 1945 to 2007.

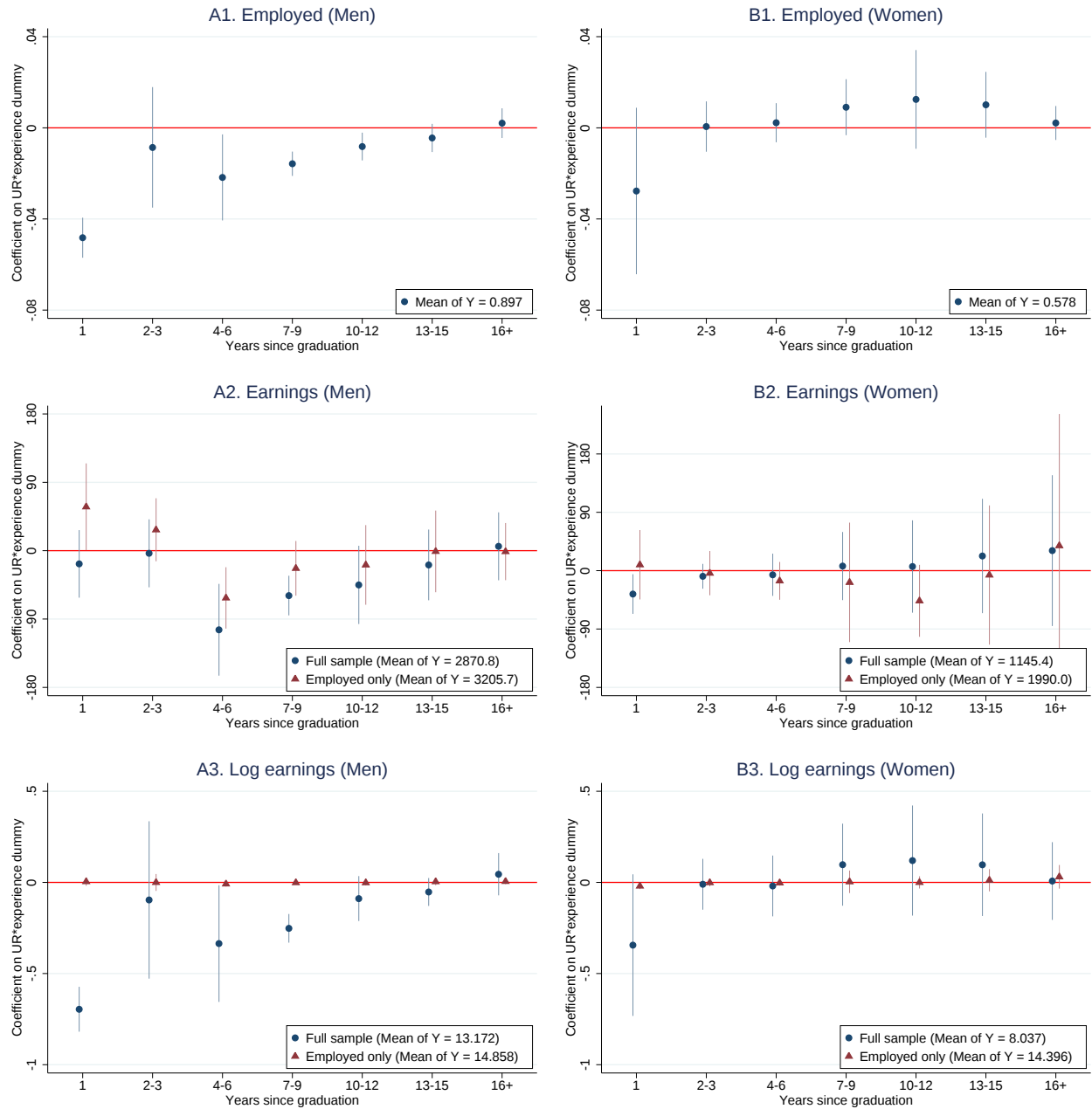


Figure 2: Effects of National Unemployment Rate at Graduation on Employment and Earnings

Notes. Monthly earnings in levels are in thousands of 2015 KRW, where 1 USD is worth approximately 1,100 KRW. We take the logarithm of monthly earnings in 2015 KRW. When constructing log earnings for the full sample, we impute zero earnings with 1 KRW before taking the logarithm. 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 wild bootstrapped 95% confidence interval, clustered at the level of graduation year. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation, years since graduation, and calendar year. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for.

ations in the initial unemployment rate by estimating equation (1).¹⁸ The results for men are displayed in the left column. Panel A1 shows that male recession graduates experience a decline in employment likelihood for more than a decade. In the first year after graduation, a 1 percentage point higher unemployment rate at college graduation results in a 4.8 percentage point lower employment probability, and the negative effect persists up to experience year 12, except during experience years 2–3.¹⁹

In panels A2 and A3 of Figure 2, we examine monthly earnings in thousands of 2015 South Korean won (KRW) and the natural logarithm of monthly earnings in 2015 KRW, respectively.²⁰ In the full sample, a high unemployment rate at graduation causes lower earnings for up to 9 years since graduation, both in levels and in logs. This takes into account both extensive and intensive margin effects by assuming that non-workers have zero earnings.²¹ However, the impact of initial job market conditions on earnings is limited among the employed. This result implies that the earnings penalty for male recession cohorts is mainly on the extensive margin. With fewer job openings, positions are likely to be filled by candidates with higher earnings potential. This finding is supported by no deterioration in job quality among recession graduates, in terms of weekly hours of work or the probability of having a full-time or standard employment arrangement (see panels A1 and A2 of Figure A2).

In the right column of Figure 2, we find that the effects of the initial labor market conditions on female employment and earnings are much shorter-lived than those of men. Despite a sizable decline in employment and earnings immediately after graduation, comparable to that of men, the effect disappears within 2 years. This is likely due to the substantial number of women dropping out of the labor force after marriage or childbirth.²²

¹⁸Table S4 in the online appendix report the coefficient estimates, standard errors, wild bootstrapped *p*-values, and dependent variable averages for the labor market outcomes described in Figure 2.

¹⁹In experience years 2–3, recession cohorts are more likely to be self-employed than their luckier counterparts. (see panel A3 of Figure A2). This result suggests that those who could not find a job in the first year after graduation might have resorted temporarily to self-employment.

²⁰1 USD is worth approximately 1,100 KRW.

²¹In the full sample, zero earnings are imputed with 1 KRW before taking the logarithm.

²²The female labor force participation rate in South Korea has gradually increased during the past few decades, but was still below 53 percent in 2019 (source: ILOSTAT database). The experience profile of a typical non-recession graduate in our data shows a decrease in employment probability from 2 years after graduation, with the largest

Table 2: Average Effects of National Unemployment Rate at Graduation on Employment and Earnings (Experience Years 1–10)

	Employed	Earnings	Earnings (employed only)	Log earnings	Log earnings (employed only)
	(1)	(2)	(3)	(4)	(5)
A. Men					
National <i>UR</i>	−0.016*** (0.003) [0.007]	−58.7*** (15.4) [0.010]	−26.9* (15.1) [0.141]	−0.245*** (0.055) [0.034]	−0.002 (0.004) [0.716]
Adjusted R^2	0.078	0.161	0.140	0.087	0.224
Observations	11,954	11,807	10,080	11,807	9,976
Mean of Y	0.856	2,234.1	2,616.9	12.408	14.685
B. Women					
National <i>UR</i>	0.005 (0.004) [0.308]	2.0 (13.9) [0.922]	−14.6 (13.5) [0.499]	0.044 (0.064) [0.615]	−0.002 (0.008) [0.832]
Adjusted R^2	0.028	0.042	0.140	0.032	0.151
Observations	11,339	11,278	6,764	11,278	6,665
Mean of Y	0.602	1,086.3	1,811.2	8.464	14.322

Notes. Monthly earnings in levels are in thousands of 2015 KRW, where 1 USD is worth approximately 1,100 KRW. We take the logarithm of monthly earnings in 2015 KRW. To construct log earnings for the full sample in column (4), we impute zero earnings with 1 KRW before taking the logarithm. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation, years since graduation, and calendar year. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year. Wild bootstrapped p -values in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In Table 2, we compute the average effect of the initial unemployment rates on employment and earnings during the first 10 years of potential experience to facilitate a comparison with the results in previous research (e.g., Kahn, 2010; Oreopoulos et al., 2012). We find statistically significant effects only for men: a 1 percentage point increase in the unemployment rate at graduation reduces the likelihood of employment by 1.6 percentage points (1.9 percent relative to the sample average of 0.856), and reduces real monthly earnings by 59K KRW (2.6 percent relative to the sample

decrease occurring in the 10th year of potential experience. This pattern reflects the M-shaped age profile of female labor force participation.

average of 2,234K KRW).²³

5.2 Marriage and Fertility

Next, we investigate whether and how reduced labor market opportunities early in a career affect family formation behavior by estimating equation (2). Only a small number of studies have examined the long-term consequences of initial labor market conditions on marriage and childbearing, and no consensus has been reached in the literature on the sign and magnitude of the effect.²⁴ As Kondo (2016) points out, it is especially challenging to identify a long-term causal relationship between unemployment and fertility, because both variables change gradually and are often confounded with a long-term trend. In this sense, our identification strategy, which exploits a sharp deviation in the unemployment rate from a smooth cohort trend, could be useful.

Economic theory suggests that labor market conditions have competing income and substitution effects on family formation (e.g., Becker, 1960, 1973; Willis, 1973). 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 the opportunity costs of housework and children. The income effect is expected to dominate among men who are typically the family breadwinner. However, for women who carry out most of the housework and childcare duties, it is theoretically ambiguous which of the two competing effects would be stronger.

In Table 3, we find that labor market conditions at college graduation have long-term effects on marriage and fertility outcomes, such as the probability of having ever been married, propensity to have a child, and number of children.^{25,26} Panel A shows that male college graduates entering the

²³Given that the earnings penalty is mainly the result of non-employment, it is difficult to interpret the large negative estimates on log earnings in column (4) of Table 2.

²⁴The results are mixed, especially for women. Multiple studies analyzing U.S. females affected by the 1981–1982 recession reach different conclusions on long-term marital and fertility outcomes, depending on the dataset used (Kondo, 2012; Currie and Schwandt, 2014; Maclean et al., 2016; Schwandt and von Wachter, 2020). See Kondo (2016) for an overview of the literature on the relationship between labor market conditions and family formation.

²⁵There is no systematic difference in the separation or divorce rate between recession and non-recession graduates. Thus, the recession effect on the probability of being currently married is very similar to that on the probability of having ever been married.

²⁶See Table A1 for recession effects on the timing of marriage and childbirth. The results suggest that family formation is delayed (accelerated) among men (women) graduating in adverse economic conditions.

Table 3: Long-Term Effects of National Unemployment Rate at Graduation on Marriage and Fertility

	Ever married (1)	Any children (2)	Any children (ever married only) (3)	Num. of children (4)	Num. of children (ever married only) (5)
A. Men					
National <i>UR</i>	−0.022** (0.010) [0.172]	−0.017 (0.011) [0.271]	−0.003 (0.009) [0.819]	−0.028 (0.020) [0.215]	−0.016 (0.023) [0.480]
Adjusted R^2	0.271	0.278	0.084	0.287	0.142
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. Women					
National <i>UR</i>	−0.011 (0.015) [0.688]	0.009 (0.013) [0.682]	0.030** (0.011) [0.031]	0.046* (0.024) [0.191]	0.097*** (0.024) [0.001]
Adjusted R^2	0.339	0.348	0.128	0.344	0.183
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 college graduation and years since graduation. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year. Wild bootstrapped p -values in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

labor market under a 1 percentage point higher unemployment rate are 2.2 percentage points less likely to be married (3.1 percent relative to the sample average of 0.726). We also provide suggestive evidence on the decline in fertility among male recession graduates, which can be attributed almost entirely to the decline in marriage. Meanwhile, for women, as shown in panel B, weak economic conditions at college graduation substantially increase long-term fertility, while the negative income effect on marriage is mostly muted. Substitution into childbearing is especially pronounced among married women: conditional on having ever been married, female recession graduates have higher fertility along both the extensive and intensive margins. On average, a woman graduating from college with a 1 percentage point higher unemployment rate has 0.046 more children (4.2

percent increase relative to the sample average of 1.096).

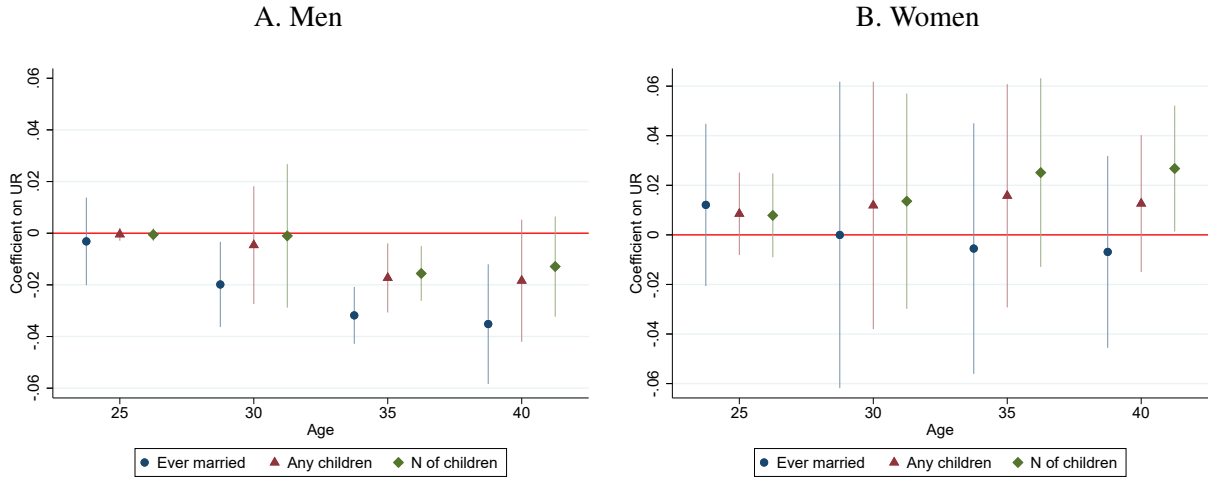


Figure 3: Effects of National Unemployment Rate at Graduation on Family Formation by a Certain Age

Notes. Each bullet shape represents the coefficient estimate on the national *UR* from a separate regression estimating equation (2). Vertical spikes around each point estimate represent the wild bootstrapped 95% confidence interval, clustered at the level of graduation year. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation and years since graduation. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for.

