THE IMPACT OF ECONOMIC CONDITIONS DURING THE COLLEGE-AGED YEARS ON EDUCATIONAL OUTCOMES

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ABSTRACT

Every decade between 1970 and 2010 opened with a recession with all decades except the 1990s experiencing a second recession. Young adults are often hardest hit by a recession in terms of job losses. Young adulthood is a critical time to get an education and educational opportunities lost during this period may not be fully made up in subsequent years. In this dissertation, I explore the effects of adverse economic conditions during the traditional college-age years (18-24) on short, medium and long run educational outcomes. This dissertation consist of one theoretical chapter and three empirical essays.

In the theoretical chapter, I show the complexity of business cycle effects on college outcomes. The main issue is that opportunity costs move countercyclically while ability-to-pay moves procyclically, thus these two factors counteract each other over the business cycle. Due to the confounding effects of opportunity cost and ability-to-pay, there is a theoretical ambiguity. In the theoretical framework, I outline the conditions under which downturns may improve educational outcomes and the conditions under which downturns may hurt educational outcomes. The ambiguity and complexity displayed in the theoretical framework underlies the importance of an empirical determination.

Essay 1 examines whether economic conditions affect college participation among different demographic groups differently. The main or average effect of an economic downturn on enrollment is well studied. However, research on how a downturn affects individuals from different backgrounds is rare. Using a class of logit models that account for interaction effects, I find that individuals who are black or Hispanic and individuals from low education maternal backgrounds are more likely to enroll in college during high unemployment periods compared to individuals from other demographic backgrounds.

Essay 2 picks up where essay 1 leaves off by investigating college outcomes for individuals who enrolled during a recession. While many studies consider the enrollment decisions, little evidence exists on whether enrollment is successfully transformed into completed education for recession era enrollees. Employing an innovative competing risk model, I estimate the completion and drop-out probabilities for individuals who enrolled during a downturn. I find that individuals who enrolled in college at 18 and who experience a recession at enrollment, are less likely to complete a 4-year degree by age 24, are more likely to complete a 2-year degree, are more likely to drop out of college and are more likely to experience inactivity.

Essay 3 builds upon the negative effects of a recession on college-aged youths found in essay 2. In essay 3, I study educational attainment after individuals have exited their college-aged years. I investigate whether cohorts who experienced adverse economic conditions during young adulthood

eventually caught up with their luckier counterparts who experienced more prosperous years. I find that individuals who experience adverse economic conditions during parts of the college-aged years (18-21) experience lower educational attainment than those who experience more prosperous college-aged years and these negative effects are still present up to ten years post college-age.

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CHAPTER 1

1 THEORETICAL FRAMEWORK

1.1 Introduction

The demand for education is cyclically driven because the factors that affect demand are also cyclically driven. There are many empirical studies that account for cyclical considerations in education investment (For e.g. see Berger & Kostal, 2002; Black & Sufi, 2002; Long, 2004; Card & Lemieux, 2000; Dellas & Koubi, 2003; Dellas & Sakellaris, 2003; Kane, 1994; ; Light, 1996; Neumark & Wascher, 1995; Sakellaris & Spilimbergo, 2000; Ewing, Beckert, & Ewing, 2010; Kantrowitz, 2010). While many empirical studies on business cycle effects exist, there is hardly any formal theory. This is because business cycle effects on educational investment are complex in theory.

Business cycles affect education investment through two main channels; opportunity cost factors and ability-to-pay factors. Opportunity costs move countercyclically while ability-to-pay moves procyclically, thus these two factors counteract each other over the business cycle. Due to the confounding effects of opportunity cost and ability-to-pay there is a theoretical ambiguity. In this theoretical framework, I outline the conditions under which downturns may improve educational outcomes and conditions under which downturns may hurt educational outcomes. The empirical essays will determine whether the harmful effects dominate or whether the helpful effects dominate.

Following the literature on human capital attainment, the model incorporates the idea of a utility maximizing individual responding to economic incentives associated with college attendance. In human capital theory, obtaining a college education is considered an investment. Individuals invest in education with the expectation of receiving a future benefit in the form of higher future wages. The decision to invest in schooling involves direct and indirect economic costs. Direct costs include expenses such as tuition and fees. Indirect costs include opportunity costs, such as foregone wages. Individuals weigh the costs and benefits associated with a college education when deciding whether to college. In the standard neoclassical model of human capital investment, individuals acquire schooling until the

(expected) marginal benefit of an additional year of education equals its marginal cost.

To chart the effects of an economic downturn, first, I assume that there is low unemployment in the economy so an individual can always find a job if he or she chooses to work. I demonstrate the individual's optimal schooling decisions under this setting. There are many economic channels through which a recession may affect the schooling decision of an individual. I investigate each channel individually. Next, I assume that there is a downturn in the economy characterized by a restriction in available work hours, or high unemployment.. Under this setting, I assume that high unemployment in the labor market results in fewer job opportunities for the individual. Fewer job opportunities mean that the opportunity cost of school is lower under the high unemployment setting than under the low unemployment setting, so the level of schooling should be higher, cetaris paribus, under the high unemployment setting. However, fewer job opportunities also mean that income from work is lower so the individual is less able to afford schooling under the high unemployment setting. Next, I assume that due to the downturn and falling incomes, the subsidy available for schooling is also negatively affected. I then explain the effect of falling subsidies during a downturn. Next, I assume that the downturn is accompanied by falling wages and explain the effect on educational investment. Next, I discuss the implication of all these factors changing simultaneously during a recession.

1.2 Model

I begin by making the following assumptions:

1. Individuals live for 2 periods beyond high school. In the first period, the individual attends school (college), works, or engages in non-market activity. Individuals do not value non-market activity and will always choose zero amounts as long as they are able to do so. In the second period, there is no schooling and no leisure, the individual only works.

2. There is no saving, borrowing or lending so the individual finances school through wages from working or through a parental or governmental subsidy

3. The period 1 time constraint is, $T = s + h_1 + l_1$, where s is amount of time spent

in school, h_1 is amount of hours spent working, and l_1 is amount of time spent in non-market/leisure activities. Total time available (T) is exogenous.

4. In period 2, the economy is at full employment and there is no schooling and no leisure, so $T = h_2$

5. Individuals receive income, $(w_2 \cdot h_2)$ in period 2, where $w_2 = \hat{w}(1 + g(s, \alpha))$. $\hat{w}$ is the high school wage and g is the return to schooling beyond high school. Returns to schooling depend on the amount of schooling, s, and ability level, α . I assume that $g_s(s, \alpha) > 0$, and $g_\alpha(s, \alpha) > 0$, and $g_{ss}(s, \alpha) < 0$ and $g_{\alpha\alpha}(s, \alpha) < 0$ so that returns to schooling and ability is positive but diminishing. It is further assumed that $g_{s\alpha}(s, \alpha) > 0$ so that the marginal returns to schooling increases when ability increases.

6. Individuals pay tuition and fees (t), which vary with the amount of schooling.

7. Individuals receive a fixed transfer from parents (π).

8. Individuals receive a given subsidy ϕ per unit of schooling. The source of this subsidy may be from parents or from the government as a direct transfer to the universities. The subsidy reduces the direct cost of schooling to the student

Low unemployment setting

In the low unemployment model, individuals work as many hours as they like. To determine the optimal level of schooling, assume that the individual's lifetime utility is given by the two-period intertemporal utility function

$$U = u(c_1, l) + \delta u(c_2) \tag{1}$$

Where c is consumption and $\delta$is the discount factor. I assume that $u_{c_i} > 0, u_{c_i c_i} < 0$ for $i = 1,2$

The individual chooses schooling level s and work hours h to maximize utility

$$\underset{s,h\geq 0}{Max} U = u(c_1) + \delta u(c_2)$$

Given the assumptions, the individuals budget constraint in period 1 is

$$\hat{w}h_1 + \pi = c_1 + s(t - \phi) \tag{2}$$

the period 1 time constraint is

$$h_1 + s = T \tag{3}$$

the period 2 budget constraint is

$$c_2 = \hat{w}(1 + g(s, \alpha))h_2$$

and the period 2 time constraint is

$$h_2 = T \tag{4}$$

The lifetime utility for an individual is seen by substituting the equations for c_1 and c_2 into the utility function

$$U = u(\hat{w}(T - s) + \pi - s(t - \phi)) + \delta u(\hat{w}(1 + g(s, \alpha))T) \tag{5}$$

The first order condition for optimal schooling is

$$\frac{\partial U}{\partial s} = u_{c_1}(-\hat{w}) - (t - \phi)) + \delta u_{c_2}\hat{w}g_s(s, \alpha)T = 0 \tag{6}$$

Equation (6) characterizes the utility maximizing amount of amount of schooling. Rewriting equation (6)

$$u_{c_1}(\hat{w} - (t - \phi)) = \delta u_{c_2}(\hat{w})g_s(s, \alpha)T \tag{7}$$

Equation 7 reveals the familiar condition that says that optimal amount of schooling is the level at which the marginal cost of schooling is equal to the marginal benefit of schooling. The marginal cost is comprised of the opportunity cost of schooling in the form of foregone earnings and the direct cost of schooling (tuition and fees). The marginal benefit of schooling is the period 2 utility increase due to schooling. More schooling in period 1 yields higher

pay and greater consumption in period 2. Individuals pay the cost for the investment in period one and reap the returns to that investment in period 2.

