The Effects of Graduating from College during a Recession on Asset Holdings

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The effects of graduating from college during a recession on asset holdings*

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Abstract

Recent studies reveal that graduating from college during a recession has persistent negative effects on labor-market outcomes - a phenomenon called the scarring effect. This study assesses the welfare impact of the scarring effect beyond labor market outcomes, by analyzing family formation behaviors and asset holdings. Scrutiny of National Longitudinal Survey of Youth 1979 reveals that, despite a substantial and persistent decline in hourly wages, business cycle conditions at entry to the labor market do not affect asset holdings in the long run; instead, young college graduates who face a recession at entry tend to move out of certain states, particularly from those states in the Northeast region where the cost of living is high. These results suggest that the cohort-specific negative shock is absorbed by the geographic mobility of college graduates; specifically, the scarred cohorts move to states with lower living costs to secure the same living standards as those of other cohorts.
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1 Introduction

The surge of the unemployment rate after the 2008 financial crisis directly hit young people who were graduating from school and looking for jobs in many developed countries. Recent

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studies reveal that the cohort graduating from school in a bad economy persistently suffers for a long time in terms of employment status and earnings because of the loss of training opportunities or the difficulty in changing jobs, hampered by information asymmetry in the labor market, a phenomenon called the scarring effect. Kahn (2010) established that graduating from college during a recession has a persistent negative effect on earnings, using data of white men in the NLSY 79, and Genda et al. (2010) find a similar effect using the Current Population Survey for white men with at least some college education. The scarring effect is observed in many other countries, such as Canada, Japan, Austria, and Norway.[1] Studies focusing on women or high-school graduates in the United States typically find weaker and less persistent effects, except for no significant difference across African Americans and whites (Genda et al., 2010; Hershbein, 2012; Speer, 2015; Kondo, 2015). Few studies, however, empirically analyze the welfare consequences of the scarring effect. Do members of the scarred cohort suffer from a lower standard of living? This paper contributes to the literature by examining the asset-holding behaviors of members of the scarred cohort.

This study examines the impact of the labor market condition at entry, approximated by the state unemployment rate, on subsequent labor market outcomes, household formation, and asset holding among college-graduate white men in the United States, using the National Longitudinal Survey of Youth 1979 (NLSY 79). The analysis first replicates significant and persistent effects of the labor market condition at college graduation on subsequent labor market outcomes found in previous studies: Graduating from college when the state unemployment rate is one percentage point higher decreases the real hourly wage by 8.3% during the first three years after graduation. This negative effect persists even 10 years after graduation. This negative impact on hourly wages, however, does not propagate to the marriage decision, number of children,[2] poverty status, welfare receipt, net family worth,

[1]See Oreopoulos et al. (2012) for the evidence of Canada, Genda et al. (2010) for Japan, (Brunner and Kuhn, 2014) for Austria, Raaum and Røed (2006) for Norway. Kawaguchi and Murao (2014) find a stronger scarring effect in economies with more rigid labor market institutions using cross-country panel data.

[2]Maclean et al. (2016) also show that graduating college during a recession has no significant long-run impact on marital status and the probability of having any children as of age 45 for men, using NLSY 79. They also find that bad labor market conditions at school graduation has negative effects on the probability

home ownership, car ownership, or net assets. A potential way to mitigate a cohort-specific labor market shock is to receive intergenerational transfers through co-residence with parents or other family members,[3] but we instead find a decrease in co-residence with parents.

As an explanation for these findings, we find that those who graduate from college in a bad year in a bad place are more likely to move out of the state of the college location and consequently are less likely to live with their parents. We also find suggestive evidence that they are less likely to live in the Northeast region and are more likely to live in the North central (Midwest) region. From these findings, we argue that the scarred cohort absorbs the negative shock on wages by moving to places where the cost of living, particularly housing prices, is lower.

Our finding that the geographic mobility of college graduates mitigates the local shock to the labor market corroborates the previous finding by Wozniak (2010) that geographic mobility of college graduates is more sensitive to local labor market conditions at the time of labor market entry than that of high school graduates. Wozniak (2010) nonetheless found that college graduates experience a similar wage reduction to that of high-school graduates if they enter the labor market during a bad time in a bad place. Our findings suggest that geographic mobility affects real wages not only by changing the nominal wage but also by changing the cost of living. This is indeed a point emphasized by Moretti (2013) in his 'real wage' argument that the cost of living, particularly the cost of housing, is substantially different across locations. We argue that the wage decline is at least partially offset by the reduction of the cost of living by workers' location choice so that proxy variables for the living standard, such as net asset holding or home ownership, are not affected.

of being married and having any children for less educated men. In contrast, Kondo (2012) finds that young women who face a worse labor market condition at ages 18-20 marry and have children earlier, though the long-run impact is limited. Hershbein (2012) also finds that graduating from high school during a recession makes women temporarily substitute into home production.

[3]Card and Lemieux (2000) report that Canadian and US youth accommodate negative local labor market shock by co-residing with their parents. Kaplan (2012) further sheds light on youth's dynamic decision of co-residence with parents based on the NLSY97. None of the studies discussed above, however, examine whether a 'scarred' cohort absorbs the adverse shock through co-residence, and we contribute to the literature in this regard.

