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Make Your Own Luck: The Wage Gains from Starting College in a Bad Economy*

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Abstract

Using data for nearly 40 cohorts of American college graduates and exploiting regional variation in economic conditions, we show robust evidence of a positive relationship between the unemployment rate at the time of college enrollment and subsequent annual earnings, particularly for women. This positive relationship cannot be explained by selection into employment or by economic conditions at the time of graduation. Changes in major field of study account for only about 10% of the observed earnings gains. The results are consistent with intensified effort exerted by students who experience bad economic times at the beginning of their studies.

JEL Codes: I23, J24, J31, E32

Keywords: Business Cycle, Higher Education, Cohort Effects

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1 Introduction

Adverse economic conditions have long-lasting impacts on individuals, especially when experienced during decisive moments in their lives. Individuals who lose a job or who enter the labor market when unemployment is high experience persistent declines in earnings (e.g. Aslund and Rooth, 2007; Kahn, 2010; Davis and von Wachter, 2011; Oreopoulos et al., 2012; Altonji et al., 2016; Liu et al., 2016; Schwandt and von Wachter, 2019). Recessions also induce increases in human capital investments in the form of higher post-secondary enrollment (e.g. Betts and McFarland, 1995; Dellas and Sakellaris, 2003; Clark, 2011; Méndez and Sepúlveda, 2012; Johnson, 2013; Barr and Turner, 2013, 2015; Atkin, 2016; Sievertsen, 2016; Charles et al., 2018), and shifts in choices of college major towards higher-earning fields (Blom et al., 2020). Macroeconomic conditions experienced during early adulthood have also been shown to have profound impacts on individuals' risk aversion, expectations, and preferences (Malmendier and Nagel, 2011; Giuliano and Spilimbergo, 2014; Malmendier and Nagel, 2016; Cotofan et al., 2021).

In this paper we explore whether the labor market outcomes of college graduates vary systematically according to the economic conditions that they experienced during their late teenage years, around the time when they enrolled in college. We perform the analysis using data for US college graduates from nearly 40 enrollment cohorts. Using an empirical strategy that flexibly controls for cross-cohort differences at the national level and exploits regional variation in economic conditions for identification, we find that individuals who enrolled in worse times have higher annual wage and salary earnings than those who enrolled in better times. Both men and women who enrolled in college in worse times tend to earn higher hourly wages, and women also experience stronger labor market attachments. The positive impact that we identify cannot be explained by selection into employment or by economic conditions at the time of graduation. Changes in major field of study account for only about 10% of the observed earnings gains. We argue that the results are consistent with a behavioral change leading to intensified effort exerted by students as a result of the bad economic times that they experience at the beginning of their studies.

Our analysis uses data for college graduates from the American Community Survey (Ruggles et al., 2020). Following previous literature (Schwandt and von Wachter, 2019; Blom et al., 2020), we proxy the economic conditions at the time of college enrollment using state-level unemployment rates at the time when individuals turned 18. To account for unobserved differences across cohorts, we identify the impact of economic conditions on future labor market outcomes by exploiting within-cohort variation in local economic conditions across US states – a strategy that is similar to Oreopoulos et al. (2012). We focus on cohorts enrolling in college between 1976 and 2014.

We find that US college graduates who experience adverse economic conditions at the time of enrollment have higher earnings than those who enroll during expansionary periods. Specifically, our estimates imply that a 15 percentage point difference in the state unemployment rates at the time of college enrollment – roughly the difference between the unemployment rates of North Dakota and Michigan in 2009 at the peak of the Great Recession – increases annual earnings by about $3,100 for women and $2,800 for men.

For men, the documented rise in annual earnings is almost entirely due to an increase in hourly wages. For women, it reflects higher hourly wages, more weekly hours of work, and more weeks worked over the year. Our results are not driven by selection into employment: graduates who enroll during bad times are more likely to be working later in life relative to those who enroll during good times. Controlling for economic conditions at the time of graduation does not eliminate the positive relationship between future earnings and unemployment at the time of enrollment. In fact, for women, we find that economic conditions at enrollment are at least as important as economic conditions at graduation in determining future earnings.

Previous evidence suggests that US college students who experience economic downturns during their early college years tend to sort themselves into higher paying fields of study (Blom et al., 2020). We consider the composition of field of study to be a natural way to explain the wage differentials that we identify. However, we find that controlling for field of study choices explains less than 10% of the estimated differentials. The overall earnings gains experienced by cohorts that enrolled during recessionary times are therefore more than ten times larger than the wage bonus driven by changes in the choice of major documented in Blom et al. (2020).