High unemployment setting

Here I assume that a downturn in the labor market restricts the amount of available work hours to to $\bar{h}$, so that individuals' work hours cannot exceed $\bar{h}$ in this high unemployment setting. The implication of this restriction is that individuals whose optimal number of work hours is less than $\bar{h}$ under low unemployment will not be affected. Individuals who were working more than $\bar{h}$ will reduce work hours to at least $\bar{h}$. These students who have to reduce work hours to $\bar{h}$ are considered marginal since they are at the margin between school and work. Thus, it is these marginal students who change their educational decisions over the business cycle. A student for whom the work hours restriction is binding can spend the extra hours in school or in leisure. The new period 1 budget constraint for the marginal individuals is:

$$\hat{w}\bar{h} + \pi = c_1 + s(t - \phi) \tag{8}$$

Substituting the new period 1 constraint and the original period 2 constraint into the objective function yields

$$U = u(\hat{w}\bar{h} + \pi - s(t - \phi), l_1)) + \delta u(\hat{w}(1 + g(s, \alpha))T) \tag{9}$$

The first order condition is:

$$\frac{\partial U}{\partial s} = u_{c_1}(-(t - \phi)) + \delta u_{c_2}(\hat{w} g_s(s, \alpha)T = 0 \tag{10}$$

Rewriting equation 10 gives

$$u_{c_1}(t - \phi) = \delta u_{c_2}(\hat{w} g(s, \alpha))T \tag{11}$$

.

Again, equation 11 is the familiar condition that optimal amount of schooling sets the

marginal cost of schooling equal to the marginal benefit of schooling. In this case, unlike the low unemployment setting there is no opportunity cost of schooling in the form of foregone earnings since affected individuals are now working the maximum amount of time available. The marginal cost now comprises of the direct cost of schooling. The marginal benefit of schooling is the same here as in the low unemployment setting.

Optimal amount of Schooling in the low unemployment versus in the high unemployment settings

Given that the marginal benefit of schooling is the same under both models but the marginal cost of schooling is lower under the high unemployment model, the level of schooling will be higher under the high unemployment model. The marginal cost curves are upward-sloping since the slopes are positive for both models;

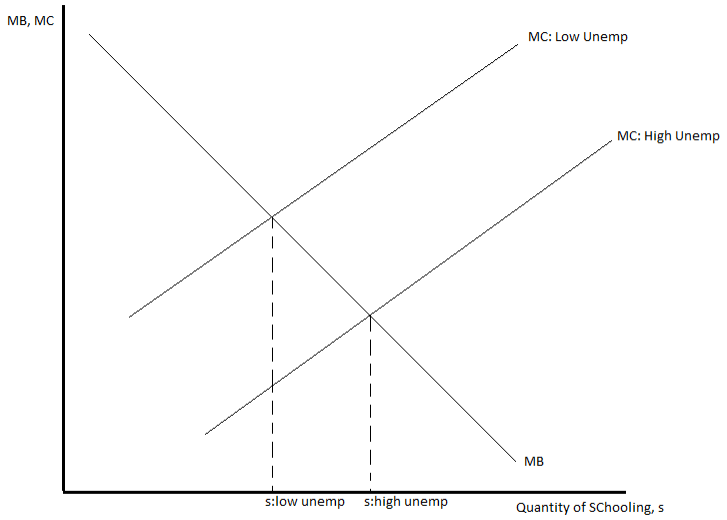
$$\frac{\partial MC_{lowunemp}}{\partial s} = U_{c_1c_1}(\phi - t)(-(\hat{w} - \phi + t)) \tag{12}$$

$$\frac{\partial MC_{highunemp}}{\partial s} = U_{c_1c_1}(\phi - t) \tag{13}$$

Both equations 12 and 13 are positive since $U_{c_1c_1} < 0$ and $(\phi - t) < 0$

Figure 1 plots marginal benefit and marginal cost curves as well as the optimal amount of schooling under high and low unemployment. This is the main effect of an economic downturn on the decision to invest in college education. To summarize, a downturn in the labor market that results in high unemployment means the opportunity cost of being in school is lower so the optimal amount of schooling is higher when there is a downturn. This result assumes that during the downturn only the amount of jobs available is affected, That is the subsidy for schooling remains unchanged and the hourly wage rate remains unchanged. This means that if the only effect of a recession is to reduce employment, then the effect on schooling is positive. From a public policy point of view, if subsidies can be maintained during a downturn then the downturn will unambiguously lead to increases in schooling. Note here that the larger the increase in unemployment during a recession, the larger is the increase in the demand for schooling, cetaris paribus. This means that if a recession affects

Figure 1: Optimal amount of schooling under high and under low unemployment settings.



labor market opportunities for different subgroups differently, education demand during a recession may be different for different subgroups.

In the next section, I explore the effects on schooling levels when the subsidy declines during a downturn and compare the effects to a decline in the subsidy during a good economy. I also relax the assumption that wage rates are constant during a downturn, and discuss the effects of a decline in the wage rates during a downturn.

Comparative Statics

Assessing the impact of a change in any of the variables is tantamount to assessing the impact these have changes on the marginal benefit and the marginal cost of schooling.

Change in optimal schooling for a change in the subsidy under low unemployment Assume that an increase in income leads them to increase the subsidy contributed towards schooling. The impact on schooling of an increase in the subsidy, cetaris paribus is positive since the marginal cost of schooling decreases, and nothing else changes.

$$\frac{\partial MC_{lowunemp}}{\partial \phi} = u_{c_1 c_1}(s) * (\hat{w} + t - \phi) + u_{c_1}(-1) < 0 \tag{14}$$

Since the marginal cost of schooling decreases when the subsidy increases while marginal benefit stays constant, schooling increases. During a downturn, the subsidy is decreasing, thus schooling decreases.

Change in optimal schooling for a change in the subsidy during high unemployment Again, assume that an increase in parental income leads to an increase in the subsidy contributed towards schooling. When the schooling subsidy increases, only the marginal cost of schooling is affected. The impact of an increase in the subsidy holding tuition constant is to decrease the marginal cost of schooling. Note that the effect of an increase in tuition, cetaris paribus is the inverse of the effect of an increase in the subsidy.

$$\frac{\partial MC_{highunemp}}{\partial(\phi)} = \frac{\partial u_{c_1}(\phi)}{\partial(\phi)} = u_{c_1c_1} \cdot (s) \cdot (t-\phi) + u_{c_1}(-1) < 0 \tag{15}$$

Given that the marginal cost of schooling decreases and the marginal benefit of schooling stays the same when the subsidy,ϕ increases under a high unemployment environment, the demand for schooling will increase. This is because the higher subsidy decreases the marginal cost to the student. Note also that the effect of an increase in the subsidy is asymmetrical over the business cycle. That is, the effect of an increase in the subsidy under the low unemployment setting is bigger than an increase under the high unemployment setting. This is because during high unemployment, people are already more likely to enroll due to low opportunity costs so the effect of the subsidy is not as strong. In the low unemployment setting, higher opportunity costs means many more students are working and the increase in schooling subsidy decreases the direct cost to students and drives more people into schooling. The effect of the subsidy is stronger under this setting since the subsidy allows individuals to work less with a small impact on consumption. With the extra time from the decline in work hours, more individuals will enroll. This result says that an increase in the subsidy leads to an increase in schooling. It also says that this increase in schooling is larger under the low unemployment setting than under the high unemployment setting.

Consider that during a downturn, lower parental income and tighter state budgets means that the subsidy for schooling is likely declining. This model predicts that a decrease in the

subsidy decreases the amount of schooling under both settings since the marginal cost to the student rises. A reduction in the subsidy not only affects the cost of college to the student, it also affects the amount of academic and social support services the university can provide. This leads to a host of other negative effects discussed at length in **??**.