Our findings have important implications for the controversy among macro economists over the cost of the business cycle. The literature has shown that the cost of the business cycle critically depends whether the idiosyncratic income shock is insured (Lucas, 1987; Krebs, 2007). Thus, the absence of a market to insure the cohort-specific labor market risk entails a substantial welfare loss from the scarring effect. Some argue that general equilibrium effects in the asset market could absorb the cohort-specific labor market shocks, depending on the parameter values and the degree of liquidity constraints, because the 'scarred' cohort can purchase assets from other cohorts at lower prices (Miyazaki et al., 2010; Glover et al., 2011; Hur, 2014). As mentioned before, co-residence with parents could be another important insurance channel. Our results do not corroborate these proposed mechanisms but suggest that another mechanism, namely geographic mobility, mitigates the adverse impact of cohort-location specific shocks at labor market entry. Overall, our findings show that, at least in the US, the welfare impact of scarring effects is more limited than the impression that might have been given by studies that only examine labor market outcomes.

2 Empirical model to measure the effects of the initial labor market condition on subsequent outcomes

We estimate the effect of local labor market conditions on subsequent labor market outcomes, as well as household structure, expenditure, or asset holdings, up to 18 years after college graduation (with a shorter follow-up period for specific variables). We assume that the outcome y of individual i belonging to cohort c living in state s in year t is determined by the following linear equation:

$$y_{icst} = \beta_0 + \beta_1 ue_{ics0} exp13_{ict} + \beta_2 ue_{ics0} exp46_{ict} + \beta_3 ue_{icr0} exp79_{ict} + \beta_4 ue_{ics0} exp1012_{ict} + \beta_5 ue_{ics0} exp1315_{ict} + \beta_6 ue_{ics0} exp1618_{ict} + \gamma_{exp} + \delta ue_{st} + \zeta_c + \eta_{s(i)} + u_{icst}. \quad (1)$$

The explanatory variable ue_{ics0} is the state unemployment rate at the college graduation of individual i living in state s belonging to cohort c. The dummy variable $expXXYY$ takes one if individual i belonging to cohort c in year t has potential experience between XX and YY years. This specification allows the effect of the initial state unemployment rate on the current outcome to vary with years since graduation, as found in previous studies (Genda et al., 2010; Oreopoulos et al., 2012). The γ_{exp} captures fixed effects corresponding to each interval of experience (1-3, 4-6, 7-9, 10-12, 13-15, 16-18), ue_{st} is the current state unemployment rate, ζ_c captures the cohort-specific effect, and $\eta_{s(i)}$ captures state of residence before individual i's college graduation.

The unemployment rate at the labor market entry ue_{ics0} could be endogenous, as college graduates can choose the timing of college graduation and the location after college graduation. For example, consider the case in which y_{icst} is the current log wage. If high wage-type workers neither adjust their graduation timing nor move to a low unemployment state, because they are resilient to external shocks, the error term and the entry unemployment rate ue_{cs0} are positively correlated, and the adverse impacts of the initial high employment rate on subsequent wages are underestimated. To address this potential endogeneity caused by endogenous choices of graduation timing and residential state, we construct two instrumental variables: one is the state unemployment rate as of age 22 of the state where individual i resided at age 14, and the other is the state unemployment rate as of age 22 of the state where individual i resided at age 21. The year when the individual was 22 corresponds to the year of college graduation for those who proceed to four-year college without skipping or repeating grades, and the state where individual i resided at age 14 or 21 should not be affected by the labor market conditions upon graduation. The instrument using the state of residence as of age 14 is a conventional instrumental variable used in the literature, such as Kahn (2010), but we try an alternative one using the state of residence as of 21 to take into account the decision to go to college outside the local state of residence.

We estimate standard errors allowing for clustering within the graduation-year cohort

and the state of residence at graduation for the OLS estimation, and within the birth-year cohort and the state of residence at age 14 or 21 for the instrumental variable estimations.

3 Data

3.1 National Longitudinal Survey of Youth 1979

The dataset used in this paper is the National Longitudinal Survey of Youth (NLSY1979), which is used by several existing studies on the effect of a recession at graduation (Kahn, 2010; Hershbein, 2012; Maclean, 2013; Kondo, 2015; Speer, 2015; Maclean et al., 2016). NLSY79 covers 12,686 youths who were between the ages of 14 and 22 in 1979, following them annually until 1994 and biennially thereafter. Following Kahn (2010), we restrict our sample to 512 white men in the cross-section white sample who obtained a bachelorfs degree between 1979 and 1989. This sample includes those who proceed to a higher degree, although observations in the year when the individual was enrolled as of May are not included in the regressions.

The key explanatory variable is the unemployment rate of the state of residence in the year of graduation. We define the year of graduation as the year when the individual obtained a bachelor degree for the first time, and we retrieved the state of residence from the confidential geo-coded file of NLSY79. We use state unemployment rates published by the Bureau of Labor Statistics, which are based on the monthly Current Population Survey. Since our data cover those who had 1-18 years of potential experience after graduating college between 1979 and 1989, the survey year ranges from 1980 to 2006. The mean of the state unemployment rates between 1979 and 1989 is 6.90%, and their standard deviation is 2.33%. Since we control for graduation year- and state-fixed effects, our identification of the effect of the state unemployment rate hinges on the variation net of these fixed effects. The standard deviation of the residual of the state unemployment rate net of year- and state-fixed effects is 1.00%, which is about one half of the standard deviation of the raw series.

We also control for the age-adjusted Armed Forces Qualification Test (AFQT) score, as a proxy for ability. After dropping individuals whose state of residence at graduation or AFQT score is missing, 489 individuals remain in the sample.

We examine the following outcome variables. First, we replicate Kahn's (2010) result on labor market outcomes: log hourly wages and employment. Next, we examine the effects on family formation, such as marital status, cohabitation with parents, and the numbers of adults and children in the household. Then, we turn to the effects on poverty and welfare status, net family income, geographical mobility, and several variables representing assets. Appendix Table A1 provides a detailed definition of each variable, and Appendix Table A2 presents summary statistics.