In Figure 3, we estimate the effect of the initial unemployment rate on family formation outcomes by age 25, 30, 35, and 40 years. We perform this exercise to address the concern that completed marriage or fertility outcomes are not observed for those who exited the KLIPS soon after graduation. If recession cohorts shift the timing of marriage and childbirths (as suggested in Table A1), but eventually catch up with other cohorts, our estimates in Table 3 would capture the large short-term effects among attrited individuals, and overstate the true long-term effect. In this case, the overstated bias would be larger if family formation outcomes were measured at a younger age. However, Figure 3 shows the opposite pattern that the recession effect on family formation accumulates up to age 40. This pattern is especially pronounced on the likelihood of marriage among men and the number of children among women, where we find the most distinct recession effects. The larger estimates for longer-term outcomes indicate that our estimates in Table 3 do not merely reflect a short-term adjustment in family formation behavior. Rather, we are likely to

provide a lower bound estimate of the permanent change in marriage and fertility outcomes due to unfavorable economic conditions at labor market entry.

5.3 Household Expenditure and Asset Holdings

As the final set of outcomes, we examine whether recession cohorts have different trajectories of consumption and asset holdings to their luckier counterparts by estimating equation (1).²⁷ Research on financial outcomes among recession graduates remains limited, the only exception being Kawaguchi and Kondo (2020).

Theory suggests that labor market shocks may be uninsurable and generate a sizable impact on consumption in an incomplete market. For new entrants in the labor market, the consumption risk may be enhanced owing to a lack of unemployment insurance. The effect of initial economic conditions on wealth accumulation, however, is *a priori* ambiguous. Young workers affected by negative labor market shocks may adjust their financial assets to insulate consumption (Kolsrud et al., 2018) or to reduce portfolio risk (Malmendier and Nagel, 2011). Alternatively, they may be able to purchase risky assets at a greatly depressed price and become asset-rich when the asset price recovers (Glover et al., 2011).

Figure 4 examines the estimated changes in the experience profile of household expenditure per capita, due to an increase in the initial unemployment rate.²⁸ For men in panel A, coefficient estimates are very close to zero in all experience years, implying limited welfare loss in terms of consumption. For women in panel B, the recession effects are negative in all experience groups and statistically significant in experience years 4–6, which overlap roughly with the birth of the first child.²⁹

Figure 5 plots the estimated effects of initial labor market conditions on debt, financial assets,

²⁷The variables on consumption and asset holdings are reported at the household level. Given that unmarried adults commonly live with their parents in South Korea, the early-career effect of initial job market conditions on consumption and asset formation may subsume the effect on parents' consumption and asset holdings. If parents and adult children are risk-sharing, our estimated effects are likely to be a lower bound rather than an overestimate, in absolute value.

²⁸Table S5 in the online appendix reports the coefficient estimates, standard errors, wild bootstrapped *p*-values, and dependent variable averages for the consumption and wealth outcomes described in Figures 4 and 5, respectively. The recession effects on these outcomes averaged over the first 10 years since college graduation are reported in panel C

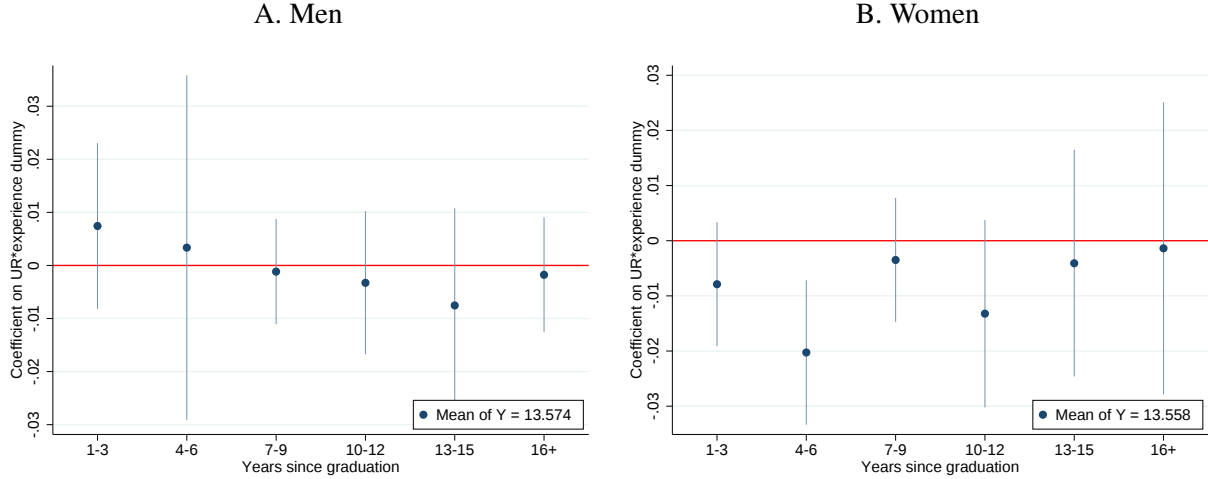


Figure 4: Effects of National Unemployment Rate at Graduation on Log Expenditure Per Capita

Notes. Monthly expenditure per capita is in 2015 KRW, where 1 USD is worth approximately 1,100 KRW. 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 wild bootstrapped 95% confidence interval, clustered at the level of graduation year. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation, years since graduation, and calendar year. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for.

and home ownership. In panel A1, we find no evidence of increasing debt as a means to smooth consumption among male recession graduates. Among female recession graduates in panel B1, debt increases temporarily in experience years 4–6, which overlaps with the timing of decreased consumption reported in panel B of Figure 4. Instead of obtaining a loan, young graduates may enhance liquidity by decumulating their financial asset holdings, which we examine next.

In panels A2 and B2 of Figure 5, we report the recession effects on the value of financial assets, including bank deposits, stocks, bonds, mutual funds, savings insurance, rotating savings and credit associations, and private lending. In the male sample, we observe a 13–31 percent drop in the total value of all financial assets during the first 9 years of potential experience per 1 percentage point increase in the initial unemployment rate. The duration of the negative impact on asset values is equivalent to that on earnings, suggesting that male recession cohorts protect their consumption

of Table S3.

²⁹The decrease in household expenditure per capita among female recession graduates is partly due to the accelerated birth of the first child, resulting in the increase in the denominator. An average woman in our sample gives birth to her first child around 6 years after college graduation. For female recession graduates who start to have children at a younger age, the first childbirth would occur within the 4–6-year range after graduation.

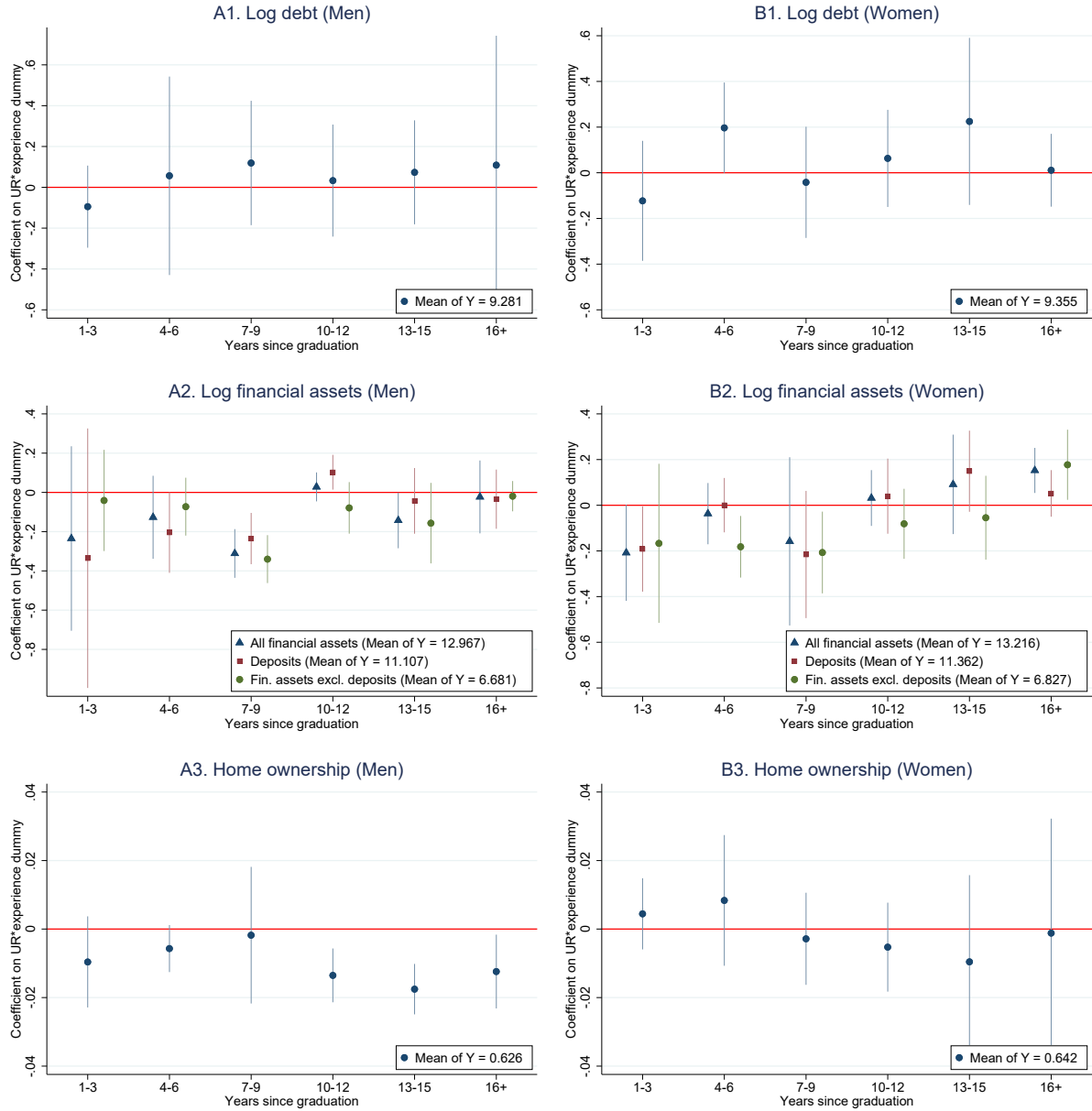


Figure 5: Effects of National Unemployment Rate at Graduation on Asset Holdings

Notes. The values of debt and financial assets are in 2015 KRW, where 1 USD is worth approximately 1,100 KRW. Zero values are imputed with 1 KRW before taking the logarithm. 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 wild bootstrapped 95% confidence interval, clustered at the level of graduation year. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation, years since graduation, and calendar year. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for.

levels mainly by adjusting their financial asset holdings. This pattern is stronger for more liquid assets, such as bank deposits, during the first several years after graduation. For women, a higher unemployment rate at graduation also appears to have a negative effect on financial asset accumulation for up to 9 years after graduation, although the effect is dampened compared to that of men.

In panels A3 and B3 of Figure 5, we examine home ownership as a measure of an illiquid asset and a durable consumption good.³⁰ For men, recession effect estimates are negative in all experience groups, and the coefficients on experience years 10 or higher are statistically significant, which corresponds to the timing of the first home purchase.³¹ We find no statistically significant effect of initial labor market conditions on home ownership among women, although the coefficient estimates display a similar pattern.

6 Discussion

In this section, we discuss the underlying mechanisms and implications of our findings in relation to the existing literature.

6.1 Discussion of Labor Market Outcomes

Our recession effect estimates on male earnings are within the range of estimates reported by well-known studies in the scarring effect literature (e.g., Kahn, 2010; Oreopoulos et al., 2012). These studies focus on male college graduates in North America, showing that a 1 percentage point increase in the initial unemployment rate leads to a 1–5 percent reduction in earnings over the first 10 years of potential experience, and the penalty lasts for 9–15 years. We find that the negative effect on earnings of women is relatively short lived and hence small in magnitude for most experience years compared to that of men, which is in line with evidence from the United States

³⁰Information on home ownership status was not collected in the first wave of the survey. We find similar results when we use ownership of current residence, available in all waves, as an alternative measure of home ownership.

³¹According to the Korea Housing Survey, the average age of the household head at the time of first home purchase is 38 years in 2008 and 2010, which is about 12 years after graduation for male college graduates.

(Kondo, 2015; Schwandt and von Wachter, 2020). The difference in career outcomes between recession and non-recession cohorts is compressed among females, because even those graduating in a robust economy tend to detach from the labor force early in their career, due to family considerations.