We argue that our results are consistent with a behavioral change in terms of the effort exerted by students who experience bad economic times during their late teenage years, when they are beginning their college studies. Increases in effort in response to adverse economic conditions have been identified in various contexts (e.g. Griffith et al., 2016; Lazear et al., 2016; Mukoyama et al., 2018). Moreover, Cotofan et al. (2021) show that individuals who experience recessions during their teenage years give higher priority to income, relative to job meaning, for the rest of their lives. In related work for the UK, we find that students who enroll during downturns are not more positively selected at the time of college entry, but perform better in terms of their college grades (Bičáková et al., 2021). All of these pieces of evidence suggest that an increase in effort is a very plausible candidate explanation for the pattern that we have documented.

Our paper provides several important contributions to the literature. We present new evidence for the US on the long-term earnings consequences of entering college during a downturn. Despite the finding that enrollment into post-secondary education tends to increase during recessions, relatively little is currently known about how

individuals who enroll during downturns ultimately perform in the labor market. The results are crucial for our understanding of the long-term impacts of recessions that operate via changes in human capital investment decisions. Our findings complement previous research on the effects of graduating during a recession (or "scarring effects"; see von Wachter (2020) for a survey of this literature) by showing that economic conditions at the time of enrollment are also important in determining future earnings of college graduates, especially for women. Our analysis also builds on the literature that highlights the important formative role of economic conditions experienced during early adulthood. Our results show that the impacts on preferences for monetary job attributes documented in Cotofan et al. (2021) are also reflected in individuals' realized labor market outcomes.

To the best of our knowledge, this is the first paper exploring the influence that the economic cycle at the time of college enrollment exerts on future wages in the US. The only other evidence of a similar nexus comes from our earlier work, which focuses on British college graduates (Bičáková et al., 2021), and from the work of Blom et al. (2020), which shows that cohorts exposed to higher unemployment during their school years tend to select majors that earn higher wages. Relative to Blom et al. (2020), we show that the earnings gains experienced by individuals who enroll during adverse economic times extend well beyond what is predicted by the change in major choices documented in their paper. The results are consistent with a behavioral adjustment in effort that induces individuals to not only choose higher-paying majors, but also to obtain higher paying jobs conditional on their major choice. Relative to Bičáková et al. (2021), a key contribution of the analysis in this paper is its study of the link between the unemployment at enrollment and subsequent labor market outcomes using a much stricter identification strategy than what was feasible for the UK study. Specifically, we are able to flexibly control for unobserved differences between cohorts by exploiting only the within-cohort variation in local economic conditions for identification, whereas the analysis in Bičáková et al. (2021) relies primarily on between-cohort variation for identification. The US data also allows us to study the impact of adverse economic conditions not only on hourly wages, but also on labor market attachment (hours worked per week and weeks worked per year – two margins that turn out to be quantitatively relevant in the case of women). Finally, focusing on the US context is also of interest given that there are key institutional differences between the US and the UK. For example, the choice of college majors is much more flexible in the US than in the UK, and there is also much stronger evidence of scarring effects in the US context relative to what has been found for the UK.

2 Data and Empirical Strategy

2.1 Data

We use individual-level data from the American Community Survey (ACS) for the years 2009–2019, obtained through IPUMS (Ruggles et al., 2020). As in Blom et al. (2020), we start the analysis in 2009, because this is the first year in which field of study choices are recorded in the data. We restrict our analysis to individuals with at least four years of college education who were born in the U.S. and who are at least 22 years old when surveyed. Nominal earnings are converted to real 2009 dollars using the Consumer Price Index from the Bureau of Labor Statistics. All analyses use the person weights provided in the data.

Following the literature (e.g. Schwandt and von Wachter, 2019; Blom et al., 2020), we assume that individuals enter college in the year in which they turn 18 – the typical college starting age in the US.[1] To impute the year of labor market entry, we follow Schwandt and von Wachter (2019) and assume that individuals with a Bachelor's degree enter the labor market 4 years after college enrollment; individuals with a Master's or Professional degree 6 years after; and individuals with a PhD 8 years after enrollment.[2] We drop observations for which the imputed year of labor market entry is after the survey year.

Our unemployment data is obtained from the Bureau of Labor Statistics (BLS). At the national level, we compute annual averages of the monthly non-seasonally adjusted unemployment rate (Series ID LNU04000000), which the BLS produces based on data from the Current Population Survey. State-level unemployment rates are obtained from the BLS's Local Area Unemployment Statistics program at the annual level.

State-level unemployment rates are only available from 1976 onwards, so we restrict our analysis to cohorts enrolling in 1976 or later. In order to observe earnings in at least two years, the 2014 cohort is the last enrollment cohort in our sample; we observe their labor market outcomes in 2018 and 2019.

2.2 Empirical Strategy

Our goal is to determine how labor market outcomes of college graduates vary according to the business cycle conditions that prevailed at the time of their enrollment

[1] We verify the sensitivity of our results to varying the imputed year of enrollment in Section 3.4.