As explained in section 2, both the timing of graduation and the choice of residential location may be determined endogenously. To solve this endogeneity problem, we construct two instrumental variables: the state unemployment rate as of age 22 in the state where individual i resided at age 14, and the state unemployment rate as of age 22 in the state where individual i resided at age 21. In our sample, 44.8% graduated from college at age 22, and 27.2% did so at age 23.

The state where the individual lived at any age before 21 should not be affected by the labor market conditions upon college graduation. Most existing studies using NLSY79, including Kahn (2010), use the state of residence as of age 14, probably because it is available for all birth-year cohorts. When using this instrument, we need to keep in mind that the estimates should be interpreted as the local average treatment effect for those who had not moved across states since they were middle-school students. This implies that those who went to college in other states do not contribute to the identification, whereas about 25% of the sample moved across states between age 14 and 21. In particular, prestigious universities tend to attract students from all over the country, and thus using the state of residence at age 14 misses the impacts among arguably elite students. Thus we try the state of residence as of age 21 as an alternative instrument and compare the results based on two instrumental

variables in light of the difference of compliers. The state where the individual lived as of age 21 reflects the location choice made at the time of entering college, but it should not be affected by the labor market conditions upon graduation. 5.9% of our sample moved across states between age 21 and actual college graduation. A drawback of this alternative instrument is that it is not available for the oldest birth-year cohort, that was already 22 years old when NLSY started, while the state of residence as of age 14 is available for all birth-year cohorts.

4 Estimation results

4.1 The first-stage results

Before estimating the structural equation (1), we check to see whether the proposed instrumental variables are valid, by estimating the first-stage regression. The unit of analysis to estimate the first-stage equation is individuals. The first-stage model for the conventional instrumental variable is:

$$ue_{ics0} = \gamma_0 + \gamma_1 ue_{cs(i,14)0} + \lambda_c + \mu_{s(14)} + v_{cs}, \tag{2}$$

where ue_{ics0} is state unemployment rate at college graduation of individual i who belongs to birth-year cohort c in state s. The instrumental variable $ue_{cs(14)0}$ is the unemployment rate at age 22 in state s where individual i resides at age 14. We control for cohort fixed effects and state at age 14 fixed effects. The error term is allowed to be correlated within a state of residence at age 14 and birth-year cohort.

Similarly, the first-stage model for the alternative instrumental variable is:

$$ue_{ics0} = \gamma_0 + \gamma_1 ue_{cs(i,21)0} + \lambda_c + \mu_{s(21)} + v_{cs}. \tag{3}$$

The instrumental variable is the unemployment rate at age 22 of the state where individual

i resides at age 21, which presumably captures the state where colleges were located.

The estimation results are reported in Table 2. Column (1) indicates that when the unemployment rate at age 22 of the state where an individual resided at age 14 increases by 1 percentage point, the state unemployment rate at college graduation increases by 0.431 percentage point. The estimated coefficient below 1 implies that some people move across states between age 14 and the year of college graduation, and they choose the timing of graduation other than age 22. The t-statistics for the estimated coefficient is 3.73, which implies that the F-statistic is 14.04, negating the concern about a weak instrument.

Column (2) reports the regression result using the alternative instrumental variable. Note that we lost 25 observations who were age 22 in year 1979, as we do not know the state of residence at age 21 for those individuals. The estimated coefficient increases up to 0.673, which is not surprising, given that the estimate does not reflect the inter-state mobility between ages 14 and 21. As explained in the data section, about 25% of individuals move between ages 14 and 21. As expected, the instrumental variable becomes even stronger with an F-statistic of 31.98. Overall, the first-stage regression results confirm the relevance of the conventional and alternative instrumental variables.

4.2 Effects on subsequent labor market outcomes

Before examining the effect on household structure and asset holding behaviors, we examine whether graduating during a recession has significant negative effects on labor market outcomes, as found by Kahn (2010). Table 3 reports $\beta_1 - \beta_6$ in equation (1), the estimated coefficients of the interaction terms between the state unemployment rate at college graduation and dummies for the potential experience group. Columns (1)-(3) show that the unemployment rate at entry does not have a persistent negative effect on the probability of being employed, regardless of the estimation methods used. It is important to note that the impact is assessed up to 9 years after graduation, because the NLSY 1979 stopped collecting labor force status in the way the Current Population Survey collects it after 2000. No

significant impacts of initial labor market condition on subsequent employment probability corroborate with the Kahn (2010)'s finding.

The estimated impacts of initial adverse local labor market condition on hourly wage depend heavily on estimation methods. OLS estimates indicate no statistically significant impacts, but conventional IV estimates, using the unemployment rate at age 22 of the state of residence at age 14 as the IV, point to statistically and economically significant adverse impacts on hourly wages. This finding replicates Kahn (2010)'s basic results, while her functional form is more restrictive than ours: She found that a one percentage point increase in the unemployment rate at college graduation lowers wages by 9.1%, and this adverse impact does not attenuate for over 15 years. The size of the effect is stronger than those reported in Genda et al. (2010), who used cross-sectional data from the CPS.

The conventional instrumental variable defines the home state as the state of residence at age 14. Deploying this IV limits the compliers to those who proceed to the colleges located in the individuals' home states, and the IV estimates are the local average treatment effects among the compliers. An alternative IV is the unemployment rate at age 22 of the state of residence at age 21, and this IV addresses the endogenous location choice after graduation. The IV estimates based on this instrumental variable, reported in the last column of Table 3, are closer to the OLS estimates, and none of them are statistically significant. The contrast of estimates is reasonable given the difference of the compilers; as mentioned in the data section, 25% of students proceed to colleges located outside of home states, namely the state of residence at age 14. It is not surprising to find a stronger adverse impact of the initial local unemployment rate on subsequent wages among "foot fixed" people who proceed to local colleges, than among "foot loose" people who proceed to out-of-state colleges, because they include more arguably elite students, as prestigious universities tend to attract students from all over the country. This finding corroborates with the findings by Altonji et al. (2016) that those who graduate as well-compensated college majors are resilient to adverse local labor market shocks.