The asymmetrical effects also mean that a decrease in the subsidy during low unemployment has a larger negative effect on schooling than a decrease in the subsidy during high unemployment. Decreasing the subsidy during a good economy may result in less schooling because individuals have more labor market options. Decreasing the subsidy during a poor economy may result in a smaller negative impact on schooling because individuals have fewer labor market options. Because the level of schooling is higher under high unemployment and since the effect of the subsidy is smaller under high unemployment, a reduction in the subsidy during high unemployment still results in more total schooling than a reduction during a good economy. This result suggest that increased subsidies are more effective (has larger positive effects on schooling) when the economy is doing well, and a decrease in the subsidy when the economy is poor has a smaller negative impact on schooling than a decrease in subsidy when the economy is doing well.

The preceding result would seem to suggest that the current procyclicality of state funding is actually optimal. However, this is ignoring the combined role of high unemployment and the decline in the subsidy on the probability of becoming inactive. Since individuals are restricted in the amount of hours they can work during the downturn, any decline in schooling means that there is an increase in inactivity. Compare this with the low unemployment model where a decrease in schooling caused by a decline in the subsidy can be offset with an increase in work hours, leaving inactivity unchanged. Under the high unemployment setting the decline in schooling cannot be offset with an increase in working. This demonstrates the greater likelihood of inactivity during a downturn. So while the decline in schooling caused by a decline in the subsidy is lower when unemployment is high, the probability of inactivity is higher. In addition, universities usually offset falling subsidies with an increase in tuition. Note that the effect of higher tuition is equal to the effect of falling subsidies. Thus the rate of inactivity is even higher when tuition is rising at the same time that subsidies are falling. From a public policy perspective, while declining subsidies during a downturn, is less

harmful to schooling outcomes than decreasing the subsidy during a good economy,cetaris paribus, the risk of inactivity is higher during a recession. The recommendation for public policy would be to target these students who are stuck in the state of inactivity.

Change in optimal schooling for a change in wages during low unemployment

$$\frac{\partial MC}{\partial \hat{w}} = u_{c_1 c_1}(t-\phi)(h) \tag{16}$$

$$\frac{\partial MB}{\partial \hat{w}} = \delta u''(c_2)(1+g(s,\alpha))T(\hat{w}g_s(s,\alpha)T) + \delta u'(c_2)g_s(s,\alpha)T \tag{17}$$

The effect of a change in the high school wage rate is ambiguous. Both the marginal cost and the marginal benefit of schooling is affected when the high school wage rate changes. The marginal cost of schooling is unambiguously higher, however, the direction of change in the marginal benefit is unclear. Higher wages means that income per hour of work is higher so individuals may choose to work less without any declins in consumption, thus increasing time spent in school. In addition individuals are richer so they are more able to afford the cost of schooling. On the other hand higher wages may induce individuals to work more thus reducing the time spent in schooling. In the same vein, higher wages means that the opportunity cost (in the form of foregone earnings) of being in school is higher so demand for schooling will decrease. Higher wages also impact the marginal benefit of schooling. Also, the premium between college education and high school education is smaller thus reducing the incentive to enroll in school. We do not know which effect will dominate.

Change in optimal schooling for a change in wages during high unemployment

$$\frac{\partial MC}{\partial \hat{w}} = u_{c_1 c_1}(t-\phi)(\bar{h}) \tag{18}$$

$$\frac{\partial MB}{\partial \hat{w}} = \delta u''(c_2)(1+g(s,\alpha))T(\hat{w}g_s(s,\alpha)T) + \delta u'(c_2)g_s(s,\alpha)T \tag{19}$$

The effect of an increase in the wage rage is similar under both labor market settings.

However, comparing equations 16 and 18 we see that equation 18 is less than or equal to 16 since $\hat{h}$ is less than or equal to h. This means that individuals who are working more than $\hat{h}$ during low unemployment see a higher increase in their marginal cost of schooling when the wage rate rises. This result is intuitive since individuals can freely increase or decrease work hours under the low unemployment setting but not under the high unemployment setting.

We are really interested in the effect of a decline in the wage rate since wages are likely to decline during a recession. The previous results mean that a decrease in the wage rate has an ambiguous effect for the same reasons as an increase in the wage rate. In this case the marginal cost of schooling is lower so individuals may choose more schooling. However, ability to pay for college will be lower. On the other hand, a decrease in the high school wage rate means that the premium between the high school wage and the college wage increased so college is more attractive. The results also show that the effect of the decrease in the wage rate is stronger under the low unemployment setting. In sum, an increase or a decline in wages during a labor hours restriction has ambiguous effects on schooling. While the direction of the effect cannot be established, the magnitude of the effect is lower under the high unemployment setting. This is expected since under the low unemployment setting the individual can substitute freely among school, work and inactivity while under the high unemployment setting an individual is restricted in the amount of work hours he or she can choose.

1.3 Discussion

This model underscores the theoretical complexity of the issue due to many confounding factors at play. One prediction of the model is that the optimal amount of schooling is higher under high unemployment than under low unemployment if the only thing that changes is the amount of jobs available. This suggests that a downturn in the economy that affects labor market opportunities of different demographic groups differently may affect educational investments differently. A downturn in the economy is usually accompanied by reduced funding for colleges and universities. This model shows that reduced funding during a downturn has a smaller negative effect on the demand for schooling than reduced funding during a good economy. The reason is that the subsidy reduces the cost of schooling

to the individual. When funding is reduced and thus cost of schooling to the individual is higher, more individuals will choose to fore go schooling. When the economy is doing well and individuals can easily find a job, these individuals who choose to fore go school do so in favor of work. However, during periods of high unemployment individuals who cannot afford the now higher cost of schooling and who are already working the maximum amount of labor hours available is forced into inactivity.

During a recession, period 1 wage rates are also lower. Lower wages has an ambiguous effect on the demand for schooling. On the one hand, lower high school wages mean that the opportunity cost of schooling is lower thus demand for schooling should be higher. In addition, lower high school wages, cetaris paribus, means that the premium between the high school wage and the college wage is higher thus demand for school is also higher. On the other hand, lower high school wages means that ability to pay is lower, thus demand for schooling is lower.

The problem is further complex, since during a recession it is likely that all these factors are changing simultaneously. That is, there are labor hour restrictions resulting in high unemployment, lower parental income and tighter state budgets means that the subsidy for higher education is decreasing, tuition is increasing to make up for the shortfall in appropriations and wage rates are likely falling or stagnant. The various theoretical ambiguity and complexity underlies the importance of an empirical determination. In the next three essays, I investigate empirically, the net effects of a recession on educational outcomes.

CHAPTER 2

2 THE IMPACT OF ECONOMIC CONDITIONS ON COLLEGE PARTICIPATION AMONG DIFFERENT DEMOGRAPHIC GROUPS

2.1 Introduction

Access to higher education has been greatly expanded since the mid-1960s. The amount of students and the percentage of the population now attending college are increasing and this increase has brought more demographically diverse enrollment. Actions taken by the federal government clearly played a major part in these trends, though larger economic, demographic, and social forces were also at play (Brock, 2010). Despite the gains, college access remains problematic, and gaps in enrollment between certain racial and ethnic minority groups, and between groups of different socioeconomic stautus are substantial. In this chapter, I examine the role of economic conditions during college-aged years in exacerbating or mitigating the differences in college participation among differerent demographic groups.

Labor market downturns affect different subgroups differently (Engemann and Wall, 2009; Hoynes, Miller and Schaller, 2012). In "Who Suffers During Recessions?", Hoynes, Miller, and Schaller find that the impacts of the Great Recession (December 2007 to June 2009) have been greater for younger workers, for men, and for black and Hispanic workers, than for others in the labor market. Labor market conditions are well known to affect college investment decisions. The differential impact of a recession on different subgroups may lead to unequal educational investment choices as cycle driven incentives and opportunites to invest are different for different demographic groups. If demographic differences in educational patterns are observed over the business cycle, then macroeconomic fluctuations may affect long-term prospects (Dellas and Koubi (2003)), and may contribute to racial and socioeconomic inequality in the future.

Demographic differences in educational patterns may lead to inequality in the future because post-secondary educational attainment during young adulthood is one of the biggest determinants of future earnings and income. The cumulative amount of education and training young adults receive during their critical years will significantly affect their long

term labor market success. (Sum, Ishwar, Nathan, Mykhayo, et al 2003). Young adulthood is a critical time to get an education and opportunities lost during bad times may not fully made up during good times (Flug, Spilimbergo, & Wachtenheim (1999)). Those who do not enroll in college when they come of age during a recession see their college attendance probability eroded with time as high school graduates who delay post secondary education are less likely to return and complete a college degree (Dellas and Sakellaris, (2003)). This suggests that young adults who emerge from their college-age years (18-24) with little or no college education face substantially lower future earnings, job quality and quality of life.