For both men and women, the main difference from the previous studies is that the decline in earnings is mainly through the reduction in employment. There are two potential explanations for the large extensive margin effect in our setting. First, the Asian financial crisis created South Korea's worst recession in the post-war era, during which job opportunities were substantially reduced even for high-skilled labor. Similarly, recent studies have documented a large and persistent reduction in employment among college graduates affected by the Great Recession (Altonji et al., 2016; Rothstein, 2019). Second, South Korea's labor market is characterized by nominal wage rigidity and employment protection laws.³² As a result, demand shocks would translate mainly into employment losses rather than wage reductions.³³ Given these institutional features, as well as the South Korean firms' strong preference for recruiting young college graduates, those who did not find a job shortly after graduation were largely bypassed by firms, even after the economy had recovered.

6.2 Discussion of Family Formation Outcomes

We find that the initial unemployment rate has a sizable negative effect on family formation among male college graduates, unlike the cases of the United State or Germany showing only a delay but no long-term change in marriage and fertility rates (Kondo, 2012; Hofmann and Hohmeyer, 2016; Maclean et al., 2016; Kawaguchi and Kondo, 2020). This is because earnings losses experienced

³²The OECD indicators of employment protection legislation show that, among the 34 OECD countries in 1997, South Korea had the third least flexible labor market (index value 3.04), after Portugal (4.58) and the Czech Republic (3.31). The United States and Canada had the most flexible labor market institutions in the same year, with index values of 0.26 and 0.92, respectively.

³³See Kawaguchi and Murao (2014) for a cross-country comparison of the scarring effect on employment among 20 OECD countries (excluding South Korea). A substantial and persistent reduction in employment among those finishing college during a recession is indeed more commonly observed in countries with more rigid labor market institutions, such as Belgium (Cockx and Ghirelli, 2016) and Spain (Fernández-Kranz and Rodríguez-Planas, 2018).

by recession cohorts in our study stem mainly from the substantial drop in employment probability, whereas the extensive margin effect is negligible among male college graduates in the aforementioned countries. Our results are more consistent with the decline in employment, marriage, and fertility observed among early-career males during the “Lost 20 Years” in Japan (Raymo and Shibata, 2017), or among young male workers in the U.S. manufacturing sector subject to import competition (Autor et al., 2019). It is also possible that the male breadwinner norm prevalent in South Korea may render male recession graduates with lower earnings even less attractive in the marriage market, which reinforces the negative income effect.

Among female recession graduates, we observe a sizable increase in fertility despite the short-lived penalty in the labor market. A significant increase in fertility despite a small reduction in earnings is also found in a sample of college graduate or white women in the United States who were affected by the 1981–1982 recession (Kondo, 2015; Maclean et al., 2016; Schwandt and von Wachter, 2020). Two factors may have contributed to strengthening the positive substitution effect of reduced labor market opportunities in a woman’s early career. First, breadwinner–homemaker couples remain common among the population of interest in the aforementioned studies, including ours. Second, family-friendly policies are not well established in South Korea or the United States, making it more difficult for women to pursue their own careers once becoming mothers.³⁴

If economic conditions at labor market entry change the patterns of marital matching, there may be an additional income effect on fertility through an increase or reduction in the (potential) spouse’s income or wealth. In Table 4, we find evidence that this channel is active among women. Conditional on having ever been married, women graduating from college in a higher unemployment rate are more likely to have a spouse whose parents are high school or college graduates and had a regular job when he was 14 years old. The positive selection on the husband’s background characteristics among female recession graduates may suggest higher household resources and thus, a positive income effect on fertility. This can further explain why we see a sizable increase in fertility, despite the short-lived reduction in earnings among female recession cohorts. Among

³⁴Del Bono et al. (2012, 2015) make the similar point that substitution into childbearing is less pronounced when women are more career oriented, and when gender-based specialization within couples is weaker.

Table 4: Effects of National Unemployment Rate at Graduation on Spouse Characteristics

	Father's edu. level		Parents' job status at age 14			
	HS or more (1)	College or more (2)	Standard worker (3)	Non-stand. worker (4)	Busin. owner (with employee) (5)	Busin. owner (no employee) (6)
A. Men						
National <i>UR</i>	−0.009 (0.010) [0.433]	−0.002 (0.008) [0.816]	0.007 (0.012) [0.606]	−0.000 (0.008) [0.962]	−0.013 (0.009) [0.123]	0.004 (0.009) [0.652]
Adjusted R^2	0.081	0.066	0.026	0.014	0.005	0.056
Observations	1,627	1,627	1,604	1,604	1,604	1,604
Mean of <i>Y</i>	0.556	0.167	0.407	0.055	0.128	0.395
B. Women						
National <i>UR</i>	0.026** (0.010) [0.028]	0.018 (0.011) [0.109]	0.032** (0.014) [0.033]	−0.003 (0.009) [0.820]	−0.007 (0.010) [0.579]	−0.020 (0.012) [0.174]
Adjusted R^2	0.060	0.086	0.030	−0.004	−0.003	0.032
Observations	1,457	1,457	1,447	1,447	1,447	1,447
Mean of <i>Y</i>	0.568	0.183	0.386	0.069	0.141	0.381

Notes. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation and years since graduation. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year. Wild bootstrapped *p*-values in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

men, we find no systematic difference in the spouse's economic background by labor market entry condition.³⁵

6.3 Discussion of Financial Outcomes

Our results suggest that a cohort-specific labor market shock can translate into a cohort-specific shock to wealth accumulation. During the first 9 years after graduation, recession cohorts give

³⁵This exercise is not feasible on a more direct measure of the spouse's own economic status at the beginning of the marriage. Time-varying spousal characteristics at the start of a marriage are missing for at least 45.3 (36.6) percent of married men (women) in our sample, who entered the KLIPS after getting married or did not report the year of marriage. Spousal earnings within 2 years of marriage are missing for an additional 22.9 (27.4) percent of married men (women). Similarly, spousal earnings at each experience year are observed only for a selective subset of married individuals in the analysis sample, and the missing status is correlated with the unemployment rate at graduation. Therefore, an analysis of couple's total earnings as a time-varying outcome is subject to selection bias.

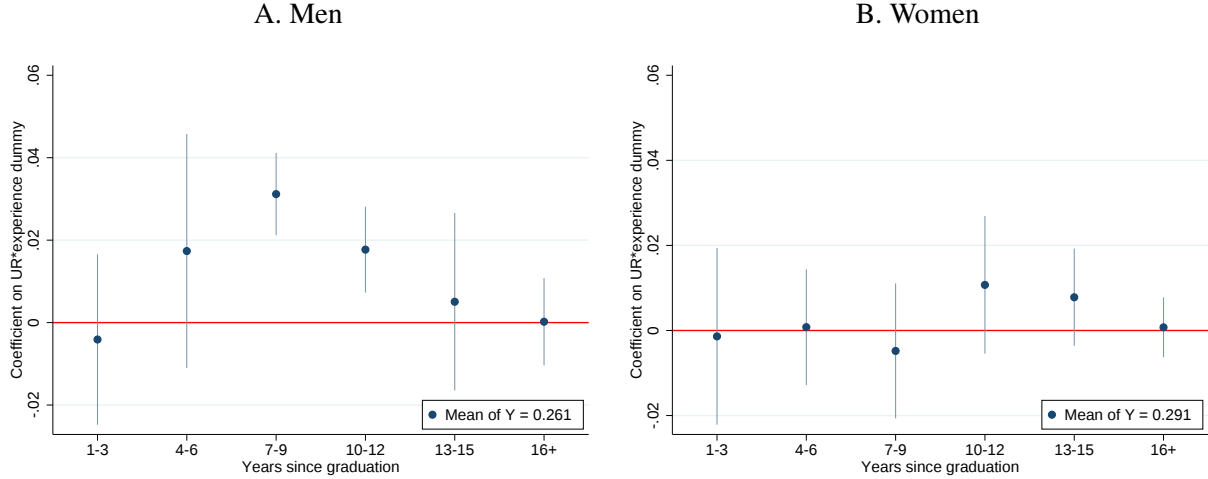


Figure 6: Effects of National Unemployment Rate at Graduation on Coresidence with Parents

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 wild bootstrapped 95% confidence interval, clustered at the level of graduation year. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation, years since graduation, and calendar year. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for.

up some of their liquid assets to protect consumption from reduced earnings. Male recession cohorts also face a decline in home ownership rates from the 10th year after graduation. This result differs from that of Kawaguchi and Kondo (2020), who find a weak increase in home and vehicle ownership and no effect on net household asset values among recession graduates in the NLSY79 data. While recession graduates in their sample tend to migrate to areas with lower cost of living as a coping mechanism, we do not observe a systematic difference in migration patterns by labor market entry conditions in our data.

Our finding is consistent with studies regarding the effect of income shocks on consumption and household resources among unemployment insurance recipients in developed economies or rural households in low-income countries. During unemployment spells, consumption is less sensitive to a fall in income among households with more liquid assets, while debt financing plays a limited role (Kolsrud et al., 2018; Ganong and Noel, 2019). In developing countries, sales of livestock or gold are used for consumption smoothing (Rosenzweig and Wolpin, 1993; Fafchamps et al., 1998; Frankenberg et al., 2003).

In addition to adjusting asset holdings, college graduates use informal risk-sharing among family as a means to protect consumption. While female recession cohorts insure by matching with a spouse from a higher socioeconomic background, male recession cohorts, instead, use parental coresidence as an alternative coping mechanism. In Figure 6, we find a sizable increase in the probability of living with at least one of their own parents or with one of their in-laws throughout their 30s, among male recession graduates.³⁶

Given that economic security over the life course depends not only on income but also on wealth, the substantial delay in asset formation may have lasting repercussions on individual welfare and old age security. The negative effects on asset holdings may prevent recession graduates from accumulating a sufficient buffer against future negative income shocks, leaving them more vulnerable to financial distress as they age, compared to their luckier counterparts.

7 Conclusion

This study investigates the long-term effects of initial labor market conditions, exploiting the across-cohort variation in the unemployment rates induced by the unexpected 1997–1998 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, family, and financial outcomes. Men who graduate from college in a poor economy experience a large and persistent reduction in employment, earnings, and the likelihood of getting married and having children. Women who face limited job opportunities at college graduation substitute into childbearing, having more children at a younger age. Neither male nor female college graduates suffer from reductions in consumption, but this is achieved by giving up some asset holdings. We also find that recession graduates insure against reduced consumption by living with their parents (men), or by finding a spouse from an advantaged economic background (women).

³⁶It is common in South Korea for unmarried adults from both recession and non-recession cohorts to live with their parents. This is a possible reason for no recession effect on parental coresidence during the first several years after college graduation.

These empirical results suggest the following. First, labor market entry in a recession has lingering effects, and may even leave a permanent mark on a young worker's life course, even after the penalties in the labor market have disappeared. Second, a large-scale recession has a greater impact than modest recessions do, because the affected cohorts suffer not only from reduced earnings but also from prolonged unemployment. Lastly, family provides a risk-sharing mechanism through which recession graduates can protect their living conditions against the initial negative shock. Investigating the spillover effects on the spouse or parents of recession graduates would be an interesting area for future research.

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Appendix Figures and Tables

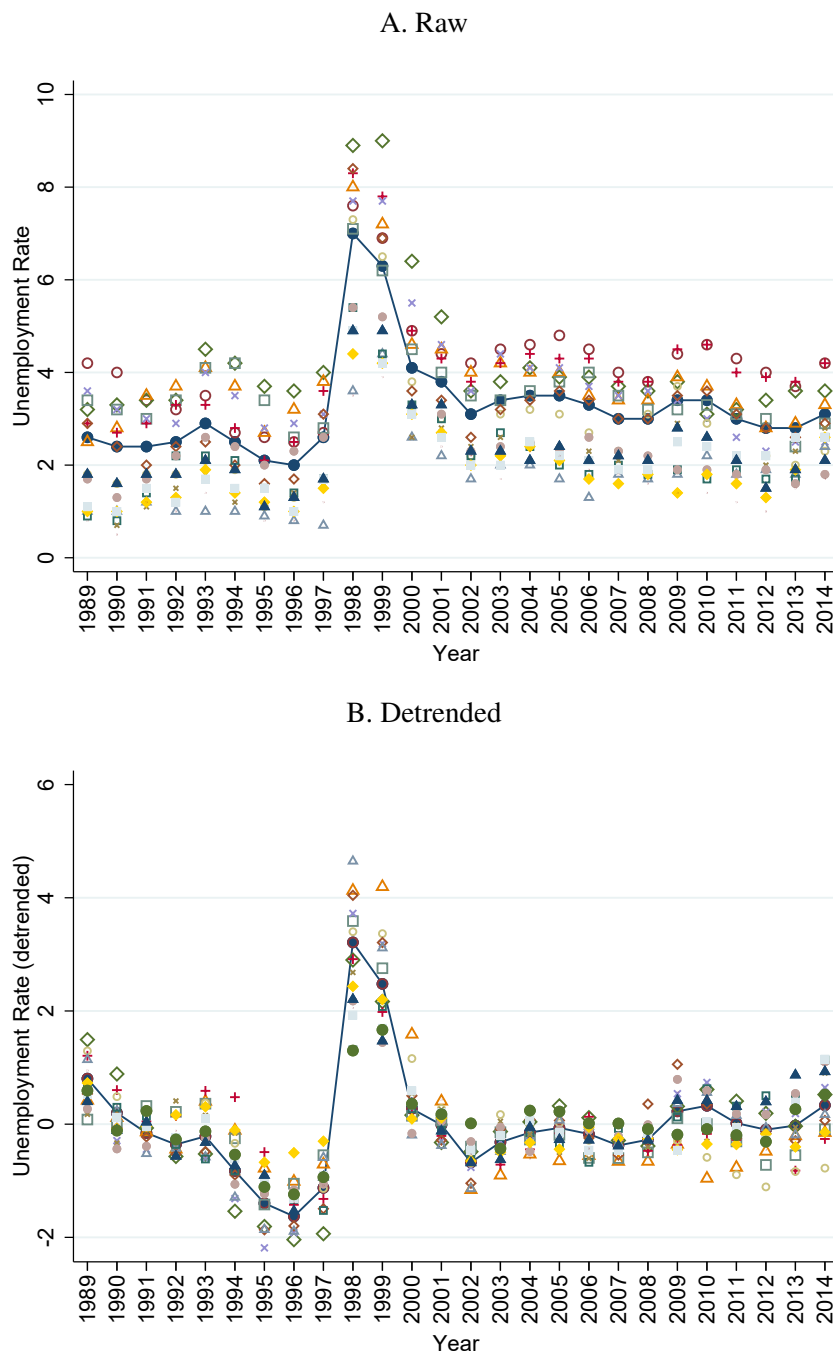


Figure A1: National and Regional Unemployment Rates

Notes. The solid line displays the national unemployment rate, and the various bullet shapes indicate 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 shows the residuals from a regression in which we control for a cubic function of years and region fixed effects.