In the following analysis, we only report the conventional IV estimates, given the significant negative impact of the state employment rate at college graduation on subsequent wages, with caveats that the estimated impacts are the average treatment effects among those who graduate from colleges located in their home states.

4.3 Effects on subsequent household structure

Given the persistent negative effect of the initial labor market condition on wages, this section examines its effects on household structure, because choice of household structure, such as co-residence with parents, could work as an insurance mechanism to absorb the adverse shock. Specifically, we examine the effects on the probability of being currently married, the number of adults in the same household, co-residence with parents, and the number of children.

Table 4 reports $\beta_1 - \beta_6$ in equation (1), the estimated coefficients of the interaction term between the state unemployment rate at college graduation and dummies for the potential experience group, on variables capturing the household structure. Columns (1) and (2) report the OLS and IV regression results for the dummy for being currently married. Estimated coefficients are all statistically insignificant and imply that a recession at graduation does not affect the marriage behavior of college-educated men; this is consistent with findings by Maclean et al. (2016), who find no long-term impact of graduating during a recession on marital status for college-educated men.

Next, Columns (3) and (4) show the effect on the number of adults in the same household. None of the estimates based on OLS or IV are statistically significant. While not precisely estimated, the IV estimates suggest that the high unemployment rate at labor market entry decreases the number of adults in the household. Given that the marriage rate is not affected, and that it increases if there is any impact, the decrease in the number of adults should indicate a decreased propensity to live with either parents or roommates (including unmarried partners). To check the first possibility, Columns (5) and (6) report the effects on

the dummy for living with at least one parent. The IV estimate indicates that a 1%-point increase in the unemployment rate at entry decreases the probability of living with parents by about 5.6-7.1 percentage points. Decreased probability of co-residence with parents seems to explain a large part of the effect on the number of adults in the household. Lastly, Columns (7) and (8) show the effect on the number of children. A recession at graduation has no statistically significant impact on the number of children.

Overall, graduating in a recession does not affect the subsequent household formation, except that it decreases the probability of co-residence with parents. The analysis in a later subsection reveals that this is due to increased inter-state mobility.

4.4 Effects on household income and home/car ownership

This subsection discusses whether graduating from college in a bad economy adversely affects household income by examining the impacts on households' poverty status, welfare receipt, and real net family income. This analysis enables us to examine the combined responses of family formation, as well as family members' labor supply reaction, because a man belonging to a scarred cohort could marry a woman with a stronger labor market attachment so that the family income is not affected. Table 5 Columns (1) - (4) indicate that a high state unemployment rate at graduation does not affect the probabilities of having a family income below the poverty threshold or being a welfare receipt. At the same time, while not precisely estimated, IV estimates reported in Column (6) weakly suggest that a high unemployment rate at entry tends to lower real total net family income. This is not surprising, given the significant negative impact on respondents' own hourly wages. Overall, the regression results reported in Table 5 suggest that the local labor market condition at the entry does not significantly affect the subsequent family income in a clear cut way.

We also examine whether local labor market conditions affect subsequent home ownership. Home ownership represents both consumption and asset-holding behaviors, because an owned home provides both consumption and asset values. Previous empirical studies

tend to show a positive correlation between lifetime wealth and home ownership (Henderson and Ioannides, 1987). Home ownership is available only between 1985 and 2000, and thus we can examine the impact of initial labor market condition on home ownership after 6 to 11 years after college graduation. While OLS estimates reported in Column (1) of Table 6 show no impact, the IV estimates reported in Column (2) indicate that graduating in an adverse condition instead increases the probability of home ownership. Specifically, a one percentage point increase of local unemployment rate increases the home ownership probability by about 12 percentage points after 7 to 9 years of college graduation, compared to the mean home ownership of 61%, though the estimate is rather imprecise. Notwithstanding its being counter intuitive, this result is indeed consistent with the prediction by Miyazaki et al. (2010) and Glover et al. (2011), who claim that the plummeted asset prices faced by scarred cohort enable them to purchase more assets. Another possibility is that the scarred cohort is more likely to live in regions with lower housing prices, and we will investigate this possibility in later subsection. Columns (3) and (4) report the regression coefficients of the logged mortgage amount on the same set of explanatory variables. The result implies that the state unemployment rate at graduation does not systematically affect the balance of home mortgage loans. This result suggests that the scarred cohort does not necessarily purchase their homes through taking a big mortgage loan.

As another measure of property ownership, we also examine the impacts on vehicle ownership. The results of regressions are reported in Table 7. All the estimated coefficients are statistically insignificant, implying that the state unemployment rate at college graduation does not affect vehicle ownership afterwards. If there are any effects, while very imprecisely estimated, the IV estimates suggests that the scarred cohorts are more likely to hold vehicles and those of higher market values than their counterparts.

Overall, the analysis in this subsection suggests that the state unemployment rate at labor market entry affects neither family income nor home/car ownership. If there are any effects, while those effects are very imprecisely estimated, we find an indication that members

of the scarred cohort are more likely to own their homes and vehicles.

4.5 Effects on subsequent asset holding

We next examine the effect of the state unemployment rate at college graduation on subsequent asset-holding behaviors beyond home and vehicle ownership. For this purpose, we first use the created variable, total net family worth, contained in the dataset between 1985 and 2004. We use this variable as a dependent variable in two ways: taking the natural logarithm conditional on the positive amount and using the raw number, including negative numbers. The OLS and IV estimates for each dependent variable are reported in Table 8. None of the estimates are statistically significant, though both the point estimates and the standard errors of IV estimates are large.