Given the welfare implications of unequal effects of labor market downturn on the college participation rates of different subgroups, it is surprising that these unequal effects do not figure prominently in this field. Most papers that consider the effect of an economic downturn on college participation look only at main effects. Main effects studies tell us whether, on average, there are significant differences between those who experience a downturn and those who do not. Looking only at main effects inherently assumes that the effects of an economic downturn are constant for different demographics and can obscure dramatic differences in the severity of the cyclical impacts for different groups. Main effects cannot tell us whether one group, and which group, suffers more than others during a downturn. These main-effects-only research leads to ineffective policy recommendations as policies cannot be targeted towards individuals who may suffer the most during an economic downturn.

The main or average effect of adverse labor market conditions on college participation decisions in the USA is well documented. Examples include Berger & Kostal, 2002; Betts & McFarland, 1995; Black & Sufi, 2002; Card & Lemieux, 2000. In general, these studies find that college participation rates are higher among cohorts that experience higher unemployment rates. This means that there are college participation gaps among cohorts who experience a downturn and cohorts who do not. Exceptions to this finding include Corman (1983), Kane (1994), Card and Lemieux (2000), and Berger and Kostal (2002), who all find either a negative or statistically insignificant impact of unemployment rates on college participation.

Many studies document differences in college participation rates among the different demographic groups. These studies mainly attribute participation gaps to individual and

family background, including academic preparedness, family income and support, and quality of high school (Kane, 1994; Manski & Wise, 1983). However, most of these studies ignore the role that labor market conditions may play in explaining and perpetuating these racial, income, ability participation gaps.

While one strand of literature considers the main effect of recessions on participation college participation rates, another strand looks at the gap in participation rates among differnt demographic groups. This paper adds to both strands of literature and enhances the literature by considering the impact of labor market conditions on the college particiapation rate of different demographic groups. Few studies look at the intersection of economic conditions and the college participation gap.

Results from a class of logit models that account for interaction effects between two variables show that the effects of economic downturn on participation rates differ for certain demographic groups. I find that individuals who are black or Hispanic and individuals from low education maternal backgrounds are more likely to enroll in college during high unemployment periods compared to individuals from other demographic backgrounds. I also find that the effects of high unemployment on college participation do not differ based on income, ability or gender. This result shows that the racial participation gap shrinks during periods of high unemployment. Since the demographic groups that are most sensitive to high unemployment tends to experience higher rates of unemployment, this result says that the college participation gaps among certain demographic groups will continue to shrink, all else equal.

2.2 Literature Review

Many studies consider the main or average effect of labor market conditions on participation decisions. Main-effects studies inform us how participation probabilities differ between people who experience a downturn and those who do not. In this literature review, I first summarize the relevant theoretical and empirical research of how labor market conditions affect schooling decisions on average. In the interaction literature review section, I summarize the relevant studies that explain why schooling decisions differ for different groups and then explain how a labor market downturn could further heighten the participation differences

among different demographic groups. I conclude the literature review by explaining how the current research fits into the literature.

Main Effects of Economic Downturns

During an economic contraction, the probability of finding a job is lower, thus reducing the opportunity cost of being in school. However, during a contraction, household income is usually lower which affects the ability to pay for college. Therefore, the decision to invest in college is affected by the interaction between the opportunity cost and the ability to pay considerations (Becker, 1964). The opposing nature of opportunity cost and ability to pay makes the effect of an economic contraction on college participation decisions theoretically ambiguous; opportunity-cost considerations tend to make schooling choices counter-cyclical whereas ability-to-pay considerations makes college participation decisions cyclical.

Opportunity cost and ability-to-pay affect outcomes through a number of different channels. Researchers have identified four main theoretical negative effects or ability-to-pay effects. See Fallon and Lucas, 2002; Dellas and Sakellaris, 2003, McIntyre and Pencavel, 2004; Schady, 2004. Firstly, the reduction in income makes it harder for students and their families to bear the direct costs of education such as tuition, fees and books. This leads to affected students choosing to fore go college. Secondly, the reduction in income may force students to increase time spent working at a paid job. This increase in work hours leaves less time for educational activities. Thirdly, reductions in hourly or daily wage rates may force students to work extra hours to maintain a given level of income, again leaving less time for educational activities. And lastly, sensing weaker labor market prospects from a decline in school quality, students become less interested in school (Schady, 2004).

These researchers also identified two theoretically positive effects of economic downturn on educational outcomes. Firstly, a reduction in wage rates and available jobs make working less attractive to students, who then substitute educational activities for work. And secondly, students may realize that less-educated workers suffer more during economic crisis and are more likely to attend school given this realization. For example, during the most recent recession in 2007-2009, the employment declines for those with a high school degree was 16 percent, compared with 7 percent for those with a college degree. Also, the wage gap

between what a high school graduate makes and what a college graduate makes increased during the current recession. The average weekly wage for a college graduate declined by 5 percent during the recession while high school diploma holder's paychecks declined by 10 percent (Pew Charitable trust, Economic mobility study).

During an economic downturn, the positive effects may dominate the negative effects leading to higher college participation rates. The negative effects may dominate the positive effects leading to lower participation rates. It is also possible that the positive and negative effects cancel each other out leading to statistically insignificant effects. This theoretical ambiguity underlies the need for empirical determination of the net effect.

Empirical studies on the net effect of an economic downturn on college participation have found mixed results. In the U.S., Betts and McFarland (1995) found that a one-percent increase in the adult unemployment rate is associated with a four-percent increase in full-time community college participation. However, when looking at recent high school graduates, Betts and MacFarlane found that a one-percent increase in the unemployment rate is associated with rises in full-time attendance of about 0.5 percent. Similarly, Dellas and Sakellaris (2003) studied higher education participation and the business cycle for 18 to 22 year olds and found that college participation is strongly counter-cyclical, after controlling for observable characteristics. For the period 1968-88 a one percentage point increase in the unemployment rate is associated with a 2% increase in college enrollment.

Many other studies find that participation in college increases when the unemployment rate rises. See Berger & Kostal, Black & Sufi, 2002; Dellas & Koubi, 2003; Dellas & Sakellaris, 2003; Gustman & Steinmeier, 1981; Lehr & Newton, 1978; Light, 1996; Sakellaris & Spilimbergo, 2000; Ewing, Beckert, & Ewing, 2010; Kantrowitz, 2010; Long, 2004.

On the other hand, Card and Lemieux (2001) find that the state unemployment rate has no effect, or a slightly negative effect, on the college participation rates of 18- to 21-year-old men and women. Looking at four-year colleges, Manski and Wise (1989) find that the local unemployment rate is not significantly related to college application. They find support for the presumption that there is some interaction between local labor market opportunities and the continuation of schooling. Other studies fail to find any statistically significant impact of unemployment rates on college participation. Examples include Corman (1983), Kane

(1994), Card and Lemieux (2001), and Berger and Kostal (2002).

Interaction Effects between Demographic groups and Economic Condition

Race and Gender

College participation differs by race. After controlling for such factors as family background, high school graduates from ethnic minority backgrounds are generally found to be more likely to participate in college (Borus and Carpenter 1984; Kane 1994; Hilmer 1998, 2001). The results differ, however, among ethnic groups (Ordovensky 1995; Evans and Schwab 1995; Averett and Burton 1996; Ellwood and Kane 2000). One of the reasons advanced for the higher probability of participation in post-high school education by ethnic minorities is racial discrimination in the labor market (Rice 1999; Leslie and Drinkwater 1999), or unequal access to jobs for other reasons. Discrimination or unequal access in the job market change the cost and benefits of a college education. The result is that, on the one hand, this may discourage further investment in education if those discriminated against see a smaller returns to further education. On the other hand, the opportunity cost to being in school will be lower for individuals who have less access to jobs, and they may be induced to pursue further education. In addition, individuals who face discrimination or unequal access in the job market may obtain further qualification to compensate for the disadvantages resulting from such discrimination (Rice 1999; Leslie and Drinkwater 1999).

The business cycle may disproportionately affect college participation if one group is last to be hired during an economic boom but first to be let go during a downturn. This phrase describes the labor market experience of some racial minorities especially black men (Barrett and Morgenstern 1974; Bradbury 2000; Browne 1997; Freeman 1973). Due to this last hired, first fired phenomenon, the level of employment for blacks is more volatile than for whites with respect to business cycle conditions (Freeman 1973). Thus, when the economy weakens, the unemployment rate for blacks rises by more than that for whites in percentage points (Couch and Fairlie, 2010). This means that while the opportunity costs of schooling declines for both minorities and non-minorities during a downturn, the decline is greater for black individuals. Thus, black individuals should be more likely to enroll than non-blacks

during a downturn.