[2] While this assumes very expeditious degree completion, we make these assumptions in order to be consistent with the existing literature on the negative effects of graduating during downturns (and specifically Schwandt and von Wachter, 2019). It is worth emphasizing, however, that our focus is on the impact of economic conditions at the time of *enrollment*, and hence our core results are not sensitive to the assumptions that we make about the length of studies for each degree level.

into college. If we were to use variation in economic conditions at the national level, it would be challenging to disentangle the effect of business cycle conditions at enrollment from other factors that vary across cohorts. We therefore follow the literature that investigates the impact of economic conditions at the time of labor market entry (e.g. Oreopoulos et al., 2012) and identify the impact of economic conditions at the time of enrollment by relying on within-cohort variation in economic conditions across US states. In particular, we assign individuals to states based on their state of birth, and capture the economic conditions faced at the time of enrollment by individual i from enrollment cohort c and state s through the state-specific unemployment rate in the enrollment year, denoted U_{sc}.[3]

Our identifying equation is given by:

$$w_{it} = \alpha + \beta U_{sc} + \chi_{ct} + \theta_s + \gamma x_{it} + \epsilon_{it}, \tag{1}$$

where w_{it} is the labor market outcome of individual i observed in year t, α is a constant term, U_{sc} is the state-level unemployment rate faced by individual i at the time of enrollment, χ_{ct} is a set of fully interacted cohort-year fixed effects, θ_s represent state of birth fixed effects, x_{it} is a set of individual-specific characteristics (race/ethnicity dummies and an indicator variable for individuals with post-graduate education), and ϵ_{it} is a standard error term.

β is our coefficient of interest. It captures the impact of economic conditions at the time of enrollment on future labor market outcomes, after controlling fully flexibly for variation across cohorts and over time at the national level through χ_{ct}.[4] Identification is obtained solely from variation in outcomes at a given point in time across individuals from the same enrollment cohort who faced different local economic conditions at the time of enrollment, beyond the permanent local differences captured by the state fixed effects. The specification in Equation (1) cannot explicitly include controls for age profiles due to multicollinearity; however, given that age is perfectly predicted by cohort and time,[5] results are numerically identical if we replace the cohort-year fixed effects χ_{ct} with a set of fully interacted cohort-age fixed effects (given that all individuals in a given cohort are at the same age in a given year).

[3]Admittedly, the state in which the student attends college, or the state in which they reside in the period leading up to enrollment may not be the same as their state of birth. Individuals' state of birth, however, is arguably more exogenous than the state in which they choose to go to college. Note that in their analysis of the ACS data, Schwandt and von Wachter (2019) conclude that selective migration is unlikely to induce major bias in their results on the impact of economic conditions at the time of labor market entry.

[4]Note that these fixed effects control not only for permanent differences across enrollment cohorts, but also for cohort-specific impacts of current economic conditions in the year in which labor market outcomes are observed.

[5]This follows from the fact that we assign individuals to enrollment cohorts based on the year in which they turned 18.

Thus, the specification can be viewed as accounting for fully flexible cohort-specific life-cycle profiles at the national level.

For comparison purposes, we also present results below from specifications where we control separately for cohort and time, or cohort and age fixed effects (rather than the interaction of the two). These specifications impose different assumptions (assuming either that the impact of current economic conditions or that the life-cycle profile of earnings is the same across all cohorts) and thus differ in terms of the source of variation used for identification. However, they yield qualitatively and quantitatively similar results to our preferred estimates, confirming the robustness of our findings.

It is worth emphasizing that, although we observe earnings for 2009–2019 only, the variation that we use for identification is based on state-specific business cycle conditions prevailing at the time of enrollment, i.e. over the period 1976–2014 – a period that features a wide variety of economic conditions across states and time.

3 Results

3.1 Main Results

Table 1 presents our key results regarding the link between economic conditions at enrollment and future earnings. The dependent variable is the logarithm of individuals' annual labor earnings (total wage and salary income), in real 2009 dollars. The top panel focuses on men; the bottom panel on women. All specifications control for state of birth fixed effects, and include dummies for black and Hispanic individuals, and for individuals with a post-graduate degree.

For reference purposes, Columns (1) and (2) begin by presenting results using variation at the national level, i.e. using the national unemployment rate as the measure of economic conditions at the time of enrollment. Here we cannot control for cohort fixed effects, as these would absorb the effect of the economic conditions at enrollment. Both columns instead control for a cubic cohort trend. Column (1) includes year fixed effects, while Column (2) presents results that control for age fixed effects. Standard errors are clustered at the cohort level. For both men and women, the estimated coefficients are positive and statistically significant when controlling for year fixed effects, but in both cases they are statistically insignificant when controlling for age fixed effects.