NLSY79 also asks "amount left over after all debts are paid from selling all assets" and whether "after all debts are paid from selling all assets would the respondent be ahead, in debt, even?" between 1992 and 2004. To supplement the previous analysis, we use these variables as dependent variables. Because the variables are available only in later years of the survey period, we can only examine the effects after 13-18 years of graduation. The regression results reported in Table 9 suggest the absence of the impact of initial labor market conditions on these asset holding variables.

Nothing definitive can be inferred from these imprecise estimates, but the analysis of asset holding suggest that the negative earnings shock experienced by the scarred cohorts are at least not propagated to their asset holdings in significant ways. In the next subsection, we attempt to find a mechanism that insulates the asset holdings of the scarred cohorts from negative labor market shocks. The key seems to be the geographic mobility of college graduates.

4.6 Effects on inter-state mobility and location choice

The analysis heretofore shows that the adverse labor market conditions at entry significantly decrease subsequent wages. We have not found evidence, however, that this negative shock is propagated to home/car ownership or net asset holdings. In this section, we attempt to reconcile these conflicting, at least at a glance, findings by examining the geographic mobility of college graduates in response to local labor market conditions. As pointed out by Wozniak (2010) based on the analysis of the Census, college graduates sensitively move across states in response to local labor market conditions. Thus as the first step, we examine how labor market conditions at entry affect the inter-state mobility after college graduation. We define the mover as one who lives in the state different from the state in the year of college graduation. Columns (1) and (2) in Table 10 report the regression of the mover dummy variable on the state unemployment rate at college graduation and its interaction terms with the years elapsed from college graduation. The IV estimates show that a one percentage point increase in the state unemployment rate increases the probability of living in state other than the state where college was located by 12-16 percentage points after 1-18 years of graduation. This impact is significant compared with the average of the mover dummy variable, which is 37.3%. The estimated coefficients are statistically significant too. The result indicates that the adverse local labor market condition induces the out of state migration.

The finding that the adverse local labor market condition induces the out of state migration, however, does not explain why negative impact on wages does not propagate to asset holdings. A possible mechanism that potentially reconciles the findings is that those who graduate in an adverse labor market condition are more likely to live in geographic areas where the cost of living, particularly the housing cost, is lower, because the lower living cost could compensate for the lower wages. To investigate the possibility, we regress the dummy variable indicating the residence in rural area on the same set of explanatory variables as before. The results of regression reported in Columns (3) and (4) of Table 10 indicate that

the initial labor market conditions do not affect the probability of living in rural areas in statistically significant ways. With caveats of imprecise estimates, however, the IV estimate suggests that those who enter the labor market with a one percentage point higher local unemployment rate is 1.7 to 4.5 percentage points more likely to live in rural areas. The size of the estimated coefficient is rather large compared with the mean probability of 15.2%.

We now proceed to examine the impact of initial local labor market conditions on the subsequent location choice, using 4 regions as the unit of analysis. Ideally, we would like to estimate the impact of local unemployment rate on the interstate mobility from a specific origin state to a specific destination state, the small sample size of NLSY79 does not allow for the analysis with such a high granularity. The dummy variables are created to indicate the state of residence in one of four regions: Northeast, North Central (called Midwest by U.S. Census Bureau after May 1984), South, and West. These mutually exclusive and collectively exhaustive dummy variables are regressed on the same set of explanatory variables. The regression results are reported in Table 11. The IV estimates indicate that those who enter the labor market in a bad year in a bad place are less likely to live in the Northeast region. Since the estimand of IV estimates is the local average treatment effect who do not move states between age 14 and the year of college graduation, the negative estimates imply that those who were originally from the Northeastern states are more likely to move out from the region or those who are originally from non-Northeastern states are less likely to move into the Northeastern states. The decreased probability to live in the Northeastern states are almost exclusively absorbed by the increased probability to live in the North Central states, while the estimates are not as precisely estimated as those for the Northeast region.

The cost of living index created for each region by the Bureau of Labor Statistics is not cross-sectionally comparable because of the difference in the consumption basket across regions. While accurate measurement of cost of living by location is difficult to obtain, Kennan and Walker (2011) used the American Chamber of Commerce Research Associationfs (ACCRA) Cost of Living Index (COLI) to adjust for the difference in the cost of living across

states to analyze the migration behavior based on NLSY79 up to the 1994 interview.[4] Based on these data, simple state average COLI by region are 111 for Northeast, 98 for North Central, 98 for South and 106 for West. It is tempting to use this state level index to deflate wages and use the 'real wage' as the dependent variable for the wage equation estimation, but we need higher granularity data to implement such a full-blown analysis. For example, the COLI of the state of New York was 109 and that of the state of New Hampshire was 121, and apparently the state level index fails to capture the heterogeneity in the COLI within a state, such as the difference of COLI between New York City and Buffalo. While the crude measurement of COLI and the small sample size of NLSY79 do not allow us to draw a definitive conclusion, we speculate that the lower living cost faced by the scarred cohort as a result of location choice at least partially explains why the scarred cohort does not have to give up its asset holdings regardless of significantly lower wages. This argument is in line with Moretti (2013)'s that we should pay close attention to regional disparities in the living cost when we consider the wage inequality, since the regional disparity in the living cost is substantial. In the end, our findings suggest that the inter-state mobility associated with a substantial change in the living cost is an important coping mechanism that absorbs cohort-location specific labor market shocks.