Men may also be disproportionately affected by a downturn than women and as a result seek more education during a downturn. Dellas and Sakellaris (2003), consider such impacts and find that the impact of business cycle on demand for education similar for men and for women. They also find differing impacts by race, where participation decisions of Blacks are not related to business cycle but it is related to other economic variables such as the interest rate during a downturn.

Mother's Education and Household Income

Human capital theory also suggests that family background plays an important role in the decision to go to college. Family income, for example, has long been found to be a significant determinant of the college-going decision (Corman 1983; Kane 1994; Rouse 1995; Evans and Schwab 1995; Cameron and Heckman 1998; Ellwood and Kane 2000; Hilmer 1998, 2001). During a recession, family income may become more important in increasing or maintaining participation rates. With fewer jobs available, individuals may need increased parental support. Individuals whose families are not able to support them during a recession may suffer more. This may lead to disparities in participation rates for different income groups between individuals who experienced a downtown and those who did not.

Previous studies have found that parental education is one of the most powerful factors influencing the decision to go to college (Kane 1994; Rouse 1995; Evans and Schwab 1995; Averett and Burton 1996; McElroy 1996; Ellwood and Kane 2000). More highly-educated parents are more likely to invest in their child's education as a consequence of their own educational experience, while children whose parents did not attend college may lack sufficient information about college preparation or application (Long 2004). During a downturn, more highly educated parents may reinforce the importance of college education. On the other hand, students from backgrounds with lower parental education may see their parents suffer more during a recession relative to more highly educated parents and pursue more education. Additionally, individuals from backgrounds with low parental education may rely more on information from the labor market to assist them in making enrollment decisions (Beattie, 2002). Individuals, whose parents are more likely to have attended and completed

college, may view attending college as a birthright (Beattie, 2002) and thus may be less susceptible to broad-scale changes in unemployment.

Ability

Expectations are that students with high scholastic aptitudes have (relatively) more academic potential and are more likely to participate in college (Spady, 1970). Low-ability students may realize smaller gains from a college education if skill and education are complements (Long 2004), while high-ability individuals see higher returns to schooling. Human capital theory suggests that ability lowers students' educational costs and increases their demand for schooling.

Students with lower ability face fewer labor market opportunities while high-ability individuals may have a higher chance of finding a job during a recession. Thus, the opportunity cost of schooling is lower for lower ability individuals during a recession, making schooling more attractive to individuals of lower abilities. Lower ability individuals and individuals at the margin between schooling and other labor market conditions should be more sensitive to economic conditions. As a result, it can be expected that more marginal students, those who might not have started college in previous periods, are more strongly affected than high ability individuals.

Where this paper fits into the literature

One strand of the literature looks at the average effect of a labor market downturn on college participation rates. Another strand looks at how college participation rates differ among different demographic groups. This current research also considers both average effects of a downturn and differing effects of a downturn among different demographic groups. However, the main contribution of this research is to bring these two separate strands of research together by considering interaction effects. When the impact of a downturn on college participation differs based on demographic group, there is an interaction effect. There is a dearth of research that considers interaction effects and how individual background characteristics, such as race, class, and gender may cause students either to react differently to similar situations in the labor market or to have access to different labor market informa-

tion on which to base enrollment decisions. In light of the recent economic downturn and given the possible long term effects of unequal college participation during a downturn, this research is timely and imperative.

2.3 Data

Individual background and school participation data are taken from the NLSY79 survey. The NLSY79 survey is a nationally representative sample of 12 686 individuals who were between ages 14 and 22 when first interviewed in 1979. I restrict the sample to students who were of traditional college age (18-24) between 1979 and 1989 and have completed a high school degree by age 18. The survey contains information on respondents' sex, race/ethnicity, date of birth, and region of residence. The armed forces qualifying test (AFQT) scores available in the NLSY79 data set are used as a measure of ability. Access to Geocode data was obtained with special permission from the BLS. Geocode data identifiy individual-level variables, such as respondents' locations at each round of the survey. I use the location information to determine labor market conditions during students' college-age years. Individuals' state-of-residence data from the NLSY were match with and state unemployment rates from the Bureau of Labor Statistics (BLS), and the Bureau of Economic Analysis (BEA) economic data. National and regional unemployment data are from the BLS and BEA.

The data cover the years 1979 to 1989. The oldest cohort was between 18 and 19 in 1978/ 1979, and the youngest were ages 18 to 19 in 1983/1984. The sample under consideration entered young adulthood during the early highly volatile years of the early 1980s, which means some individuals experienced recession years during young adulthood and some experienced highly prosperous years, all within the same decade. This provides a natural experiment. During the 11-year period, 1979-1989, there were three recession years in the United States, 1980, 1981 and 1982 (NBER). Therefore, three of the five cohorts experienced a recession between their 18th and 19th birthday, and the two cohort that became of age in 1978/1979 and 1983/1984 were recession free.

The two back-to-back recessions of the early 1980s were unusually long and deep. On average, they are comparable to the most recent recession of 2007. The recession of the early 1980s had the highest unemployment peak of any post-war recession of 10.8%. The

2007 recession is a close second with 10.1% peak unemployment rate. During the 1980s recessions GDP fell by a combined 4.9% compared to 4.1% during the 2007 recession. While the causes of both recessions may be different, the similar pattern of unemployment and GPD changes means that the effect of the earlier recessions can inform to some degree what can be expected with the most recent recession.

Construction of Variables

The analysis considers the impact of the economic conditions during the college-aged years on probability of college attendance. Attendance is based on answers to schooling participation questions in the surveys. All individuals are asked whether they are "currently attending school and which level of schooling they are enrolled in since September of the current academic year". The variable constructed for college participation takes a value of one for all individuals who were enrolled at least once between ages 18 and 24. Of the 12,686 respondents 2,346 did not yet finish high school, so they were dropped from the sample so that the lower high school completion rates of minorities (Snyder and Hoffman 2003) are factored out. In addition individuals who were older than 18 the first year of the survey (1979) were also dropped from the sample, leaving a sample size of 5700. Custom weights for the sample based on the years used in the analysis were obtained from the BLS. This facilitates a generalization of the results to the country by ensuring that the sample is nationally representative.

I construct dummy variables based on whether individuals experienced high average unemployment rate, or low unemployment rate, throughout the period. Individuals were classified as facing high average unemployment if they fell in the third and fourth quartile of the unemployment rate. Individuals who fell in quartiles 1 and 2 of the unemployment rate were classified as having experienced low unemployment. I did this for national as well as regional unemployment rates. As a robustness test, I also measured economic conditions using a dummy variable for whether the individual experienced a recession during the college age years or not.

Table 1: Economic Indicators During Post-war Recessions

Post-war Recessions	Duration (Months)	% Change in GDP	Peak Unemployment rate	Unemployment Rate Peak date
Nov. 1948-Oct. 1949	11	-1.6%	7.9	Oct. 1949
July 1953-May 1954	10	-2.6	6.1	Sept. 1954
Aug. 1957-April 1958	8	-3.7	7.5	July 1958
April 1960-Feb. 1961	10	-1.6	7.1	May 1961
Dec. 1969- Nov. 1970	11	-0.6	6.1	Aug. 1971
Nov. 1973-March 1975	16	-2.8	9	May 1975
Jan. 1980-July 1981	6	-2.2	7.8	July 1980
July 1981-Nov. 1982	16	-2.7	10.8	Nov. 1982
July 1990-March 1991	8	-1.4	7.8	June 1992
March 2001-Nov. 2001	8	-.03	6.3	July 2003
Dec. 2007-June 2009	18	-4.1	10.1	Oct. 2007

Source: Marc Labonte (Recession Similarities and Differences), NBER

Table 2: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Enrolledby25	5720	.50	.50	0	1
Recessionat18	5720	.62	.49	0	1
HighNationalUr	5720	.40	.49	0	1
HighRegionalUr	5720	.5	.5	0	1
Black	5720	.27	.44	0	1
Hispanic	5720	.15	.35	0	1
Female	5720	.50	.50	0	1
AFQTScore	5720	47	27	0	100
MeanHHIncome	5720	22216	10703	3 769	165 180

Data Summary

Descriptive Statistics

Fifty percent of the sample participated in college by age 25. Sixty-two percent of the sample experienced a recession at age 18. The sample is 27 percent black, 15 percent Hispanic and 50 percent female ratio. The mean score on the AFQT test is 47 percent, and mean income is $22, 216.