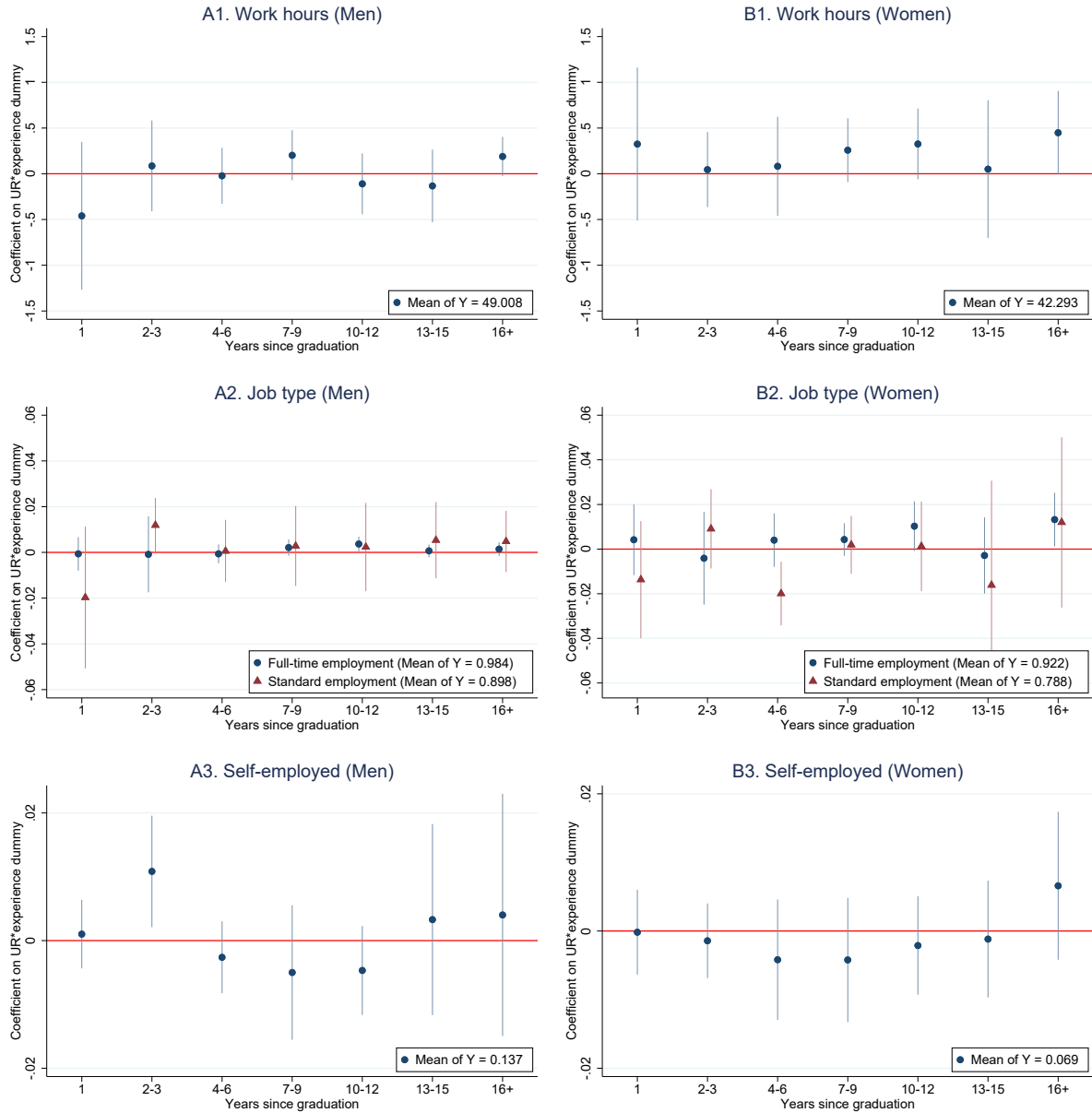


Figure A2: Effects of National Unemployment Rate at Graduation on Job Quality

Notes. Work hours are examined for the employed. The probability of having a full-time or standard employment arrangement is analyzed for wage workers. 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 wild bootstrapped 95% confidence interval, clustered at the level of graduation year. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation, years since graduation, and calendar year. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for.

Table A1: Effects of National Unemployment Rate at Graduation on Age of Family Formation

	Age at first marriage			Age at first childbirth		
	Tobit (1)	Acc. fail. time (2)	Cox PH (3)	Tobit (4)	Acc. fail. time (5)	Cox PH (6)
A. Men						
National <i>UR</i>	0.388*** (0.144) [0.007]	0.049** (0.021) [0.008]	−0.060** (0.029) [0.036]	0.166 (0.147) [0.292]	0.034 (0.024) [0.191]	−0.041 (0.029) [0.191]
Log likelihood	−5,826	−2,251	−12,092	−5,608	−2,214	−11,215
Observations	2,393	2,393	2,393	2,474	2,474	2,474
Median of <i>Y</i>	30.0	30.0	30.0	32.0	32.0	32.0
B. Women						
National <i>UR</i>	−0.170 (0.278) [0.670]	0.002 (0.034) [0.967]	0.038 (0.054) [0.634]	−0.388 (0.272) [0.168]	−0.033 (0.033) [0.415]	0.075 (0.050) [0.142]
Log likelihood	−5,277	−2,068	−11,048	−5,024	−2,003	−10,114
Observations	2,253	2,253	2,253	2,320	2,320	2,320
Median of <i>Y</i>	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 college graduation and years since graduation. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year. Score bootstrapped *p*-values in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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

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S1 Summary Statistics

Table S1 reports the summary statistics for the variables used in the main analysis in Section 5. 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 (during the Asian financial crisis). Panel B shows time-invariant background characteristics. Labor market, family formation, and financial outcomes are described in panels C, D, and E, respectively.

The treatment variables in panel A and the 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. Control variables include background characteristics, such as father's educational attainment and parents' job status at age 14.³⁷

Panel C reports the variables on labor market outcomes, including employment status and monthly earnings (in thousands of 2015 KRW).³⁸ The annual person survey collects information on each individual's current labor market outcomes, including work status and average monthly earnings, at the time of the survey. Because the KLIPS started in 1998, the early career outcomes for those who graduated from college prior to 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, which provides a full employment history of the person survey respondents from their first to the most recent jobs. However, earnings and other characteristics of retrospective jobs recorded in the work history file are mostly missing or are too crude for our analysis.³⁹ Therefore, we use the person survey data for the main analysis, and use the work history record to check whether missing information on retrospective jobs would bias our results. In Figure S5, we show that our regression results on employment outcomes are robust to including observations from the work history record.

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

In panel E, we report the variables on consumption and asset holdings from the household survey.⁴⁰ As a proxy for consumption, we use average monthly household expenditure per capita in the year of the survey. The survey also collects detailed information on the stock of debt, financial assets, and real estate at the time of the survey. Total debt is calculated as the sum of debt outstanding from financial institutions and nonfinancial agents. The balance of financial assets is

³⁷The 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, are missing for 14–25 percent of the individuals in the analysis sample.

³⁸One USD is worth approximately 1,100 KRW.

³⁹For 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. Although respondents are asked to report working hours, fringe benefits, and establishment characteristics of retrospective jobs, the response rate is extremely low on these questions.

⁴⁰The information on expenditures, debt, financial assets, and home ownership is reported from the second wave onward in the KLIPS.

available by asset type (i.e., bank deposit accounts, stocks, bonds, mutual funds, savings insurance, rotating savings and credit associations, or private lending). Information on home ownership is also reported in the survey. All monetary values are inflation-adjusted to 2015 KRW.

We conduct a separate analysis by gender, because men and women face different choice sets and constraints in work and family life. With the country’s 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 by purchasing a house or contributing a much larger share of the housing price. Women carry out most of the housework and childcare duties, 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 Table S1. 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 in the age of having the first child. On average, men (women) get married at age 30 (28) and have their first childbirth at age 31 (29).

S2 Robustness Checks

We conduct additional robustness checks to show that our results are not sensitive to alternative measures of economic conditions at graduation, other functional form specifications, or alternative sample restrictions. This exercise is performed for labor and financial outcomes averaged over the first 10 years of potential experience, and for family formation outcomes as of the most recent survey year.

Measures of Economic Conditions. In addition to the national and regional unemployment rates in the year of college graduation, we use an indicator for college graduation in 1998 or 1999 as a treatment variable to measure the direct influence of the Asian financial crisis. We choose 1998 and 1999 because the Hodrick-Prescott (HP) filtered series of the national and regional unemployment rates indicate that the two year period during and shortly after the crisis constitute a sharp downturn. The recession effects measured by the regional unemployment rates UR_{cr} or the crisis cohorts dummy DC_c are presented in Table S2.

The estimated effects of the regional unemployment rate UR_{cr} are qualitatively similar, but, in general, smaller in magnitude than the estimates from the benchmark regressions in Section 5, which use the national unemployment rate UR_c . This is consistent with the substantial degree of geographic relocation after college graduation, described in Section 4.1.

From the regressions based on the 1998 or 1999 cohort dummy, we find that the estimated coefficients on DC_c are about four times those on the national unemployment rate UR_c from the regression analyses in Section 5. This confirms that the sharp downturn in the economy during the crisis is the main source of the identifying variation, given that the unemployment rates were, on average, 4 percentage points higher in 1998 and 1999 than in the rest of the analysis period.

Specifications for Cohort Trend. To gauge whether our results are driven by the cubic functional form of $f(c)$, we use an alternative way to remove a smooth national trend in the unemployment rates that does not impose a functional form assumption. We apply the HP filter to the unemploy-

ment rate series, as in Hofmann and Hohmeyer (2016). We use the smoothing parameter values of $\lambda = 6.5$ suggested by Ravn and Uhlig (2002) for annual U.S. data and $\lambda = 100$ suggested by Uribe and Schmitt-Grohé (2017) for annual data from emerging market economies. The regression results using the HP-filtered data are very similar to our baseline results described in Section 5, for both of the smoothing parameter values. See Figure S2 for results on employment and earnings, Figure S3 for marriage and fertility, and Figure S4 for consumption and asset holdings.

Region-Specific Trends. Based on the almost parallel movement of the regional unemployment rates, the cohort trend $f(c)$ is assumed to be parallel across regions in the regression analysis, described in Section 4 and estimated in Section 5. We relax this assumption by additionally controlling for region-specific cohort trends $\delta_r \times c$. Figures S2, S3, and S4 show that this alternative specification yields very similar results to the baseline regressions.

Structural Break after the Crisis. Figure 1 shows that there was a lasting increase in the national unemployment rate even after the South Korean economy had recovered from the Asian financial crisis. The national unemployment rate never returned to the pre-crisis level: the post-crisis rates in 2000–2014 are on average 0.8 percentage points higher than the pre-crisis rates in 1989–1997. The South Korean labor market has experienced a structural change after the crisis, such as an introduction of institutions improving labor market flexibility (Lee, 2017), and a substantial increase in non-standard work arrangements (Keum, 2012). Some of the institutional changes were demanded by the IMF as a condition of the bailout package.

To take into account the post-crisis transformation of the South Korean labor market, we allow the cohort trend to be different after the crisis by interacting $f(c)$ with a dummy variable indicating 2000–2014 cohorts. As presented in Figures S2, S3, and S4, results are robust to allowing a structural break in 2000.

Sample Restriction. We repeat our analysis in Section 5 using graduation cohorts up to 2007 only to exclude those who graduated from college during or shortly after the Great Recession. The results are robust to imposing this restriction on the estimation sample (see Figures S2, S3, and S4). 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.

Using Large Cross-Sectional Data. The sample size of the KLIPS is not very large to begin with, and observations are excluded when outcome variables are missing. Thus, there might be a concern about the representativeness of our KLIPS sample. In the online appendix, we show that the analysis sample and results from the KLIPS data are comparable to those from larger datasets, such as the EAPS or Census data (see Table S6). However, because the EAPS and Census do not report the year of college graduation, we can only compute the reduced form effect of the unemployment rate in the predicted year of college graduation. The predicted graduation year is constructed in the same way as in Section 4.2. Also note that we can only examine a small subset of the outcome variables on employment, marriage, and fertility using the EAPS or Census data. Sections S3.1 and S3.2 in the online appendix provide further details on our EAPS and Census samples, respectively.

S3 Additional Data for Robustness Checks

S3.1 Economically Active Population Survey (EAPS)

The Economically Active Population Survey (EAPS) is a monthly survey of individuals aged 15 and over in approximately 33,000 households, conducted by Statistics Korea. The survey was first conducted in 1957 under the name of “Labor Force Survey,” and has been the primary source of labor force statistics for the population of South Korea. The microdata from 1968 to present are available from the Microdata Integrated Service (MDIS) maintained by Statistics Korea. The EAPS is comparable to the Current Population Survey in the United States.