5 Conclusion

This paper examined the effect of graduating from college in a recession on white men's asset holding behaviors. Using data from the NLSY79, we confirmed that college graduates who enter the labor market in a recession earn significantly less than those who enter the labor market in a usual economic condition, and the effect lasts up to 18 years after graduation, as found in previous studies. Nonetheless, we found no negative effect of a recession at labor market entry on asset holding behaviors. Instead, scarred cohorts are less likely to stay with parents after graduation because of out of state migration; they are less likely to reside in

[4]The data are available from Econometrica's web archive.

states in the Northeast region where the cost of living is allegedly high. The lower living cost as a result of location choice might at least partially offset the negative and persistent impacts on wages. These results suggest that, although college graduates who enter the labor market in a bad economy suffer from persistent earnings loss, they cope with this adverse income shock by location choice. We articulate a possibility that well received facts that college graduates are more mobile and their location choices are more sensitive to local labor market conditions arguably insulate them from local labor market shocks at college graduation through the change in the living cost associated with location choice.

Related to the location choice of college graduates, this study first showed that the choice of instrumental variable to handle the endogenous locational choice after college graduation has a substantial impact on the estimated impact of graduating from college in a recession on subsequent wage losses. We argued that the conventional instrumental variables used in the literature that define the exogenous location as the state of residence at age 14 pick up the impact among college graduates who proceed to their home state colleges. Recent studies find that the impact of scarring effects is heterogeneous (Altonji et al., 2016), or more broadly, the estimated returns to college graduation are substantially different by the choice of instrumental variables because of the change in groups treated (Carneiro et al., 2011). Similarly, in the context of estimating scarring effects, we articulated that we should pay careful attention to the groups upon which the average treatment effect is defined in relation to the choice of instrumental variables.

The finding that graduating from college during a recession does not necessarily lower the long-term asset holding has an important implication for the benefit of mitigating the business cycle. Literature has shown that the presence of an uninsurable labor market shock substantially increases the cost of the business cycle, contrary to the famous argument by Lucas (1987); the results in this study, however, suggest that the risk of being hit by a recession at the time of graduation – a labor market shock that seems difficult to insure because of the lack of access to unemployment insurance – is insured presumably through

location choice of college graduates. Thus, the results in this study suggest that, at least in the US, where the labor market is allegedly flexible, the benefit of mitigating the business cycle fluctuation can be limited than the impression given by the studies that only look at labor market outcomes.

The suggested mechanism that the cohort-location specific labor market shock at labor market entry is absorbed by the location choice of new entrants is novel, but the small sample size of NLSY79 did not allow us to scrutinize the implications of the hypothesis. Further analysis based on large scale data sets with panel features, such as panel data created from administrative records combined with a location-specific cost of living index, is warranted to deepen our understanding of the mechanism of how the cohort-specific local labor market shocks are absorbed or propagated to outcomes beyond labor market outcomes.

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Table 1: Descriptive statistics of the analysis sample

	(1) N	(2) mean	(3) sd
Emp	3,306	0.957	0.202
Hourly wage	5,070	22.71	24.69
Married	5,357	0.564	0.496
Nadults	5,357	2.035	0.817
Parent	5,357	0.110	0.313
Nchild	5,357	0.703	1.060
Poverty	4,855	0.0181	0.133
Welfare	5,346	0.00449	0.0669
Net family income	4,843	92,201	153,454
Rural	5,246	0.152	0.359
NE	5,356	0.236	0.425
NC	5,356	0.343	0.475
South	5,356	0.267	0.442
West	5,356	0.154	0.361
Move	5,357	0.373	0.484
FamWorth	2,636	221,099	365,037
Home	1,744	0.613	0.487
Mortgage	1,015	126,119	252,926
Vehicle	1,744	0.939	0.240
Market value of vehicle	1,611	14,953	12,452
Net asset	964	278,260	470,209
ExcessDebt	1,099	0.0355	0.185

Note: Monetary values of hourly wage, net family income, family worth, net asset, mortgage and market value of vehicle, are denominated in 2000 prices using the Consumer Price Index.

Table 2: First-stage regression

	(1) UE rate at graduation	(2) UE rate at graduation
UE rate at 22 of state lived at 14	0.431	
	(0.115)	
UE rate at 22 of state lived at 21		0.673
		(0.119)
Observations	489	464
R-squared	0.531	0.713

Note: The unit of analysis is individuals. Column (1) includes cohort fixed effects and state at age 14 fixed effects. Standard errors robust against the clustering within state at age 14 and birth-year cohort are reported. Column (2) includes cohort fixed effects and state at 21 fixed effects. Standard errors robust against the clustering within state at age 21 and birth-year cohort are reported.

Table 3: Regression of labor market outcomes on initial state unemployment rate interacted with years elapsed from graduation

	(1) OLS Emp	(2) IV Emp	(3) IV alt Emp	(4) OLS ln(wage)	(5) IV ln(wage)	(6) IV alt ln(wage)
State UE × 1-3	-0.008	-0.009	-0.012	-0.021	-0.083	-0.032
	(0.005)	(0.015)	(0.011)	(0.019)	(0.050)	(0.032)
State UE × 4-6	-0.005	-0.011	-0.016	-0.025	-0.074	-0.038
	(0.005)	(0.011)	(0.009)	(0.019)	(0.043)	(0.032)
State UE × 7-9	-0.006	-0.014	-0.016	-0.011	-0.064	-0.026
	(0.004)	(0.011)	(0.009)	(0.018)	(0.039)	(0.030)
State UE × 10-12				-0.027	-0.072	-0.034
				(0.020)	(0.039)	(0.031)
State UE × 13-15				-0.015	-0.067	-0.028
				(0.022)	(0.039)	(0.030)
State UE × 16-18				-0.013	-0.095	-0.027
				(0.025)	(0.052)	(0.045)
Observations	3,306	3,306	3,204	5,070	5,070	4,906
R-squared	0.052	0.032	0.041	0.204	0.167	0.194

Notes: Robust standard errors against the clustering within the state and year of college graduation are presented in parentheses for OLS estimates. Robust standard errors against the clustering within the state of residence at age 14 and year of birth are presented in parentheses for instrumental variables estimates. Robust standard errors against the clustering within the state of residence at age 21 and year of birth are presented in parentheses for alternative instrumental variable estimates.