In Columns (3) and (4) we replace the national unemployment rate at enrollment with the unemployment rate in the state of birth in that same year; this allows us to control much more flexibly for cohort-level differences at the national level by

including a full set of cohort fixed effects. In these regressions we cluster the standard errors at the cohort-state level. Column (3) includes year fixed effects in addition to the cohort fixed effects, while Column (4) presents analogous results where year fixed effects are replaced with age fixed effects.[6] All of the coefficients in these specifications are positive and statistically significant at the 10% level or higher.

Column (5) presents our preferred specification, which is the most restrictive. This specification controls for fully interacted cohort-year fixed effects which, as discussed above, produces identical results to a specification that controls for fully interacted cohort-age fixed effects. It therefore allows for flexible cross-cohort differences that can vary over time (or over the life-cycle), thus controlling for unobservables that affect cohort outcomes at the national level not only in a static sense, but also over time (or over their life-cycle). Identification is achieved solely from regional variation in economic conditions at enrollment within cohort-year cells (beyond what is predicted by the state fixed effects). The results are nearly identical to those in Column (4). We estimate that a 1 percentage point increase in the local unemployment rate at enrollment is associated with an increase in women's earnings of about 0.4%. The estimated effect for men is about half as large, at around 0.2%.

To give an example in terms of the absolute magnitudes, our estimates imply that a 15 percentage point difference in the state unemployment rates at college enrollment – roughly the difference between the unemployment rates of North Dakota and Michigan in 2009 at the peak of the Great Recession – increases earnings by about $3,100 per year for women and about $2,800 per year for men (in 2009 dollars).

3.2 Selection into Employment

The positive relationship between the unemployment rate at enrollment and future earnings could be driven by lower employment rates among graduates who started college during downturns. If these individuals are less likely to find a job after graduation, then by focusing on those with positive earnings (as we have done in Table 1), we might be picking up a selection effect in terms of who is able to find work.

We rule out this possibility in Column (1) of Table 2. We report the coefficient for the effect of the local unemployment rate at the time of college enrollment on the probability of having any wage or salary income when observed in our survey, estimated through a linear probability model. Once again we include a set of fully

[6]Despite the fact that cohort, age and calendar year are perfectly collinear, the two specifications yield different results because they make different assumptions. The model in Column (3) assumes that the impact of current macroeconomic shocks is the same across all cohorts, while the model in Column (4) assumes that the life-cycle age profile of wages is the same across all cohorts. The residual variation used for identification of the coefficient of unemployment at enrollment is therefore slightly different in the two cases.

interacted cohort-year fixed effects, as well as state fixed effects and controls for race/ethnicity and for holding a post-graduate degree.

The evidence emerging from this analysis is clear: higher local unemployment in the year of college enrollment *increases* the probability of working (having labor income) later in life. The increase is large and significant for women, for whom a 1 percentage point increase in the unemployment rate at enrollment increases the probability of having any wage or salary income by 13%, indicating a higher degree of labor market attachment for those who enroll during downturns. For men, the effect is much smaller and statistically insignificant, probably reflecting the already high labor force attachment of men (and male college graduate in particular). Overall, there is no evidence pointing to increased selection among employed graduates who entered college during a bad economy.

3.3 The Extensive and Intensive Margins of Earnings Growth

Next, we decompose the positive earnings effect (conditional on working) into its intensive and extensive margins, i.e. we assess whether annual labor earnings increase as a consequence of higher per-hour wage rates or extended working hours.

The results are reported in the remaining columns of Table 2. For reference, in Column (2) we reproduce the benchmark results from our preferred specification with fully interacted cohort and year fixed effects. Column (3) estimates the same specification (Equation 1), but with the logarithm of weeks worked per year as the dependent variable.[7] In Column (4) we use the logarithm of usual hours worked per week as the dependent variable, and in Column (5) we use the logarithm of hourly wages.

The table shows that partially different margins are at work for men and women. Men's annual earnings growth is primarily driven by an increase in hourly wages, whereas for women, hourly wages, hours worked per week, and weeks worked per year all expand. The results clearly show that adverse economic conditions lead to an increase in women's labor market attachment, both in terms of their probability of working (Column 1), and in their annual hours of work, conditional on working (Columns 3 and 4). The lack of a similar pattern for college-educated men is likely due to their already very high and inelastic labor supply. Interestingly, the results in Column (5) also show that the increase in hourly wage rates is of very similar magnitude for both men and women.

[7] In some years, the ACS only reports weeks worked in intervals. In such cases, we take the mid-point of each interval.