In Section S2, we pool data from the 1989–2017 EAPS to measure the effect of the unemployment rate at college graduation on employment probability over the first 10 years of potential experience. Because the year of degree completion is not reported in the EAPS, we can only compute the reduced form effect of the unemployment rate in the predicted year of college graduation. The predicted college graduation year is constructed based on the typical age at college graduation, as described in Section 4.2. To make the analysis using the EAPS and KLIPS data as comparable as possible, we restrict our EAPS sample to individuals whose predicted graduation year is between 1989 and 2010. In the regression analysis, the outcome variable of interest is the employment dummy. Control variables include a cubic function of predicted college graduation year, fixed effects for years since predicted year of graduation and calendar year, and an indicator for 4-year college graduates. Standard errors are clustered only at the level of predicted graduation year, because no regional information is available in the EAPS data. Although the March and August supplements of the EAPS collect job and income data on wage workers, these supplemental surveys started in 2001 and thus are not suitable for measuring earnings losses due to the Asian financial crisis.

S3.2 Population and Housing Census (Census)

The Population and Housing Census (Census) is a quinquennial survey collecting information related to population, households, and housing characteristics, conducted by Statistics Korea. The population census started in 1925, and the questions on housing were added to the survey in 1960. The 1960–2015 Census microdata are available from the MDIS.

We use the 2% sample of the 2010 and 2015 Census for the analysis in Section S2. After constructing the predicted year of college graduation, we restrict the sample to those with the predicted graduation year between 1989 and 2010. With no information on the actual year of college graduation, we estimate the reduced form effect of the unemployment rate in the predicted graduation year. The outcome variables of interest include whether an individual has ever been married, whether an individual has any children, and the number of children. Because the information about childbirth exists only for women, we assign men the same number of children as their current spouse. Control variables include a cubic function of predicted college graduation year, fixed effects for years since predicted year of graduation and region of birth, and an indicator for 4-year college graduates. Standard errors are clustered at the level of predicted graduation year by region of birth.

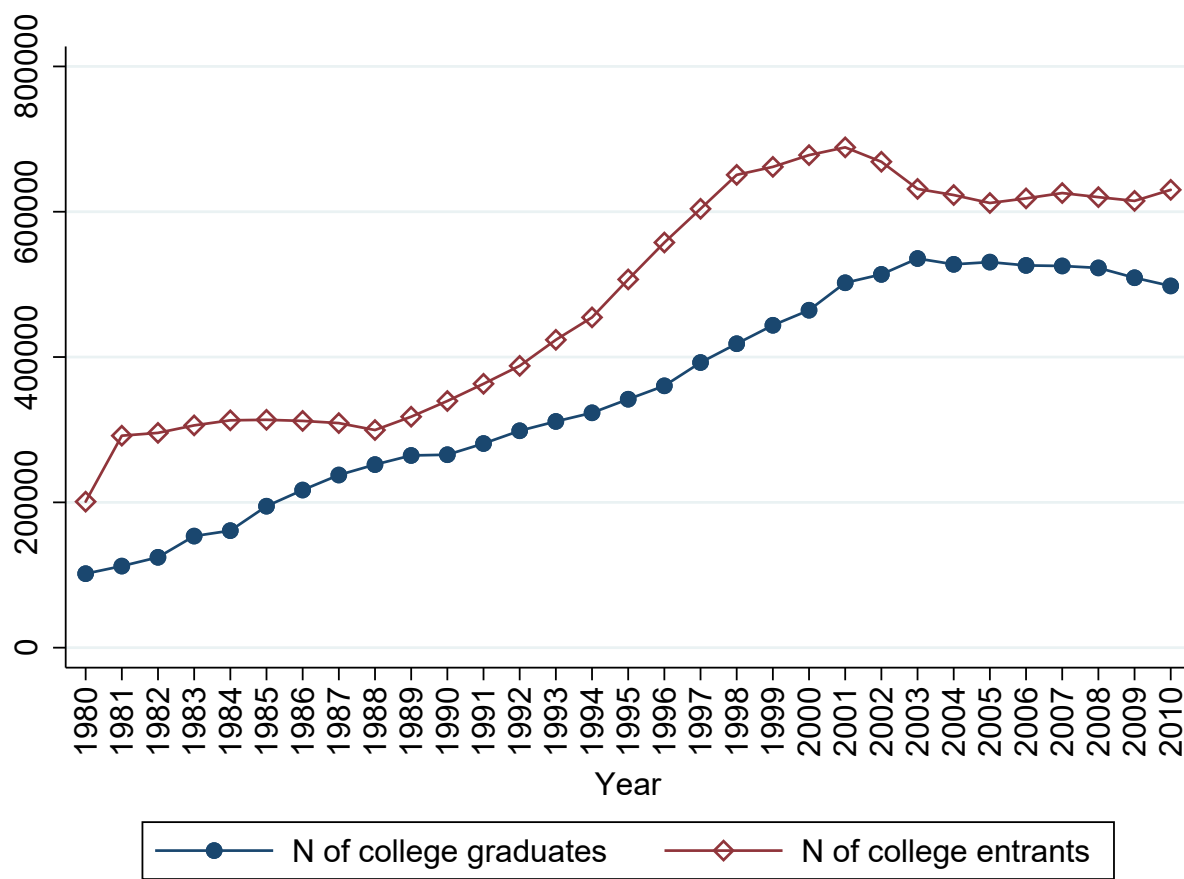


Figure S1: Number of College Graduates and Entrants in South Korea

Notes. Data are from the Korean Educational Statistical Service (<https://kess.kedi.re.kr/index>). All types of 4- and 2-year colleges, except for online universities, are included.

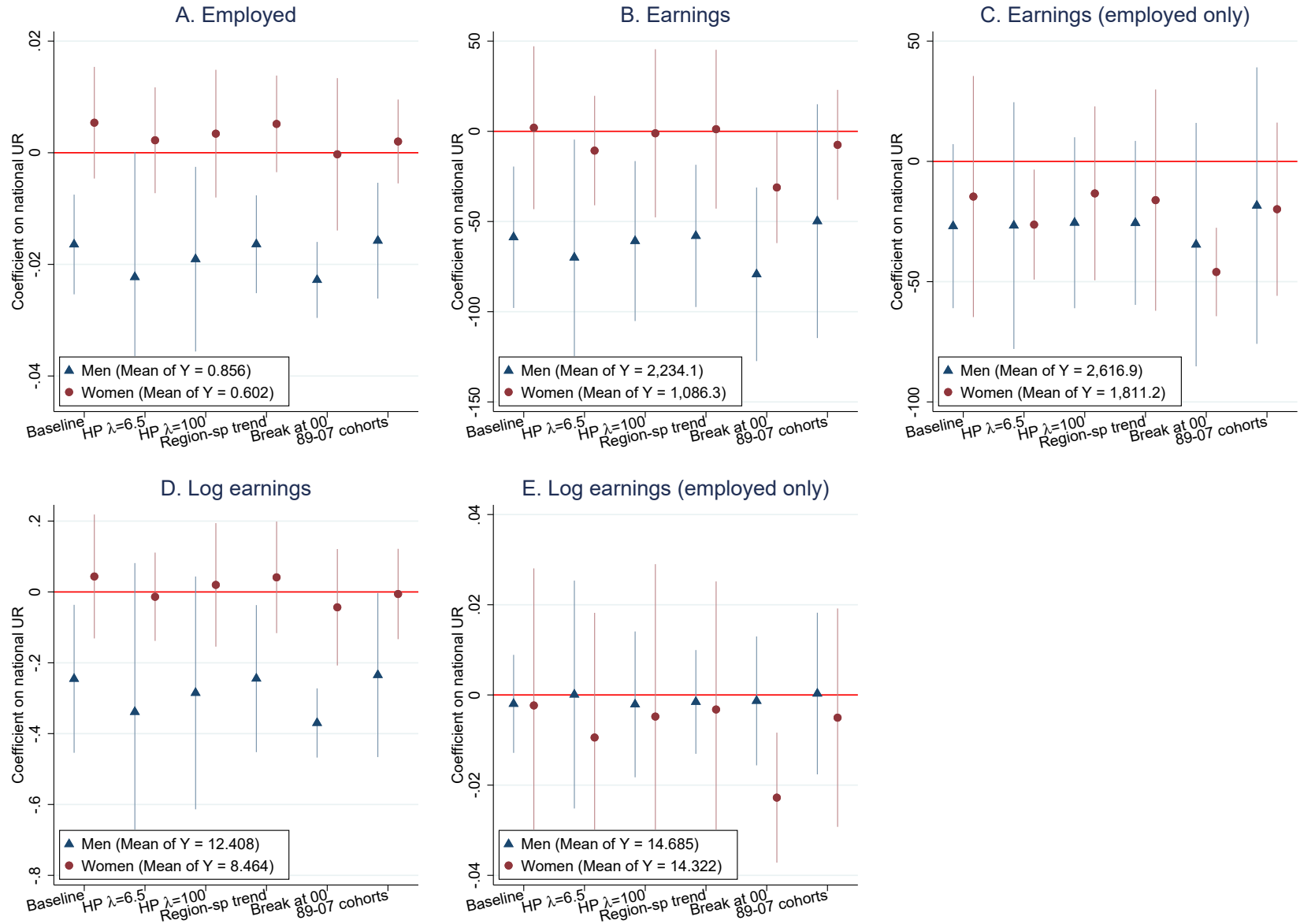


Figure S2: Effects of National Unemployment Rate at Graduation on Employment and Earnings (Experience Years 1–10), Using Alternative Specifications and Sample Restrictions

Notes. In panels B and C, monthly earnings are in thousands of 2015 KRW, where 1 USD is worth approximately 1,100 KRW. In panels D and E, we take the logarithm of monthly earnings in 2015 KRW. In panel D, to construct log earnings for the full sample, we impute zero earnings with 1 KRW before taking the logarithm. Each bullet shape represents the coefficient estimate on the national *UR* from a separate regression estimating the 10 year average effect of equation (1). Vertical spikes around each point estimate represent the wild bootstrapped 95% confidence interval, clustered at the level of graduation year. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation, years since graduation, and calendar year. When we use the HP-filtered series of the national *UR*, the cubic function of college graduation year is dropped from the regression. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for.

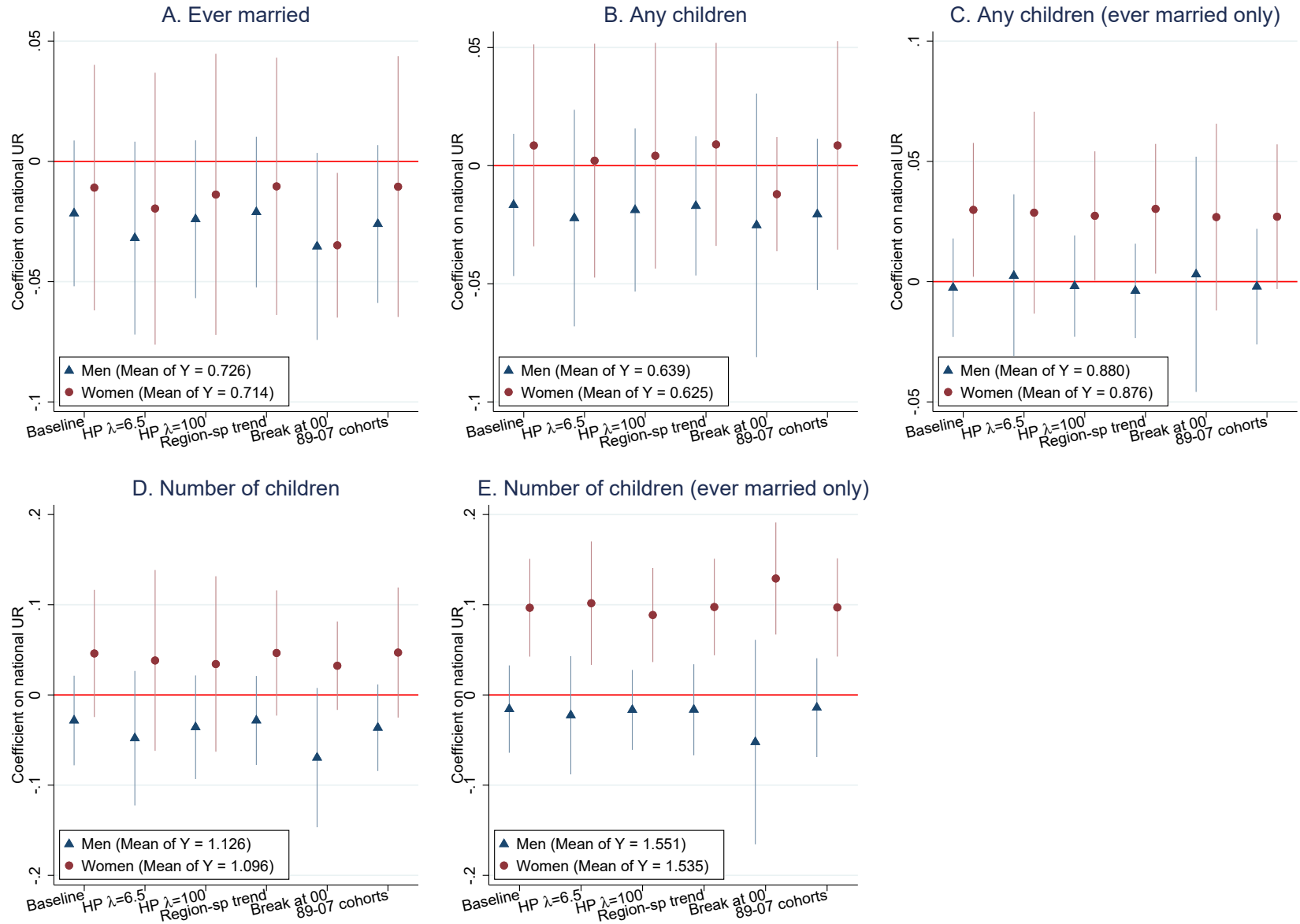


Figure S3: Effects of National Unemployment Rate at Graduation on Marriage and Fertility, Using Alternative Specifications and Sample Restrictions

Notes. Each bullet shape represents the coefficient estimate on the national UR from a separate regression estimating equation (2). Vertical spikes around each point estimate represent the wild bootstrapped 95% confidence interval, clustered at the level of graduation year. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation and years since graduation. When we use the HP-filtered series of the national UR , the cubic function of college graduation year is dropped from the regression. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for.