Table 4: Regression of family outcomes on initial state unemployment rate interacted with years elapsed from graduation

	(1) OLS Married	(2) IV Married	(3) OLS Nadults	(4) IV Nadults	(5) OLS Parent	(6) IV Parent	(7) OLS Nchild	(8) IV Nchild
State UE × 1-3	-0.003	0.063	-0.024	-0.069	-0.021	-0.071	-0.025	0.094
	(0.021)	(0.054)	(0.022)	(0.071)	(0.010)	(0.039)	(0.042)	(0.129)
State UE × 4-6	0.006	0.061	-0.020	-0.074	-0.020	-0.074	-0.031	0.068
	(0.022)	(0.048)	(0.016)	(0.055)	(0.008)	(0.032)	(0.043)	(0.114)
State UE × 7-9	0.007	0.059	-0.002	-0.053	-0.013	-0.056	-0.028	0.065
	(0.021)	(0.045)	(0.016)	(0.052)	(0.007)	(0.030)	(0.048)	(0.110)
State UE × 10-12	-0.000	0.057	-0.003	-0.046	-0.012	-0.057	-0.008	0.071
	(0.021)	(0.044)	(0.017)	(0.051)	(0.007)	(0.029)	(0.053)	(0.113)
State UE × 13-15	-0.001	0.047	-0.004	-0.056	-0.010	-0.056	-0.027	0.054
	(0.021)	(0.041)	(0.018)	(0.050)	(0.007)	(0.028)	(0.051)	(0.103)
State UE × 16-18	0.004	0.070	0.012	-0.038	-0.004	-0.066	-0.001	0.071
	(0.020)	(0.053)	(0.018)	(0.063)	(0.008)	(0.037)	(0.053)	(0.135)
Observations	5,357	5,357	5,357	5,357	5,357	5,357	5,357	5,357
R-squared	0.219	0.173	0.131	0.111	0.196	0.107	0.284	0.250

Notes: Robust standard errors against the clustering within the state and year of college graduation are presented in parentheses for OLS estimates. Robust standard errors against the clustering within the state of residence at age 14 and year of birth are presented in parentheses for instrumental variables estimates.

Table 5: Regression of family income on initial state unemployment rate interacted with years elapsed from graduation

	(1) OLS Poverty	(2) IV Poverty	(3) OLS Welfare	(4) IV Welfare	(5) OLS ln(FamInc)	(6) IV ln(FamInc)
State UE × 1-3	0.001	-0.005	0.001	-0.008	-0.026	-0.042
	(0.003)	(0.008)	(0.001)	(0.006)	(0.025)	(0.064)
State UE × 4-6	-0.000	-0.000	-0.000	-0.006	-0.001	-0.040
	(0.002)	(0.006)	(0.001)	(0.004)	(0.025)	(0.054)
State UE × 7-9	-0.000	0.002	0.001	-0.005	-0.008	-0.039
	(0.003)	(0.005)	(0.001)	(0.004)	(0.023)	(0.050)
State UE × 10-12	0.001	0.000	0.001	-0.004	-0.022	-0.056
	(0.002)	(0.005)	(0.001)	(0.004)	(0.027)	(0.051)
State UE × 13-15	0.005	0.006	0.001	-0.005	-0.014	-0.056
	(0.003)	(0.007)	(0.002)	(0.004)	(0.026)	(0.050)
State UE × 16-18	0.005	0.006	0.002	-0.010	-0.002	-0.047
	(0.003)	(0.008)	(0.002)	(0.007)	(0.028)	(0.065)
Observations	4,855	4,855	5,346	5,346	4,843	4,843
R-squared	0.048	0.039	0.026	0.021	0.187	0.173

Notes: Robust standard errors against the clustering within the state and year of college graduation are presented in parentheses for OLS estimates. Robust standard errors against the clustering within the state of residence at age 14 and year of birth are presented in parentheses for instrumental variables estimates.

Table 6: Regression of house ownership on initial state unemployment rate interacted with years elapsed from graduation

	(1) OLS Home	(2) IV Home	(3) OLS ln(mortgage)	(4) IV ln(mortgage)
State UE × 7-9	0.009	0.119	0.021	-0.054
	(0.019)	(0.069)	(0.027)	(0.087)
State UE × 10-12	0.010	0.090	0.028	-0.008
	(0.018)	(0.056)	(0.030)	(0.055)
Observations	1,744	1,744	1,015	1,015
R-squared	0.168	0.048	0.203	0.176

Notes: Robust standard errors against the clustering within the state and year of college graduation are presented in parentheses for OLS estimates. Robust standard errors against the clustering within the state of residence at age 14 and year of birth are presented in parentheses for instrumental variables estimates.

Table 7: Regression of vehicle ownership on initial state unemployment rate interacted with years elapsed from graduation

	(1) OLS Vehicle	(2) IV Vehicle	(3) OLS ln(mktval)	(4) IV ln(mktval)
State UE × 7-9	-0.012	0.033	-0.061	0.136
	(0.009)	(0.029)	(0.035)	(0.098)
State UE × 10-12	-0.013	0.029	-0.041	0.128
	(0.009)	(0.022)	(0.034)	(0.080)
Observations	1,744	1,744	1,611	1,611
R-squared	0.080		0.077	0.034

Notes: Robust standard errors against the clustering within the state and year of college graduation are presented in parentheses for OLS estimates. Robust standard errors against the clustering within the state of residence at age 14 and year of birth are presented in parentheses for instrumental variables estimates. R-squared is not reported for Column (2) because it takes a negative value.