Exploratory Analysis

Figures (7)to (9) display the participation rates for the different genders, races, income and ability quartiles based on labor market conditions. This allows us to determine the existence and magnitude of participation gaps among different demographic groups and then assess whether these gaps depend on the state of the labor market.

Main effects:

To identify main effects we compare the heights of each bar in figures (7)to (9). The difference in the height of each bar for each independent variable measures the participation gap among demographic groups. For regional unemployment, we see that on average, the main effects differ by gender,income and ability (figure 7). For national unemployment, the low unemployment bars are mostly higher than the high unemployment bars (8). This suggests a negative main effect of high national unemployment. Defining labor market conditions by a recession suggests the opposite. The recession bars are consistently higher than the

no recession bars suggesting a positive main effect of a recession across all demographic groups (9). We can also see that the bars are consistently higher for higher ability and income quartiles, suggesting that the main effects of higher ability and income levels should be positive. The bars for women are also consistently higher than for men suggesting that main effects should be positive for women. The bars are lower for black individuals which suggests that main effects should be negative for black individuals. It is important to note, however, that these averages do not control for the other independent variables.

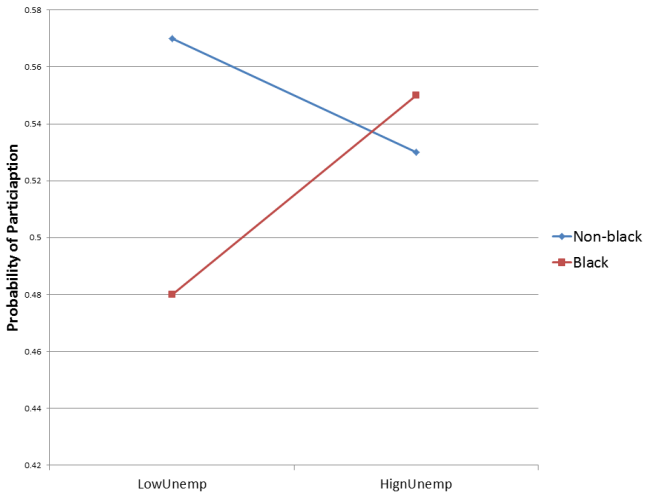
Interactions:

While one can identify an interaction in a bar graph by looking at the "difference in differences" over high and low unemployment, interaction is most easily seen by line graphs. Figure 2a provides a graphical representation of the mean participation probabilities of blacks and non-blacks over low and high unemployment. The less parallel the lines are, the more likely there is to be a significant interaction. The lines in Figure 2a, are not parallel, so we would expect an interaction. Because the lines intersect, this type of interaction is sometimes called a cross-over interaction. This means that, while the participation gap favors non-blacks during low unemployment, this gap is completely erased and is reversed to favor blacks during high unemployment. When labor market conditions are defined by a recession, the gap between blacks and non-blacks shrinks, but black participation rates never surpass those of non-blacks (figure 2b). There is no evidence for interaction for the other independent variables since the lines are all parallel (figures 3 to 6)

Regardless of how labor market conditions are measured we see that the ability and income participation gaps are significantly larger than the racial and gender gaps. For example, figure 7 shows the enrollment rate for different demographic groups based on high versus low regional unemployment. Holding labor market constant at low average regional unemployment, over 70 percent of individuals from income quartile 4 participates in college compared to 40 percent from income quartile 1. Eighty percent of individuals from ability quartile 4 participates in college compared to 28 percent from ability quartile 1. By comparison, just under 53 percent of white individuals participate versus 45 percent for black individuals. These numbers are similar when the state of the labor market is

Figure 2: Effects of Race and Labor market Conditions on College Participation

(a) High Unemployment



(b) Recession

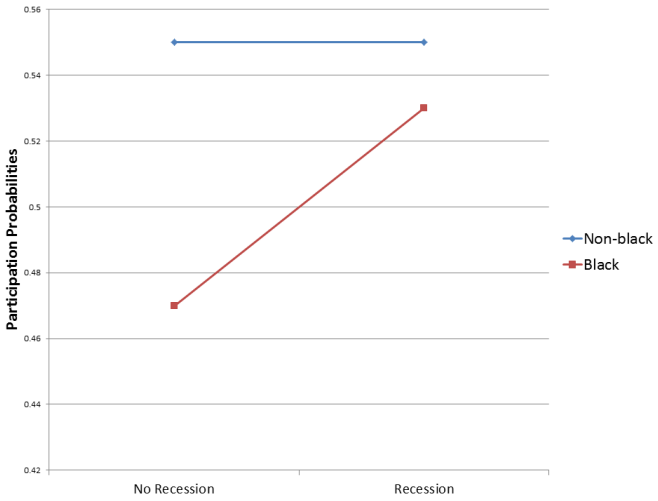


Figure 3: Effects of Labor Market Conditions , Income and Gender on College Participation rates by Ability level

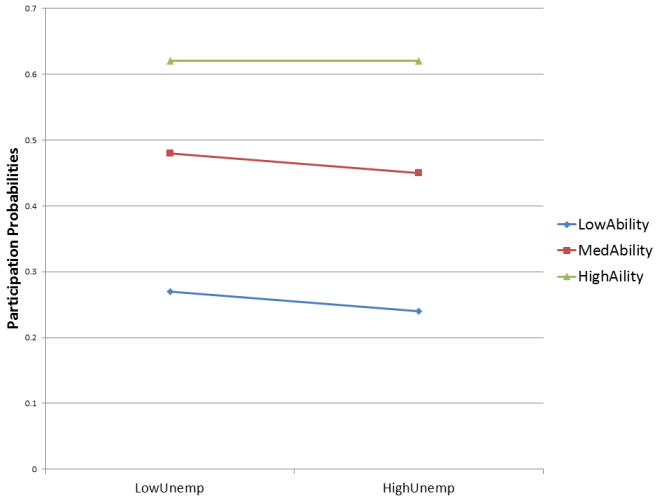


Figure 4: Effects of Labor Market Conditions , Income and Gender on College Participation rates by Income

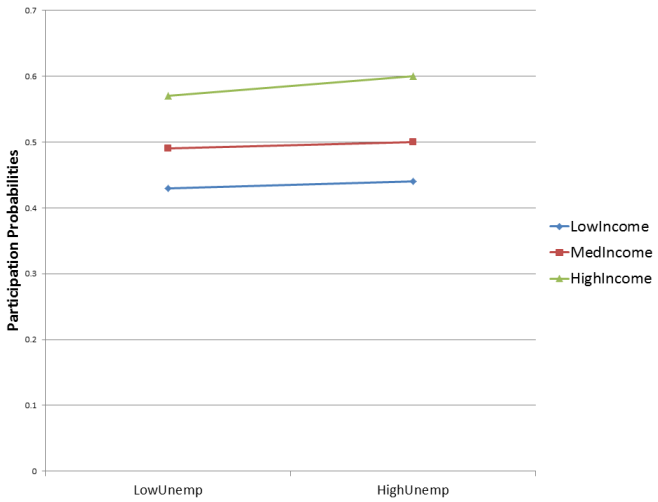


Figure 5: Effects of Labor Market Conditions , Income and Gender on College Participation rates by Race (Hispanic)

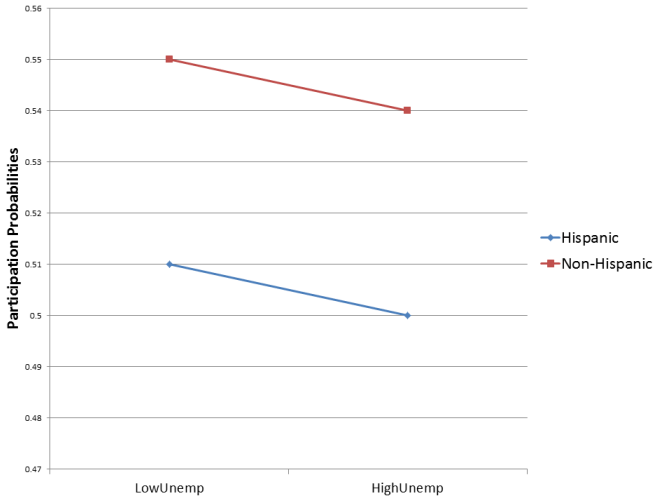


Figure 6: Effects of Labor Market Conditions , Income and Gender on College Participation rates by Gender