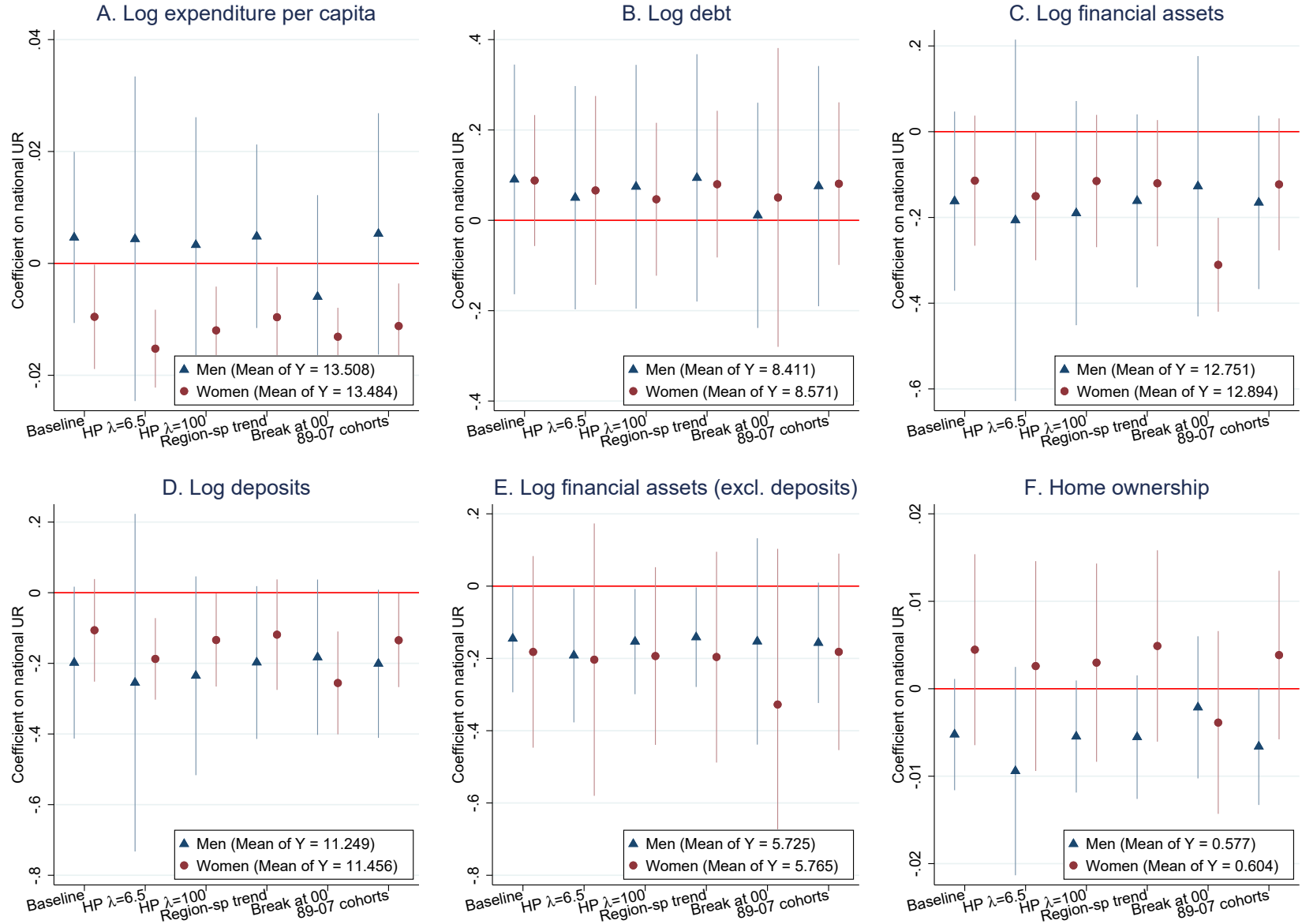


Figure S4: Effects of National Unemployment Rate at Graduation on Consumption and Asset Holdings (Experience Years 1–10), Using Alternative Specifications and Sample Restrictions

Notes. Monthly expenditure per capita and the values of debt and financial assets are in 2015 KRW, where 1 USD is worth approximately 1,100 KRW. Zero values are imputed with 1 KRW before taking the logarithm. Each bullet shape represents the coefficient estimate on the national UR from a separate regression estimating the 10 year average effect of equation (1). Vertical spikes around each point estimate represent the wild bootstrapped 95% confidence interval, clustered at the level of graduation year. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation, years since graduation, and calendar year. When we use the HP-filtered series of the national UR, the cubic function of college graduation year is dropped from the regression. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for.

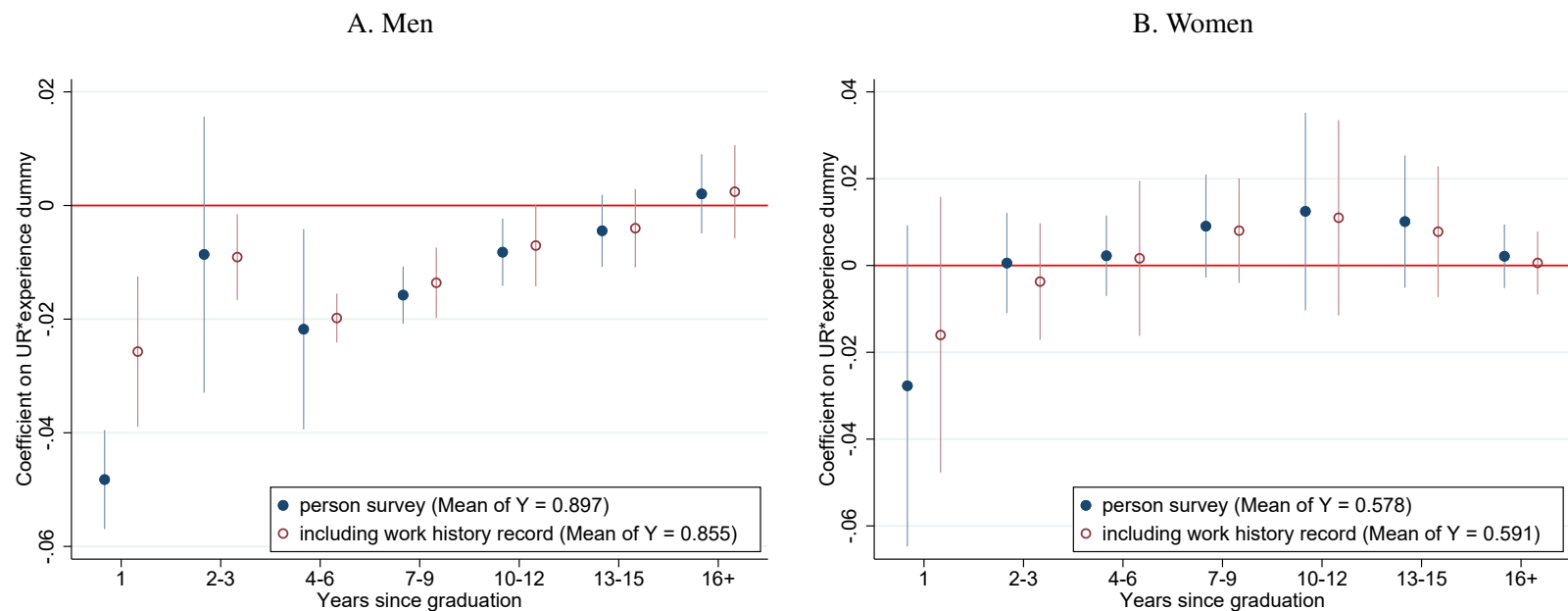


Figure S5: Effects of National Unemployment Rate at Graduation on Employment, by Data Source

Notes. The number of observations (including those from the work history record) are 30,131 for men and 25,795 for women. 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 wild bootstrapped 95% confidence interval, clustered at the level of graduation year. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation, years since graduation, and calendar year. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for.

Table S1: Summary Statistics

	Men			Women		
	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	[1.419]	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						
Attended 4-year college	0.656	[0.475]	2,474	0.546	[0.498]	2,320
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						
Standard worker	0.410	[0.492]	2,401	0.446	[0.497]	2,262
Non-standard 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
Monthly earnings ^a	2,871	[2,277]	22,617	1,145	[1,350]	20,686
Monthly earnings (employed only) ^a	3,206	[2,171]	20,254	1,990	[1,219]	11,906
Log monthly earnings ^b	13.17	[4.736]	22,617	8.04	[7.160]	20,686
Log monthly earnings (employed only) ^c	14.86	[0.505]	20,051	14.40	[0.538]	11,549
Work hours per week (employed only)	49.01	[11.81]	20,483	42.29	[11.77]	12,004
Full-time employment (wage workers only)	0.984	[0.127]	17,132	0.922	[0.268]	10,192
Standard employment (wage workers only)	0.898	[0.302]	16,678	0.788	[0.409]	9,922
Self-employed	0.137	[0.344]	22,856	0.069	[0.254]	20,795
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 (ever married only)	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 (ever married only)	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. Financial outcomes						
Monthly expenditure per capita ^a	885.8	[469.3]	20,706	865.5	[436.0]	18,808
Value of debt ^a	46,039	[112,724]	22,268	49,847	[107,755]	20,305
Value of financial assets ^a	28,539	[65,462]	22,267	29,456	[63,059]	20,302
Value of deposits ^a	19,051	[51,967]	22,089	19,814	[48,158]	20,128
Value of financial assets excluding deposits ^a	9,641	[31,080]	22,266	9,812	[34,385]	20,302
Log monthly expenditure per capita ^b	13.57	[0.495]	20,706	13.56	[0.482]	18,808
Log debt ^b	9.28	[8.848]	22,268	9.36	[8.889]	20,305
Log financial assets ^b	12.97	[7.012]	22,267	13.22	[6.865]	20,302
Log deposits ^b	11.11	[7.726]	22,089	11.36	[7.648]	20,128
Log financial assets excluding deposits ^b	6.68	[8.012]	22,266	6.83	[8.036]	20,302
Home ownership	0.626	[0.484]	22,256	0.642	[0.480]	20,296

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 men and 20,795 for women. Family formation outcomes are as of the most recent year in which an individual participated in the survey. Standard deviations in brackets.

^a In thousands of 2015 KRW, where 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.

^c Before taking the logarithm, the values are inflation-adjusted to 2015 KRW and zero earnings are dropped.

Table S2: Effects of Economic Conditions at Graduation on Various Outcomes, Using Alternative Treatment Variables