Table 8: Regression of asset holdings on initial state unemployment rate interacted with years elapsed from graduation

	(1) OLS ln(FamWorth)	(2) IV ln(FamWorth)	(3) OLS FamWorth	(4) IV FamWorth
State UE × 7-9	0.011	0.217	-6,605.139	33,735.500
	(0.051)	(0.224)	(10,822.999)	(40,055.639)
State UE × 10-12	0.022	0.196	-6,047.597	27,055.141
	(0.052)	(0.181)	(11,936.942)	(32,878.675)
State UE × 13-15	0.022	0.248	-9,051.980	38,546.958
	(0.051)	(0.223)	(13,834.419)	(40,410.285)
State UE × 16-18	0.019	0.194	-3,473.642	29,377.491
	(0.050)	(0.168)	(16,744.580)	(32,344.470)
Observations	2,636	2,636	2,775	2,775
R-squared	0.205	0.158	0.164	0.109

Notes: Robust standard errors against the clustering within the state and year of college graduation are presented in parentheses for OLS estimates. Robust standard errors against the clustering within the state of residence at age 14 and year of birth are presented in parentheses for instrumental variables estimates.

Table 9: Regression of asset holdings on initial state unemployment rate interacted with years elapsed from graduation

	(1) OLS ln(asset)	(2) IV ln(asset)	(3) OLS ExcessDebt	(4) IV ExcessDebt
State UE × 13-15	0.083	0.074	0.005	0.007
	(0.068)	(0.228)	(0.007)	(0.020)
State UE × 16-18	0.040	-0.004	-0.004	-0.002
	(0.072)	(0.156)	(0.007)	(0.013)
Observations	964	964	1,099	1,099
R-squared	0.141	0.116	0.078	0.099

Notes: Robust standard errors against the clustering within the state and year of college graduation are presented in parentheses for OLS estimates. Robust standard errors against the clustering within the state of residence at age 14 and year of birth are presented in parentheses for instrumental variables estimates.

Table 10: Regression of moving/location choice on initial state unemployment rate interacted with years elapsed from graduation

	(1) OLS Move	(2) IV Move	(3) OLS Rural	(4) IV Rural
State UE × 1-3	0.043	0.145	-0.002	0.045
	(0.022)	(0.076)	(0.015)	(0.056)
State UE × 4-6	0.051	0.133	-0.006	0.043
	(0.022)	(0.068)	(0.013)	(0.048)
State UE × 7-9	0.053	0.135	-0.006	0.039
	(0.021)	(0.064)	(0.013)	(0.043)
State UE × 10-12	0.047	0.129	-0.012	0.026
	(0.022)	(0.064)	(0.014)	(0.043)
State UE × 13-15	0.044	0.124	-0.024	0.017
	(0.022)	(0.061)	(0.014)	(0.042)
State UE × 16-18	0.038	0.161	-0.016	0.036
	(0.023)	(0.077)	(0.015)	(0.061)
Observations	5,357	5,357	5,246	5,246
R-squared	0.164		0.113	0.086

Notes: Robust standard errors against the clustering within the state and year of college graduation are presented in parentheses for OLS estimates. Robust standard errors against the clustering within the state of residence at age 14 and year of birth are presented in parentheses for instrumental variables estimates. R-squared is not reported for Column (2) because it takes a negative value.

Table 11: Regression of region of residence on initial state unemployment rate interacted with years elapsed from graduation

	(1) OLS NE	(2) IV NE	(3) OLS NC	(4) IV NC	(5) OLS South	(6) IV South	(7) OLS West	(8) IV West
State UE × 1-3	0.003	-0.094	-0.013	0.124	-0.004	-0.018	0.015	-0.012
	(0.011)	(0.050)	(0.019)	(0.071)	(0.012)	(0.035)	(0.013)	(0.045)
State UE × 4-6	0.005	-0.079	-0.025	0.102	-0.006	-0.026	0.026	0.002
	(0.011)	(0.044)	(0.019)	(0.063)	(0.013)	(0.030)	(0.013)	(0.040)
State UE × 7-9	0.009	-0.077	-0.032	0.089	-0.008	-0.020	0.031	0.008
	(0.011)	(0.041)	(0.019)	(0.059)	(0.012)	(0.027)	(0.014)	(0.037)
State UE × 10-12	0.004	-0.071	-0.030	0.081	-0.004	-0.029	0.031	0.019
	(0.011)	(0.040)	(0.020)	(0.058)	(0.013)	(0.027)	(0.015)	(0.037)
State UE × 13-15	0.001	-0.078	-0.017	0.097	-0.009	-0.025	0.025	0.007
	(0.011)	(0.039)	(0.018)	(0.056)	(0.013)	(0.027)	(0.013)	(0.036)
State UE × 16-18	0.007	-0.093	-0.030	0.116	-0.011	-0.044	0.034	0.020
	(0.012)	(0.051)	(0.020)	(0.075)	(0.013)	(0.034)	(0.016)	(0.045)
Observations	5,356	5,356	5,356	5,356	5,356	5,356	5,356	5,356
R-squared	0.639	0.514	0.590	0.466	0.606	0.606	0.503	0.421

Notes: Robust standard errors against the clustering within the state and year of college graduation are presented in parentheses for OLS estimates. Robust standard errors against the clustering within the state of residence at age 14 and year of birth are presented in parentheses for instrumental variables estimates.