3.4 Sensitivity to Different Choices for Enrollment Year

As mentioned, our analysis assumes that college graduates all enrolled at the typical age of 18 (this is commonly assumed in the literature). In Figure 1 we show that choosing years around the one in which individuals turn 18 as the year of enrollment would not change our conclusion substantially. In the figure, we plot our coefficient of interest from a model that is analogous to our benchmark specification in Equation (1), but where we vary the year for which the unemployment rate is measured. Each marker represents the coefficient for the unemployment rate from a separate regression. The one labeled as t_0 uses the year in which individuals turn 18, and hence corresponds to the coefficient shown in Table 1, Column (5). The other markers correspond to separate regressions in which we vary the unemployment rate between the one experienced at age $t_0 - 5$ (13 years old) and the one experienced at age $t_0 + 5$ (23 years old).

For both men and women, the results are strongest when using the unemployment rate experienced at age 18. For men, the coefficients estimated between $t_0 - 1$ and $t_0 + 2$ are very similar. For women, all coefficients between the year in which they turn 14 and the year in which they turn 19 are statistically significant, though slightly smaller than our benchmark. Overall, Figure 1 shows that the unemployment rates that matter for future earnings are indeed those around age 18, the typical age of college enrollment.

4 Mechanisms

In this section we explore a number of mechanisms that could potentially account for the higher annual earnings observed among graduates who enroll in college during periods of worse macroeconomic conditions.

4.1 Selection on Ability Pre-College Enrollment

One potential explanation for the positive relationship between the unemployment rate at the time of enrollment and future labor market outcomes of college graduates would be that individuals who enroll during downturns are more positively selected in terms of their underlying, pre-university ability. This explanation, however, is somewhat counter to economic intuition, given previous evidence that has shown that enrollment into post-secondary education tends to expand during economic downturns (see e.g. Dellas and Sakellaris, 2003; Clark, 2011; Méndez and Sepúlveda, 2012; Johnson, 2013; Barr and Turner, 2013, 2015; Sievertsen, 2016). Standard notions of selection would suggest that the expansion of enrollment would be associated with

the entry of marginal, lower-ability students (see e.g. Carneiro et al., 2011; Carneiro and Lee, 2011).

Though expansions in enrollment do not necessarily imply expansions in the size of the *graduation* cohorts (see e.g. Bound et al., 2010), we do find that the proportion of college graduates is similar, or slightly larger among birth cohorts who turn 18 during periods of worse macroeconomic conditions.[8] Consistent with the idea of negative marginal selection during downturns, in related work using data from the UK (Bičáková et al., 2021), we find that pre-university academic achievement indicators are similar or slightly worse for cohorts of graduates that enroll during worse economic conditions.

In sum, while we cannot fully rule out this channel, it seems unlikely that our result would be driven by having a more positively selected pool of university graduates in terms of underlying, pre-university ability among those that enroll during downturns.

4.2 The Economy at Graduation

Relatively recent literature (Kahn, 2010; Oreopoulos et al., 2012; Schwandt and von Wachter, 2019; von Wachter, 2020) has shed light on the negative wage effect of graduating during a recession for college students in particular. This literature highlights how graduating during downturns leads to a "scarring effect" in the form of lower earnings for many years after graduation. Conversely, cohorts that are lucky enough to graduate during an economic expansion enjoy relatively higher earnings. Given the cyclicality of the economy, it is natural to wonder whether the wage premia that we detect stem from a favorable timing of graduation for the affected cohorts. If the cohorts who enroll during downturns systematically graduate in boom periods, we might be simply picking up the effect of this favorable graduation timing.

The analysis presented in Columns (1)-(3) of Table 3 dissipates this concern. For reference, in Column (1) we report the results of our benchmark model. In Column (2) we first present a specification where we control for the unemployment rate in the year of labor market entry, but not the unemployment rate at enrollment. In line with the literature on scarring effects (Schwandt and von Wachter, 2019), we use the unemployment rate in the state of residence at the time of the survey, and include a

[8]This result is obtained by regressing the gender-specific share of college graduates in each birth cohort-state cell on the state-level unemployment rate at the time when the cohort turned 18, as well as a full set of state of birth and birth cohort fixed effects. Using cohorts who turn 18 in 2005 or earlier, we obtain an estimated coefficient on the state-level unemployment rate of 0.001 for both men and women (with p-values of 0.19 and 0.03 for men and women respectively), indicating that the share of college graduates is marginally higher for cohorts witnessing higher unemployment rates at age 18.

full set of state of residence fixed effects.[9] The results confirm that graduating in a recession depresses earnings. We estimate that for each additional percentage point increase in the local unemployment rate at the time of graduation, average earnings drop by around 0.5% for men and 0.3% for women.

In Column (3) we include our variable of interest – the unemployment rate at the time of enrollment – along with the unemployment rate at graduation.[10] The estimated effect of the unemployment rate at enrollment remains significant and large in magnitude for women; for men, the effect still points in the same direction, though it is somewhat reduced in magnitude and not statistically significant at conventional levels. We conclude from this analysis that the positive earnings effect that we find for individuals who enroll during bad times cannot be explained by the economic conditions that they graduate into. This is particularly true in the case of women, for whom the positive earnings effect associated with the economic conditions at enrollment is even larger in magnitude than the negative effect due to economic conditions at graduation.