	Men					Women				
	National UR	Regional UR	DC	Mean	Obs.	National UR	Regional UR	DC	Mean	Obs.
A. Employment and earnings (experience years 1–10)										
Employed	–0.016*** (0.003) [0.005]	–0.011** (0.004) [0.175]	–0.062*** (0.016) [0.059]	0.856	11,954	0.005 (0.004) [0.310]	0.005 (0.004) [0.267]	0.014 (0.012) [0.327]	0.602	11,339
Earnings ^a	–58.7*** (15.4) [0.011]	–41.5** (17.7) [0.110]	–210.1** (82.4) [0.133]	2,234.1	11,807	2.0 (13.9) [0.915]	4.3 (11.8) [0.770]	–8.0 (52.7) [0.924]	1,086.3	11,278
Earnings (employed only) ^a	–26.9* (15.1) [0.126]	–22.6 (14.3) [0.151]	–94.2 (67.6) [0.309]	2,616.9	10,080	–14.6 (13.5) [0.487]	–9.1 (11.8) [0.590]	–65.4 (60.0) [0.485]	1,811.2	6,764
Log earnings ^b	–0.245*** (0.055) [0.026]	–0.162* (0.078) [0.238]	–0.927*** (0.304) [0.126]	12.408	11,807	0.044 (0.064) [0.608]	0.059 (0.058) [0.394]	0.029 (0.202) [0.911]	8.464	11,278
Log earnings (employed only) ^c	–0.002 (0.004) [0.759]	0.000 (0.005) [0.993]	–0.005 (0.019) [0.866]	14.685	9,976	–0.002 (0.008) [0.857]	–0.000 (0.007) [0.988]	–0.010 (0.034) [0.870]	14.322	6,665
B. Marriage and fertility (as of the most recent survey year)										
Ever married	–0.022** (0.010) [0.172]	–0.013 (0.009) [0.413]	–0.094** (0.041) [0.144]	0.726	2,474	–0.011 (0.015) [0.688]	–0.015 (0.010) [0.287]	–0.056 (0.058) [0.554]	0.714	2,320
Any children	–0.017 (0.011) [0.271]	–0.009 (0.011) [0.621]	–0.074 (0.043) [0.176]	0.639	2,474	0.009 (0.013) [0.682]	–0.001 (0.009) [0.928]	0.019 (0.047) [0.778]	0.625	2,320
Any children (ever married only)	–0.003 (0.009) [0.819]	–0.002 (0.008) [0.889]	–0.008 (0.034) [0.817]	0.880	1,796	0.030** (0.011) [0.031]	0.014 (0.013) [0.431]	0.105** (0.047) [0.081]	0.876	1,656
Number of children	–0.028 (0.020) [0.215]	–0.011 (0.019) [0.666]	–0.114 (0.079) [0.198]	1.126	2,474	0.046* (0.024) [0.191]	0.015 (0.018) [0.513]	0.138 (0.083) [0.194]	1.096	2,320
Number of children (ever married only)	–0.016 (0.023) [0.480]	–0.002 (0.016) [0.886]	–0.026 (0.088) [0.753]	1.551	1,796	0.097*** (0.024) [0.001]	0.041 (0.029) [0.291]	0.318** (0.117) [0.051]	1.535	1,656
C. Consumption and asset holdings (experience years 1–10)										
Log expenditure per capita ^b	0.005 (0.005) [0.510]	0.003 (0.006) [0.658]	0.018 (0.021) [0.532]	13.508	11,317	–0.010** (0.004) [0.045]	–0.007* (0.003) [0.072]	–0.042*** (0.012) [0.005]	13.484	10,735
Log debt ^b	0.090 (0.076) [0.479]	0.126 (0.097) [0.380]	0.178 (0.312) [0.678]	8.411	11,366	0.088 (0.066) [0.240]	0.045 (0.068) [0.571]	0.374 (0.224) [0.115]	8.571	10,850
Log financial assets ^b	–0.162** (0.059) [0.099]	–0.198*** (0.058) [0.024]	–0.739*** (0.241) [0.061]	12.751	11,365	–0.114* (0.056) [0.124]	–0.139* (0.072) [0.136]	–0.276 (0.299) [0.545]	12.894	10,847
Log deposits ^b	–0.198*** (0.063) [0.065]	–0.234*** (0.063) [0.022]	–0.853*** (0.285) [0.081]	11.249	11,275	–0.106* (0.055) [0.120]	–0.117 (0.080) [0.247]	–0.399* (0.224) [0.162]	11.456	10,753
Log financial assets (excl. deposits) ^b	–0.145*** (0.049) [0.053]	–0.095* (0.055) [0.189]	–0.676*** (0.183) [0.015]	5.725	11,364	–0.182* (0.094) [0.141]	–0.221** (0.089) [0.083]	–0.444 (0.453) [0.490]	5.765	10,847
Home ownership	–0.005 (0.003) [0.106]	–0.012** (0.005) [0.074]	–0.032** (0.014) [0.063]	0.577	11,359	0.004 (0.005) [0.472]	0.003 (0.005) [0.603]	0.022 (0.015) [0.177]	0.604	10,844

Notes. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation and years since graduation. In panels A and C, calendar year fixed effects are also included in the regressions. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year. Wild bootstrapped p -values in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

^a In thousands of 2015 KRW, where 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.

^c Before taking the logarithm, the values are inflation-adjusted to 2015 KRW and zero earnings are dropped.

Table S3: Effects of National Unemployment Rate at Graduation on Various Outcomes, OLS and IV Estimation

	Men					Women				
	OLS	IV	First stage <i>F</i> -statistic	Mean	Obs.	OLS	IV	First stage <i>F</i> -statistic	Mean	Obs.
A. Employment and earnings (experience years 1–10)										
Employed	–0.016*** (0.003) [0.005]	–0.030*** (0.011) [0.022]	20.3	0.856	11,954	0.005 (0.004) [0.310]	–0.015* (0.009) [0.111]	46.1	0.602	11,339
Earnings ^a	–58.7*** (15.4) [0.011]	–102.3** (45.5) [0.046]	20.9	2,234.1	11,807	2.0 (13.9) [0.915]	–36.6 (25.1) [0.152]	47.4	1,086.3	11,278
Earnings (employed only) ^a	–26.9* (15.1) [0.126]	–55.7 (40.8) [0.216]	124.0	2,616.9	10,080	–14.6 (13.5) [0.487]	–13.7 (25.34) [0.660]	36.7	1,811.2	6,764
Log earnings ^b	–0.245*** (0.055) [0.026]	–0.381*** (0.141) [0.027]	20.9	12.408	11,807	0.044 (0.064) [0.608]	–0.197 (0.134) [0.167]	47.4	8.464	11,278
Log earnings (employed only) ^c	–0.002 (0.004) [0.759]	–0.014 (0.015) [0.455]	124.2	14.685	9,976	–0.002 (0.008) [0.857]	0.004 (0.011) [0.748]	38.2	14.322	6,665
B. Marriage and fertility (as of the most recent survey year)										
Ever married	–0.022** (0.010) [0.172]	–0.072** (0.034) [0.434]	177.4	0.726	2,474	–0.011 (0.015) [0.688]	–0.007 (0.025) [0.839]	274.0	0.714	2,320
Any children	–0.017 (0.011) [0.271]	–0.001 (0.024) [0.964]	177.4	0.639	2,474	0.009 (0.013) [0.682]	0.028 (0.031) [0.509]	274.0	0.625	2,320
Any children (ever married only)	–0.003 (0.009) [0.819]	0.023 (0.113) [0.834]	38.1	0.880	1,796	0.030** (0.011) [0.031]	0.049 (0.033) [0.347]	77.8	0.876	1,656
Number of children	–0.028 (0.020) [0.215]	0.031 (0.049) [0.582]	177.4	1.126	2,474	0.046* (0.024) [0.191]	0.097* (0.056) [0.210]	274.0	1.096	2,320
Number of children (ever married only)	–0.016 (0.023) [0.480]	–0.053 (0.229) [0.788]	38.1	1.551	1,796	0.097*** (0.024) [0.001]	0.156** (0.063) [0.238]	77.8	1.535	1,656
C. Consumption and asset holdings (experience years 1–10)										
Log expenditure per capita ^b	0.005 (0.005) [0.510]	0.005 (0.020) [0.860]	28.4	13.508	11,317	–0.010** (0.004) [0.045]	–0.022** (0.009) [0.061]	35.4	13.484	10,735
Log debt ^b	0.090 (0.076) [0.479]	0.131 (0.313) [0.776]	23.8	8.411	11,366	0.088 (0.066) [0.240]	0.165 (0.219) [0.618]	37.0	8.571	10,850
Log financial assets ^b	–0.162** (0.059) [0.099]	–0.455*** (0.103) [0.007]	23.9	12.751	11,365	–0.114* (0.056) [0.124]	–0.042 (0.137) [0.816]	37.0	12.894	10,847
Log deposits ^b	–0.198*** (0.063) [0.065]	–0.555*** (0.134) [0.004]	24.4	11.249	11,275	–0.106* (0.055) [0.120]	–0.005 (0.116) [0.982]	36.6	11.456	10,753
Log financial assets (excl. deposits) ^b	–0.145*** (0.049) [0.053]	–0.310 (0.218) [0.224]	23.9	5.725	11,364	–0.182* (0.094) [0.141]	–0.113 (0.108) [0.336]	37.0	5.765	10,847
Home ownership	–0.005 (0.003) [0.106]	–0.036 (0.028) [0.390]	24.0	0.577	11,359	0.004 (0.005) [0.472]	0.040*** (0.008) [0.009]	37.4	0.604	10,844

Notes. For variable definitions and OLS specifications, see the notes under Table 2 for the labor market outcomes in panel A, see Table 3 for the family formation outcomes in panel B, and see Table S5 for the financial outcomes in panel C. In the IV estimation, national *UR* at actual year of college graduation is instrumented with national *UR* at predicted year of college graduation. A cubic function of college graduation year and indicator variables for years since graduation are instrumented with a cubic function of predicted college graduation year and indicator variables for years since predicted year of graduation, respectively. The IV regressions include fixed effects for the region of college graduation and calendar year in panels A and C, and fixed effects for the region of college graduation in panel B. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of predicted graduation year. Wild bootstrapped *p*-values in brackets. To prevent rank deficiency, the first stage *F*-statistic is computed using variance-covariance matrix clustered at the level of predicted graduation year by region of college. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

^aIn thousands of 2015 KRW, where 1 USD is worth approximately 1,100 KRW.

^bBefore taking the logarithm, the values are inflation-adjusted to 2015 KRW and zeros are imputed with 1 KRW.

^cBefore taking the logarithm, the values are inflation-adjusted to 2015 KRW and zero earnings are dropped.

Table S4: Effects of National Unemployment Rate at Graduation on Employment and Earnings

	Employed		Earnings		Earnings (employed only)		Log earnings		Log earnings (employed only)	
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)	IV (6)	OLS (7)	IV (8)	OLS (9)	IV (10)
A. Men										
$UR \times 1[e = 1]$	-0.048*** (0.005) [0.000]	-0.092** (0.047) [0.414]	-17.4 (20.0) [0.471]	32.2 (122.3) [0.806]	57.7** (24.3) [0.038]	108.4 (129.7) [0.509]	-0.696*** (0.068) [0.000]	-1.245* (0.670) [0.445]	0.004 (0.009) [0.686]	-0.044 (0.048) [0.467]
$UR \times 1[e = 2-3]$	-0.009 (0.009) [0.472]	0.015 (0.044) [0.709]	-3.4 (18.1) [0.867]	-55.6 (92.8) [0.592]	27.5 (18.2) [0.160]	-89.2 (84.4) [0.314]	-0.096 (0.142) [0.625]	0.392 (0.616) [0.509]	-0.000 (0.011) [0.984]	-0.078** (0.031) [0.034]
$UR \times 1[e = 4-6]$	-0.022*** (0.005) [0.021]	-0.038** (0.016) [0.444]	-104.1*** (21.1) [0.002]	-249.4*** (83.6) [0.036]	-62.2*** (17.1) [0.004]	-180.5** (90.4) [0.084]	-0.336*** (0.085) [0.024]	-0.610** (0.254) [0.478]	-0.008 (0.005) [0.237]	-0.036 (0.022) [0.153]
$UR \times 1[e = 7-9]$	-0.016*** (0.003) [0.000]	-0.012 (0.010) [0.546]	-59.1*** (13.1) [0.000]	89.3 (109.2) [0.549]	-23.3 (15.9) [0.209]	103.9 (103.2) [0.447]	-0.252*** (0.043) [0.000]	-0.108 (0.172) [0.663]	-0.001 (0.004) [0.794]	0.024 (0.030) [0.583]
$UR \times 1[e = 10-12]$	-0.008** (0.003) [0.012]	-0.008 (0.016) [0.735]	-45.1 (26.7) [0.101]	-5.8 (143.1) [0.973]	-18.8 (25.1) [0.517]	25.3 (129.0) [0.877]	-0.089 (0.056) [0.159]	-0.065 (0.242) [0.840]	-0.002 (0.007) [0.855]	0.008 (0.030) [0.845]
$UR \times 1[e = 13-15]$	-0.004 (0.003) [0.159]	0.027*** (0.008) [0.527]	-18.7 (21.9) [0.428]	91.2 (133.2) [0.578]	-1.0 (25.6) [0.964]	18.8 (138.2) [0.902]	-0.053 (0.035) [0.173]	0.511*** (0.148) [0.591]	0.004 (0.007) [0.652]	0.004 (0.033) [0.929]
$UR \times 1[e = 16+]$	0.002 (0.003) [0.535]	0.003 (0.015) [0.870]	5.8 (20.5) [0.802]	-18.8 (156.7) [0.951]	-1.2 (18.4) [0.965]	-25.4 (150.0) [0.903]	0.045 (0.050) [0.435]	0.056 (0.247) [0.849]	0.005 (0.007) [0.594]	0.017 (0.030) [0.639]
Adjusted R^2	0.077		0.155		0.140		0.088		0.236	
Observations	22,856	22,856	22,617	22,617	20,254	20,254	22,617	22,617	20,051	20,051
Mean of Y	0.897	0.897	2,870.8	2,870.8	3,205.7	3,205.7	13.172	13.172	14.858	14.858
B. Women										
$UR \times 1[e = 1]$	-0.028** (0.011) [0.116]	-0.073** (0.037) [0.119]	-36.0** (14.7) [0.019]	-63.1 (52.8) [0.341]	9.1 (20.3) [0.711]	64.2 (40.3) [0.284]	-0.344** (0.142) [0.083]	-0.982* (0.524) [0.143]	-0.020** (0.009) [0.012]	0.015 (0.025) [0.658]
$UR \times 1[e = 2-3]$	0.001 (0.005) [0.928]	0.019 (0.029) [0.747]	-8.7 (9.3) [0.372]	-3.00 (47.0) [0.967]	-3.8 (13.4) [0.820]	-26.5 (27.7) [0.417]	-0.010 (0.066) [0.899]	0.240 (0.385) [0.768]	-0.001 (0.007) [0.891]	-0.014 (0.015) [0.428]
$UR \times 1[e = 4-6]$	0.002 (0.004) [0.600]	-0.003 (0.009) [0.742]	-6.3 (13.0) [0.698]	-6.9 (19.3) [0.713]	-15.7 (13.0) [0.313]	-0.25 (30.7) [0.995]	-0.019 (0.071) [0.802]	-0.012 (0.125) [0.925]	-0.002 (0.006) [0.774]	0.003 (0.012) [0.815]
$UR \times 1[e = 7-9]$	0.009 (0.006) [0.146]	-0.009 (0.009) [0.358]	7.2 (20.2) [0.810]	-31.4 (30.4) [0.343]	-18.0 (25.7) [0.651]	-25.0 (34.4) [0.543]	0.097 (0.097) [0.430]	-0.117 (0.131) [0.408]	0.003 (0.014) [0.890]	-0.003 (0.014) [0.866]
$UR \times 1[e = 10-12]$	0.012 (0.007) [0.239]	-0.021 (0.020) [0.540]	6.5 (25.8) [0.881]	-61.4 (64.9) [0.539]	-46.5* (24.9) [0.129]	-48.5 (58.2) [0.514]	0.120 (0.110) [0.418]	-0.341 (0.276) [0.469]	-0.000 (0.013) [0.996]	0.003 (0.028) [0.935]
$UR \times 1[e = 13-15]$	0.010* (0.006) [0.176]	-0.003 (0.011) [0.838]	22.7 (27.1) [0.557]	-26.1 (45.3) [0.678]	-6.7 (35.7) [0.903]	-47.5 (61.5) [0.547]	0.097 (0.105) [0.469]	-0.198 (0.182) [0.428]	0.012 (0.017) [0.653]	0.002 (0.019) [0.918]
$UR \times 1[e = 16+]$	0.002 (0.004) [0.590]	-0.032*** (0.010) [0.080]	30.9 (35.3) [0.564]	-18.6 (68.8) [0.865]	38.5 (55.7) [0.639]	101.0 (87.1) [0.442]	0.008 (0.085) [0.945]	-0.498** (0.214) [0.130]	0.031 (0.020) [0.299]	0.061*** (0.022) [0.023]
Adjusted R^2	0.024		0.037		0.100		0.028		0.109	
Observations	20,795	20,795	20,686	20,686	11,906	11,906	20,686	20,686	11,549	11,549
Mean of Y	0.578	0.578	1,145.4	1,145.4	1,990.0	1,990.0	8.037	8.037	14.396	14.396