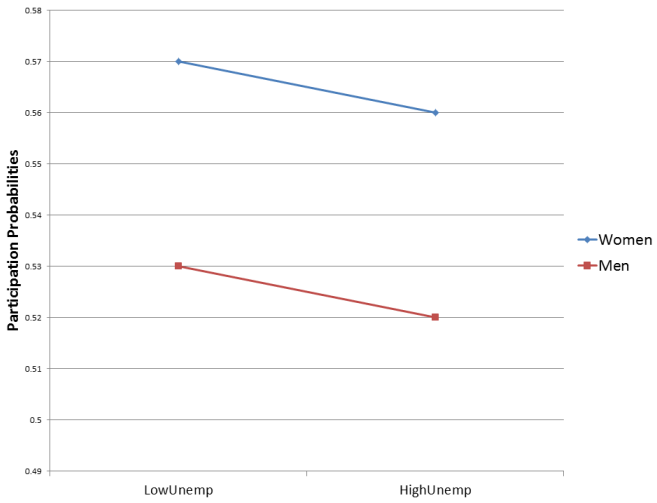
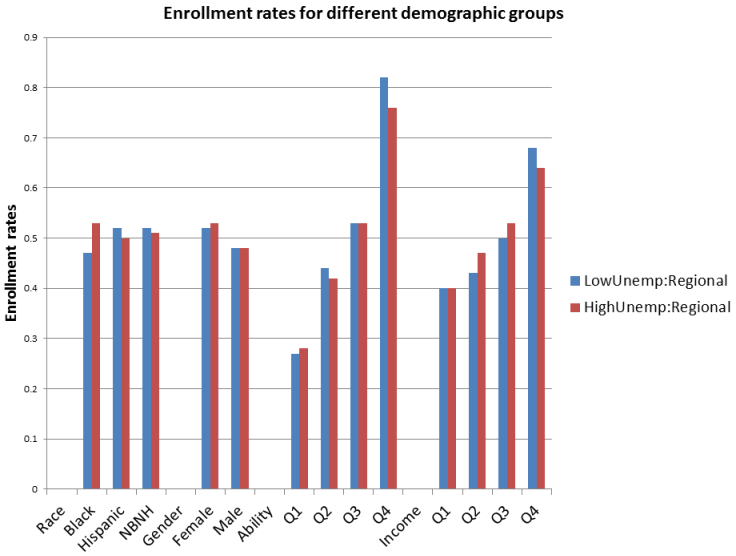


Figure 7: Participation rates by labor market conditions: Regional unemployment



measured by national unemployment and whether the economy experienced a recession or not. Regression models are employed to ascertain whether these differences are statistically significant.

2.4 Empirical Model

I employ a college participation probability model to estimate the impact of changes in the unemployment rate on probability of enrolling in college between ages 18 and 24. After the main effect of the unemployment rate is established, I estimate interaction effects to determine how the impact of high unemployment on participation differs by ability level, income level, mother's education, race and gender.

I test the magnitude and statistical significance of main and interaction effects using logit models of the following form:

$$E(y = 1|UR, X) = F(\beta_1 UR + X\beta + (X * UR)\Omega), \tag{20}$$

In this equation, y is the binary dependent variable, indicating whether the individual participates in college during the college aged years. UR is a dummy variable with a value of 1 indicating high unemployment and a value of 0 indicating low unemployment. X is a

Figure 8: Participation rates by labor market conditions: National unemployment

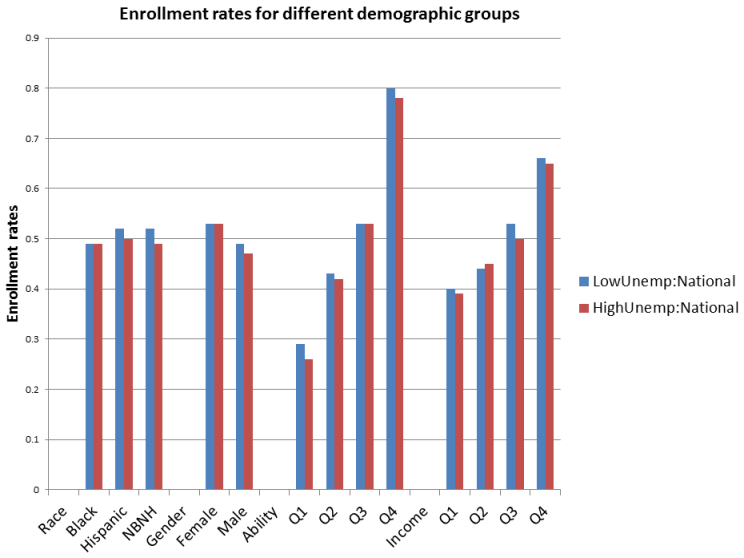
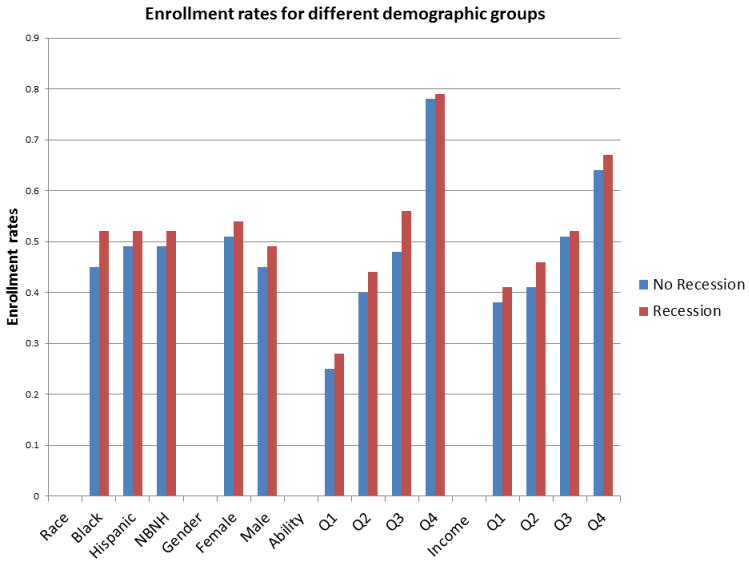


Figure 9: Participation rates by labor market conditions: Recession



vector of dummy variables that measures ability level, income level, mothers education level, race and gender. The dummy variables include low and medium versus high ability, low and medium versus high income, mother's education less than 12 and mothers education greater than 12 years versus mothers education equals 12 years, a dummy variable for Black race, a dummy variable for Hispanic ethnicity and a dummy variable for female. Variables are all characterized as dummies for ease of interpretation and comparison among and between groups. β is a vector of coefficients measuring the main effects of the independent variables. Ω is a vector of interaction coefficient, between unemployment and each independent variable.

F is the cumulative density function of the logistic distribution. The partial effect of the dummy variable x_1 is then the change in the predicted probability of $y = 1$ when x_1 changes from 0 to 1 and all other variables are held constant. Define the interaction effect to be the change in the predicted probability that $y = 1$ for a change in both x and UR. Interaction terms infer how the effect of high unemployment on the dependent variable, college participation, depends on the magnitude of another independent variable. The main effects gives us the participation gaps, and the interaction tells us how the gaps differ over different labor market conditions.

In general, there are two options when interpreting logit coefficients; compute marginal effects or exponentiate the coefficients, which gives odds ratio. As the name suggests marginal effect tells us how much the dependent variable is expected to change for a unit change in an explanatory variable- the effects are presented on an additive scale. The exponentiated coefficients give the ratio by which the dependent variable changes for a unit change in an explanatory variable- the effects are presented as multiplicative. The odds ratio gives us the ratio of the odds by which the dependent variable changes for a unit change in an explanatory variable. For example, for a dummy variable such as black race, the odds ratio is the odds of participation for blacks divided by the odds of participation for non-blacks. The odds in this case are defined as the expected number of blacks who participated for every black individual who did not participate. An odds ratio of one means the odds of participation are about even between the two groups- thus there is no participation gap between the groups. An odds ratio greater than 1 means the odds are higher for the

indicator group and an odds ratio less than 1 means the odds are lower for the indicator group. The marginal effects gives us the participation gaps in terms of percentage points while the exponentiated coefficient gives us the participation gaps in terms of odds ratios. Since both marginal and multiplicative effects answer subtly different questions both will be used.

Interaction can also be interpreted in terms of multiplicative effects or in terms or marginal effects. The multiplicative effect of an interaction tells us how the effect on participation probability of one independent variable varies with another independent variable in terms of odds ratio. For an interaction between dummy variables, for example black race and high unemployment, an odds ratio that is greater than 1 means that the effect of a high unemployment is larger for blacks than the effect of high unemployment on non-blacks. If the odds ratio is less than one it means that the effect of high unemployment is smaller for blacks than the effects of high unemployment on non-blacks. An odds ratio close to one means that there is little difference in the effects of high unemployment between blacks and non-blacks. The marginal effect of an interaction tells us how the effect on participation of one independent variable varies with another independent variable but does so in terms of probabilities. Hence, a test of whether the interaction terms equal zero is equivalent to a test of whether there are any group differences in the impact of high unemployment on the probability that the individual enrolls in college.