4.3 College Major Sorting

Using the same data as this paper, Blom et al. (2020) show that college graduates who experience a higher unemployment rate in the year in which they turn 20 were more likely to select into higher paying majors such as accounting and computer-related fields, particularly in the case of women.[11] This points towards a change in the composition of majors across cohorts enrolling at different points in the business cycle as a likely explanation for the pattern that we have identified.

In order to check whether this accounts for our result, we analyze how our benchmark coefficient changes when we add a full set of fixed effects for individuals' undergraduate field of study. Column (4) in Table 3 displays the results of this analysis.

Interestingly, we find that sorting to different majors plays only a relatively limited role in accounting for the earnings gains enjoyed by cohorts that enroll in a bad economy. Comparing the coefficients in Columns (1) and (4), we see that the inclusion of college major fixed effects reduces our coefficient of interest by less than 10% for both men and women. Hence, there are important earnings gains for individuals enrolling during downturns that go well above and beyond the gains that are generated by the changes in their field of study choices.

[9] Note that in their analysis of the ACS data, Schwandt and von Wachter (2019) conclude that selective migration is unlikely to induce major bias in the results.

[10] This specification includes state fixed effects both for state of birth and for state of residence.

[11] In Bičáková et al. (2021), we find a similar pattern, though much more muted, using UK data.

5 Discussion: Behavioral Change Leading to Increased Effort

Our findings show that college graduates who enroll in college during bad economic times have higher average earnings than those who enroll during good times. As discussed in Section 4.1, given the expansion in enrollment observed during downturns, it is unlikely that these cohorts are more positively selected at the time of college entry. It is also unlikely that the quality of education is enhanced during downturns: Kane et al. (2005) and Barr and Turner (2013) show that public expenditures on education decline in the US during downturns.

We argue that a plausible explanation for the patterns that we have documented is that individuals who enroll during downturns obtain higher paying jobs and increase their labor market attachment due to a behavioral change in effort. This seems particularly likely in light of growing evidence that economic conditions experienced during early adulthood lead to long-lasting changes in preferences, values and behavior, an idea known as the impressionable years hypothesis, first proposed by Krosnick and Alwin (1989).

The impressionable years hypothesis has proven useful for explaining differences across cohorts in preferences for redistribution, risk attitudes, and the formation of expectations of inflation (Malmendier and Nagel, 2011; Giuliano and Spilimbergo, 2014; Malmendier and Nagel, 2016; Shigeoka, 2019). Recently, Cotofan et al. (2021) have shown that "recessions create cohorts of workers who give higher priority to income, whereas booms make cohorts care more about job meaning, for the rest of their lives." Our results are consistent with a preference shift that induces those who enroll during downturns to exert more effort towards obtaining higher earnings jobs, and induces women to increase their labor market attachment.[12]

Increases in effort in response to adverse economic conditions have also been found in other contexts (e.g. Griffith et al., 2016; Lazear et al., 2016; Mukoyama et al., 2018). In Bičáková et al. (2021), we show that cohorts who enroll during adverse economic times in the UK perform better in terms of their college grades, and also earn higher wages conditional on their college grade point average, compared to cohorts who enroll during good times.

While it would be tempting to further explore the hypothesis of increased effort using earnings data for non-college-graduates, an analysis of this type would be

[12] An increase in human capital accumulation during students' college years could also arise as a result of the potential lack of (part-time) job opportunities for those who enroll during downturns. If students have more limited opportunities to work while at college, they might devote more time to their studies (see Darolia, 2014; Neyt et al., 2019, on the link between time use and educational outcomes).

problematic, given that, for individuals who do not go to college, the labor market conditions experienced during their late teenage years (which might influence their preferences and attitudes) would also be the same conditions that they experience when entering the labor market. It would therefore not be possible to separately identify impacts driven by changes in attitudes from the impact of the conditions at the time of labor market entry among this sample.

6 Conclusions

We explore the impact of adverse economic conditions at the time of college entry on future labor market outcomes for nearly 40 cohorts of US college graduates. Using within-cohort variation in local economic conditions, we find a positive impact of higher unemployment rates at the time of college enrollment on annual earnings of both female and male graduates. In particular, we find that a 1 p.p. higher unemployment rate at the time of college entry is associated with an increase in annual real earnings of around 0.4% for women and about half as much for men. While men and women experience similar increases in hourly wages, women experience a larger rise in annual earnings due to an increase in their labor market attachment in terms of their probability of working, as well as their weeks worked per year and hours worked per week, conditional on working.