Notes. Monthly earnings in levels are in thousands of 2015 KRW, where 1 USD is worth approximately 1,100 KRW. We take the logarithm of monthly earnings in 2015 KRW. To construct log earnings for the full sample in columns (7) and (8), we impute zero earnings with 1 KRW before taking the logarithm. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation, years since graduation, and calendar year. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year. Wild bootstrapped p -values in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table S5: Effects of National Unemployment Rate at Graduation on Consumption and Asset Holdings

	Log expenditure per capita ^a		Log debt ^a		Log fin. assets ^a		Log deposits ^a		Log fin. assets ^a (excl. deposits)		Home ownership ^a	
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)	IV (6)	OLS (7)	IV (8)	OLS (9)	IV (10)	OLS (11)	IV (12)
A. Men												
<i>UR</i> × 1[<i>e</i> = 1–3]	0.007 (0.007) [0.357]	0.001 (0.025) [0.975]	–0.095 (0.095) [0.335]	–0.283 (0.353) [0.485]	–0.235 (0.145) [0.270]	–0.749** (0.349) [0.063]	–0.335* (0.174) [0.251]	–0.871*** (0.325) [0.027]	–0.041 (0.091) [0.742]	–0.478 (0.369) [0.294]	–0.010 (0.006) [0.131]	–0.016 (0.026) [0.652]
<i>UR</i> × 1[<i>e</i> = 4–6]	0.003 (0.009) [0.814]	0.007 (0.013) [0.604]	0.057 (0.145) [0.808]	0.569 (0.599) [0.466]	–0.127 (0.078) [0.242]	–1.011*** (0.245) [0.009]	–0.205** (0.080) [0.051]	–0.946*** (0.240) [0.010]	–0.073 (0.063) [0.327]	–0.298 (0.296) [0.335]	–0.006 (0.004) [0.123]	–0.068 (0.060) [0.509]
<i>UR</i> × 1[<i>e</i> = 7–9]	–0.001 (0.004) [0.829]	0.018 (0.020) [0.510]	0.119 (0.108) [0.456]	–0.131 (0.503) [0.851]	–0.311*** (0.058) [0.000]	0.035 (0.304) [0.930]	–0.235*** (0.059) [0.001]	–0.176 (0.515) [0.836]	–0.340*** (0.059) [0.000]	–0.039 (0.233) [0.889]	–0.002 (0.007) [0.841]	–0.020 (0.017) [0.312]
<i>UR</i> × 1[<i>e</i> = 10–12]	–0.003 (0.006) [0.689]	–0.011 (0.020) [0.646]	0.033 (0.103) [0.796]	0.124 (0.583) [0.858]	0.028 (0.039) [0.448]	–0.068 (0.198) [0.732]	0.103** (0.047) [0.018]	–0.041 (0.168) [0.805]	–0.079 (0.062) [0.244]	–0.137 (0.304) [0.680]	–0.014*** (0.004) [0.000]	–0.019 (0.024) [0.550]
<i>UR</i> × 1[<i>e</i> = 13–15]	–0.008 (0.007) [0.355]	–0.004 (0.024) [0.908]	0.074 (0.089) [0.562]	0.220 (0.313) [0.551]	–0.143* (0.071) [0.047]	–0.073 (0.278) [0.806]	–0.043 (0.074) [0.628]	–0.175 (0.358) [0.674]	–0.157* (0.080) [0.135]	0.095 (0.286) [0.787]	–0.018*** (0.004) [0.000]	–0.069*** (0.020) [0.011]
<i>UR</i> × 1[<i>e</i> = 16+]	–0.002 (0.004) [0.731]	0.003 (0.021) [0.917]	0.109 (0.166) [0.677]	0.422 (0.417) [0.419]	–0.023 (0.084) [0.794]	0.131 (0.311) [0.715]	–0.034 (0.079) [0.682]	0.194 (0.445) [0.752]	–0.019 (0.043) [0.665]	–0.013 (0.251) [0.963]	–0.012** (0.005) [0.013]	–0.023 (0.022) [0.542]
Adjusted <i>R</i> ²	0.163		0.024		0.028		0.014		0.106		0.028	
Observations	20,706	20,706	22,268	22,268	22,267	22,267	22,089	22,089	22,266	22,266	22,256	22,256
Mean of <i>Y</i>	13.574	13.574	9.281	9.281	12.967	12.967	11.107	11.107	6.681	6.681	0.626	0.626
B. Women												
<i>UR</i> × 1[<i>e</i> = 1–3]	–0.008* (0.004) [0.166]	–0.014 (0.009) [0.233]	–0.123 (0.114) [0.355]	0.142 (0.289) [0.715]	–0.208** (0.097) [0.052]	–0.230* (0.121) [0.086]	–0.192** (0.089) [0.043]	–0.316*** (0.111) [0.003]	–0.167 (0.145) [0.358]	–0.105 (0.187) [0.670]	0.004 (0.005) [0.421]	0.028* (0.015) [0.211]
<i>UR</i> × 1[<i>e</i> = 4–6]	–0.020*** (0.005) [0.003]	–0.024*** (0.007) [0.023]	0.197* (0.098) [0.065]	0.040 (0.232) [0.889]	–0.037 (0.076) [0.616]	0.103 (0.349) [0.858]	0.000 (0.064) [0.995]	0.287 (0.292) [0.573]	–0.182** (0.077) [0.006]	–0.159 (0.141) [0.350]	0.008 (0.008) [0.415]	0.047*** (0.015) [0.049]
<i>UR</i> × 1[<i>e</i> = 7–9]	–0.003 (0.005) [0.635]	–0.011 (0.013) [0.497]	–0.042 (0.100) [0.731]	–0.127 (0.367) [0.807]	–0.158 (0.110) [0.337]	0.065 (0.155) [0.735]	–0.216** (0.094) [0.110]	–0.048 (0.130) [0.760]	–0.207** (0.097) [0.032]	–0.196* (0.108) [0.101]	–0.003 (0.006) [0.693]	0.010 (0.009) [0.303]
<i>UR</i> × 1[<i>e</i> = 10–12]	–0.013** (0.006) [0.108]	–0.018 (0.013) [0.299]	0.063 (0.085) [0.521]	–0.090 (0.157) [0.666]	0.032 (0.057) [0.603]	–0.131 (0.145) [0.467]	0.040 (0.078) [0.658]	0.067 (0.151) [0.677]	–0.081 (0.072) [0.331]	–0.068 (0.120) [0.595]	–0.005 (0.006) [0.446]	–0.007 (0.011) [0.638]
<i>UR</i> × 1[<i>e</i> = 13–15]	–0.004 (0.007) [0.694]	–0.009 (0.012) [0.531]	0.225* (0.119) [0.194]	0.323* (0.194) [0.135]	0.091 (0.086) [0.373]	0.019 (0.148) [0.919]	0.149* (0.072) [0.076]	0.115 (0.182) [0.598]	–0.055 (0.079) [0.545]	0.023 (0.199) [0.915]	–0.010 (0.009) [0.435]	0.001 (0.007) [0.902]
<i>UR</i> × 1[<i>e</i> = 16+]	–0.001 (0.010) [0.924]	–0.007 (0.008) [0.527]	0.011 (0.076) [0.892]	–0.126 (0.271) [0.756]	0.152*** (0.047) [0.005]	0.187* (0.111) [0.156]	0.052 (0.048) [0.325]	0.107 (0.115) [0.443]	0.177** (0.066) [0.024]	0.264** (0.117) [0.111]	–0.001 (0.010) [0.929]	–0.009 (0.010) [0.601]
Adjusted <i>R</i> ²	0.183		0.028		0.028		0.014		0.112		0.026	
Observations	18,808	18,808	20,305	20,305	20,302	20,302	20,128	20,128	20,302	20,302	20,296	20,296
Mean of <i>Y</i>	13.558	13.558	9.355	9.355	13.216	13.216	11.362	11.362	6.827	6.827	0.642	0.642

Notes. Monthly expenditure per capita and the values of debt and financial assets are in 2015 KRW, where 1 USD is worth approximately 1,100 KRW. Zero values are imputed with 1 KRW before taking the logarithm. Regressions include a cubic function of college graduation year, and fixed effects for the region of college graduation, years since graduation, and calendar year. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of graduation year. Wild bootstrapped *p*-values in brackets. * *p* < 0.10, ** *p* < 0.05, *** *p* < 0.01

^a Available from the second wave of the KLIPS.

Table S6: Reduced Form Results Using Predicted Unemployment Rate, by Data Source

	Employed (1)	Ever married (2)	Any children (3)	Any children (ever married only) (4)	N of children (5)	N of children (ever married only) (6)
A. Men						
	<i>KLIPS</i>					
Predicted <i>UR</i>	−0.002 (0.002) [0.288]	−0.001 (0.005) [0.852]	0.003 (0.007) [0.712]	0.010 (0.009) [0.352]	0.005 (0.014) [0.755]	0.017 (0.016) [0.339]
Adjusted R^2	0.111	0.274	0.288	0.109	0.305	0.170
Observations	11,954	2,474	2,474	1,796	2,474	1,796
Mean of <i>Y</i>	0.856	0.726	0.639	0.880	1.126	1.551
	<i>EAPS</i>			<i>Census</i>		
Predicted <i>UR</i>	−0.005** (0.002) [0.062]	−0.002* (0.001) [0.438]	−0.002 (0.002) [0.681]	−0.002 (0.001) [0.583]	−0.003 (0.003) [0.551]	−0.002 (0.001) [0.335]
Adjusted R^2	0.163	0.291	0.233	0.044	0.341	0.194
Observations	741,884	175,042	175,042	121,646	163,262	109,866
Mean of <i>Y</i>	0.840	0.703	0.575	0.818	1.094	1.603
B. Women						
	<i>KLIPS</i>					
Predicted <i>UR</i>	−0.007 (0.004) [0.177]	0.003 (0.010) [0.825]	0.014 (0.013) [0.434]	0.018 (0.013) [0.215]	0.046** (0.023) [0.071]	0.063** (0.024) [0.021]
Adjusted R^2	0.034	0.348	0.357	0.133	0.351	0.183
Observations	11,339	2,320	2,320	1,656	2,320	1,656
Mean of <i>Y</i>	0.602	0.714	0.625	0.876	1.096	1.535
	<i>EAPS</i>			<i>Census</i>		
Predicted <i>UR</i>	0.000 (0.001) [0.878]	0.003** (0.001) [0.056]	0.005** (0.002) [0.251]	−0.001 (0.001) [0.820]	0.015*** (0.003) [0.027]	0.010*** (0.002) [0.049]
Adjusted R^2	0.054	0.331	0.331	0.109	0.357	0.195
Observations	724,128	165,462	165,462	109,766	163,619	107,923
Mean of <i>Y</i>	0.666	0.669	0.581	0.869	1.016	1.528

Notes. Regressions using the 1998–2017 KLIPS data include a cubic function of predicted college graduation year, and fixed effects for the region of college graduation and years since predicted year of graduation. In column (1), calendar year fixed effects are also included in the regressions. Controls for background characteristics include father's years of education, father's years of education squared, dummies for parents' job status at age 14 (standard worker, non-standard worker, business owner hiring employees, business owner with no employee), and an indicator for 4-year college graduates. Missing values in background covariates are imputed using mean values, and dummies for missing observations are also controlled for. Robust standard errors in parentheses are clustered at the level of predicted graduation year.

Regressions using the 1998–2017 EAPS data control for a cubic function of predicted college graduation year, fixed effects for years since predicted year of graduation and calendar year, and an indicator for 4-year college graduates. Robust standard errors in parentheses are clustered at the level of predicted graduation year.

Regressions using the 2010 and 2015 Census data control for a cubic function of predicted college graduation year, fixed effects for years since predicted year of graduation and region of birth, and an indicator for 4-year college graduates. Robust standard errors in parentheses are clustered at the level of predicted graduation year.

Wild bootstrapped *p*-values in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$