The positive impact on earnings cannot be explained by selection into employment or by economic conditions at the time of college graduation. In the case of women, we find that economic conditions at enrollment matter at least as much as economic conditions at graduation in terms of determining future labor market earnings. Contrary to our expectations based on the evidence from Blom et al. (2020), that individuals who experience recessions while in college sort into more lucrative fields and therefore earn higher wages, changes in the choice of major among those who enroll in bad times account for only about 10% of the observed earnings gains.

Overall, our results show that economic downturns can have positive effects on future economic outcomes, at least for some individuals. This is consistent with previously documented evidence that economic shocks experienced during early adulthood lead to permanent changes in attitudes, values, and preferences, which may induce individuals to make important adjustments in terms of their human capital accumulation and job search behavior. Policymakers could leverage these behavioral changes by expanding college admissions during downturns, when demand is already high.

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Table 1: Main Results: Relationship between Unemployment Rates at Enrollment and Earnings for College Graduates

Dependent Variable: Log annual wage and salary income					
	Men				
	(1)	(2)	(3)	(4)	(5)
U at enrol, nat'l	0.729**	0.178			
	(0.282)	(0.111)			
U at enrol, state			0.189*	0.214**	0.218**
			(0.110)	(0.107)	(0.107)
Obs.	1,670,797	1,670,797	1,670,797	1,670,797	1,670,797
R^2	0.191	0.219	0.191	0.219	0.219
Nr. of Clusters	39	39	1,989	1,989	1,989
	Women				
	(1)	(2)	(3)	(4)	(5)
U at enrol, nat'l	0.679**	-0.029			
	(0.292)	(0.210)			
U at enrol, state			0.384***	0.385***	0.385***
			(0.107)	(0.109)	(0.109)
Obs.	1,924,219	1,924,219	1,924,219	1,924,219	1,924,219
R^2	0.098	0.119	0.098	0.120	0.120
Nr. of Clusters	39	39	1,989	1,989	1,989
State FE	✓	✓	✓	✓	✓
Year FE	✓		✓		
Age FE		✓		✓	
Cohort Trend	✓	✓			
Cohort FE			✓	✓	
Cohort-Year FE					✓

Note: The dependent variable is the logarithm of individuals' annual labor earnings (total wage and salary income) in real 2009 dollars. The sample includes college graduates who are at least 22 years old and who enrolled in college between 1976 and 2014. The table shows the estimated coefficient for the unemployment rate at the time of college enrollment, measured either at the national or the state level. The table indicates the fixed effects included in each specification. The cohort trend included in Columns (1) and (2) is represented by a cubic term. All specifications include race/ethnicity and postgraduate degree controls. Standard errors are clustered at the cohort level in Columns (1) and (2) and at the cohort x state level in all other columns.
***, ** and * denote statistical significance at the one, five and ten percent levels, respectively.

Table 2: Decomposing the Main Results

	Men				
	(1)	(2)	(3)	(4)	(5)
	Prob. Any Income	*Conditional on Working*			
		Annual Income	Weeks	Hours	Hourly Wage
U at enrol, state	0.045	0.218**	0.017	0.026	0.175**
	(0.029)	(0.107)	(0.032)	(0.033)	(0.081)
Obs.	1,835,246	1,670,797	1,670,797	1,670,797	1,670,797
R^2	0.015	0.219	0.066	0.054	0.186
Nr. of Clusters	1,989	1,989	1,989	1,989	1,989
	Women				
	(1)	(2)	(3)	(4)	(5)
	Prob. Any Income	*Conditional on Working*			
		Annual Income	Weeks	Hours	Hourly Wage
U at enrol, state	0.131***	0.385***	0.121***	0.101**	0.163**
	(0.034)	(0.109)	(0.038)	(0.050)	(0.075)
Obs.	2,269,728	1,924,219	1,924,219	1,924,219	1,924,219
R^2	0.026	0.120	0.030	0.022	0.138
Nr. of Clusters	1,989	1,989	1,989	1,989	1,989
State FE	✓	✓	✓	✓	✓
Cohort-Year FE	✓	✓	✓	✓	✓

Note: The sample includes college graduates who are at least 22 years old and who enrolled in college between 1976 and 2014. The dependent variable is a dummy equal to one for individuals who report having non-zero wage or salary income in Column (1); the logarithm of individuals' annual labor earnings (total wage and salary income) in real 2009 dollars in Column (2); the logarithm of weeks worked per year in Column (3); the logarithm of usual hours worked per week in Column (4); and the logarithm of real hourly wages in Column (5). The table shows the estimated coefficient for the state-level unemployment rate at the time of college enrollment. All specifications include race/ethnicity and postgraduate degree controls. Standard errors are clustered at the cohort x state of birth level.

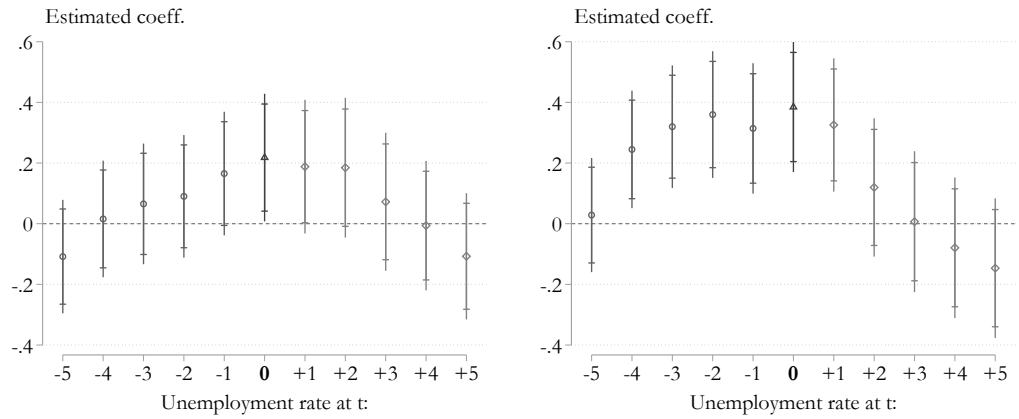
***, ** and * denote statistical significance at the one, five and ten percent levels, respectively.

Table 3: Mechanisms

Dependent Variable: Log annual wage and salary income				
	Men			
	(1)	(2)	(3)	(4)
U at enrol, state	0.218**		0.173	0.199*
	(0.107)		(0.113)	(0.102)
U at grad, state		-0.507***	-0.488***	
		(0.112)	(0.105)	
Obs.	1,670,797	1,670,797	1,670,797	1,670,797
R^2	0.219	0.227	0.228	0.253
Nr. of Clusters	1,989	1,989	1,989	1,989
	Women			
	(1)	(2)	(3)	(4)
U at enrol, state	0.385***		0.318***	0.350***
	(0.109)		(0.113)	(0.113)
U at grad, state		-0.289***	-0.285***	
		(0.103)	(0.099)	
Obs.	1,924,219	1,924,219	1,924,219	1,924,219
R^2	0.120	0.128	0.129	0.144
Nr. of Clusters	1,989	1,989	1,989	1,989
Birth State FE	✓		✓	✓
State of Resid FE		✓	✓	
Cohort-Year FE	✓	✓	✓	✓
Major FE				✓

Note: The sample includes college graduates who are at least 22 years old and who enrolled in college between 1976 and 2014. The dependent variable is the logarithm of individuals' annual labor earnings (total wage and salary income) in real 2009 dollars. The table shows the estimated coefficient for the state-level unemployment rate at the time of college enrollment and/or graduation. All specifications include race/ethnicity and postgraduate degree controls. Standard errors are clustered at the cohort x state of birth level.
***, ** and * denote statistical significance at the one, five and ten percent levels, respectively.

Figure 1: Relationship between the Unemployment Rate around the Year in which Individuals turn 18 and Future Earnings



(a) **Men** (b) **Women**

Note: The markers represent the estimated effect of the state unemployment rate on the logarithm of real annual labor earnings (total wage and salary income). Each marker is obtained from a separate regression. The coefficient for $t = 0$ corresponds to our main result, which uses the unemployment rate in the year in which individuals turned 18 (the assumed year of enrollment). Other markers are obtained from regressions that use the unemployment rates in years before or after the individual turned 18. The lines represent 95% confidence intervals. The cap on each line represents the 90% confidence interval. The sample includes college graduates who are at least 22 years old and who enrolled in college between 1976 and 2014. All regressions include fully interacted cohort and calendar year fixed effects, as well as state of birth fixed effects, and race/ethnicity and postgraduate degree controls. Standard errors are clustered at the cohort x state of birth level.

Abstrakt

Na základě dat popisujících téměř 40 kohort absolventů vysokých škol v USA a s využitím regionální variace v ekonomických podmínkách, ukazujeme robustní skutečnost, že mezi mírou nezaměstnanosti v době nástupu na vysokou školu a budoucími ročními příjmy existuje pozitivní vztah, a to především u žen. Tento pozitivní vztah nelze vysvětlit ani selekcí způsobenou tím, že příjmy jsou pozorovány jen u těch, kteří pracují, ani vlivem ekonomických podmínek po absolvování vysoké školy. Změna volby studijního zaměření vysvětluje pouze 10% pozorovaného nárůstu příjmů. Naše zjištění jsou v souladu s hypotézou, že studenti začínající svá studia za horší ekonomické situace následně vynakládají (během studia či posléze na trhu práce) vyšší úsilí.

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