Unfortunately, when there is an interaction term in logit models, the straightforward interpretation of the marginal interaction coefficient from linear regression models does not extend easily to non-linear models. Ai and Norton (2003) proposed a widely discussed approach to analyzing marginal interaction effects in nonlinear single index models. In logit models such as equation (20) the common computation of the partial effect of the interaction term between the unemployment rate (x_1) and another independent variable $x_2$is $\gamma_{12} = \Omega_{12}F'(.)$. Ai and Norton argue that this does not provide any information about the complete interaction effect. The marginal effect of a change in both variables is not equal to the marginal effect of just changing the interaction term, Ω_{12}. The complete interaction effect is the entire cross partial derivative $\Delta_{12} = \partial^2 F(.)/\partial x_1 \partial x_2$ and the significance of the interaction effect must also be tested across the entire cross partial derivative.

To account for these issues Ai and Norton introduced a Stata command that calculates the correct marginal interaction effect and standard errors in logit models. The command also plots the interaction effect and the z statistic over entire the probability that $y = 1$, so that the statistical significance of the entire interaction can be assessed graphically.

The marginal interaction terms indicate the difference in effects between high and low unemployment or between recession and no recession. If the effect of a variable is larger (i.e. more positive or less negative) in high unemployment group than in low unemployment group, then the interaction term will have a positive value. If the regression coefficients are the same in both populations, then the expected values of the interaction terms are all zero. Hence, a test of whether the interaction and dummy terms equal zero is equivalent to a test of whether there are any group differences.

2.5 Results

I ran a series of seven regression equations: Equation 0, the baseline equation, includes only main effects and measures the direct effect of high unemployment on the probability of college participation as well as the direct effect of all the other independent variables. Equations 1 and 2 add interactions of low and middle test scores with high unemployment to assess ability differences in the effect of high unemployment on college participation. Equations 3 and 4 add interactions of income with high unemployment. Equations 5 and 6 add interactions of mother's education and high unemployment. Equations 7 and 8 add interactions of black and Hispanic ethnicity with high unemployment to assess racial differences in the effect of labor market conditions. Finally, equation 8 adds an interaction between gender and high unemployment. The results are reported as odds ratio in table 3 and as marginal effects in table 4.

Main Effects

The baseline equation, equation 0, shows that the main effect of high unemployment on college participation is negative (odds ratio = .91) when no interaction effect is included. However, this effect is not statistically significant. This means that there is no statistically significant participation gap between individuals who experienced high average unemploy-

ment during young adulthood and those who experienced low average unemployment. All the equations confirm this negative result.

The negative effect however, becomes significant when we control for the interaction between high unemployment and mother's education (for mother's education less than 12 years) and when we control for interaction between high unemployment and black race. The interaction effect between these two variables and high unemployment are also significant. This result shows that for the average individual there is no statistically significant main effect of high unemployment. However, when one controls for the interaction of certain demographic group, the main effect is negative and statistically significant. This shows that it is important to consider differing impacts on different demographic groups as considering main effects only obscures more nuanced outcomes that vary by demographic group. This main effect result supports conclusion by Card and Lemieux (2001) who find that the unemployment rate has no effect, or a slightly negative effect, on the college participation rates of 18- to 21-year-old men and women.

The main effects show that individuals with low and medium test scores are only .08 and .24 times as likely than high test score individual to participate in college. Low and medium income individuals are .57 and .62 times as likely as high income individuals to participate in college. These results confirm studies that show the wide and widening college participation gaps between low and high income individuals (Bailey and Dynarski, 2011) and between low and high ability individuals. The results also show that the ability participation gap is larger than the income participation gap. The main effects are all significant at the .001 level.

The model also shows that the odds that black individuals participate in college are 2.84 times higher than non-black individuals when income, test scores, gender and mothers education are controlled for. Similarly, the odds that Hispanic individuals participate in college are 2.4 times higher than non-Hispanic individuals, ceteris paribis. This result supports previous studies that find that after controlling for such factors as family background, high school graduates from ethnic minority backgrounds are generally found to be more likely to participate in college (Borus and Carpenter 1984; Kane 1994; Hilmer 1998, 2001, Cameron and Heckman 2001; Hauser 1993; Rivkin 1995).

The participation odds for women are 1.3 times higher than for men. Individuals whose mother's completed less than 12 years of education have lower participation probability than individuals whose mother has exactly 12 years of education, and individuals whose mother has more than 12 years of education are more likely to participate than those whose mother completed 12 years of education. Individuals whose mother has less than 12 years of education are .53 times as likely as those whose mother has exactly 12 years of education. This is compared to individuals whose mother has greater than 12 years of education who are 3.3 times as likely as individuals whose mother has 12 years of education. The participation gap between the different levels of mothers education is the largest of all the gaps. This result is in line with previous studies that find that parental education is one of the most powerful factors influencing the decision to go to college (Christensen et al. 1975; Willis and Rosen 1979; Kane 1994; Rouse 1994; Evans and Schwab 1995; Averett and Burton 1996; McElroy 1996; Ellwood and Kane 2000). These main effects are also statistically significant at the .001 level.

Interaction Effects

There is a positive and statistically significant interaction effect between black race and high unemployment rate and between individuals whose mother completed less than 12 years of education and and high unemployment. The interaction effect model (table 3 equation 7) shows that Black individuals who face high unemployment are 1.48 times more likely to participate than individuals who either are non-black or who face low unemployment. This amounts to a .07 increase in percentage points on average (Table4). Figure 10 shows that this effect varies over the participation probability and this effect is statistically significant over the entire participation probability. This result can inform us about the participation gap between black and non-black individuals over the business cycle. From figure 12we see that on average, black individuals are less likely to participate than non-blacks when unemployment is low. However, when unemployment is high black individuals are more likely to participate than non-blacks. This means that the participation gap not only shrinks during high unemployment but they are reversed. The gap shrinks and is eliminated for two reasons, first, participation rates are higher for blacks during high unemployment. Socend,

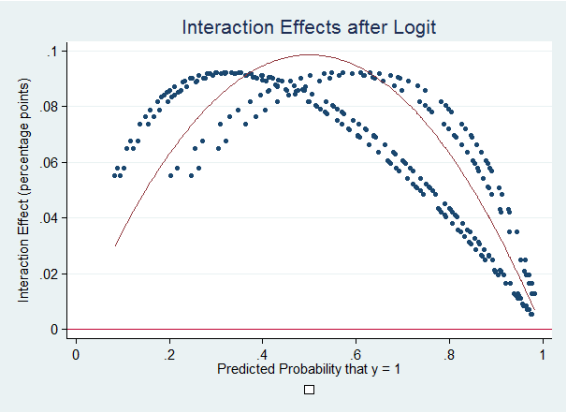
participation for non-blacks is lower during high unemployment. There is no statistically significant difference between Hispanic and Non-Hispanic individuals when unemployment rates are high.

Table 3 (equation 5) shows that the effect of high unemployment is 1.65 times higher for individuals whose mother's education is less than 12 years than the effect of high unemployment on individuals whose mother's education is equal to 12 years. The marginal effects amounts to about .10 percentage points (table 4). Figure 11 shows that this effect varies over the participation probabilities and this effect is significant over the entire participation probabilities. There is no significant interaction between unemployment and having a mother whose education is greater than 12 years. From previous discussion we know that participation probabilities are lower for individuals whose mother has lower education levels. The positive effect of high unemployment for individuals whose mother has less education coupled with no statistically significant effect for individuals with higher educated mothers means that the participation gap among individuals with different maternal education shrinks during high unemployment. (Figure 15). This gap shrinks because individuals from less-educated maternal backgrounds are more likely to enroll during high unemployment while individuals from high education parental backgrounds are not significantly affected. One possible reason for this is that individuals with low parental education may see their parents struggling and realize that less educated individuals suffer the most during periods of high unemployment and seek more education as a result. This supports previous resaerch that shows that individuals from backgrounds with low parental education may rely more on information from the labor market to assist them in making enrollment decisions. The result that individuals from background with higher education may be explained by previuos research suggesting that individuals whose parents have attended and completed college, may view attending college as a birthright and thus may be less susceptible to broad-scale changes in unemployment.(citation)

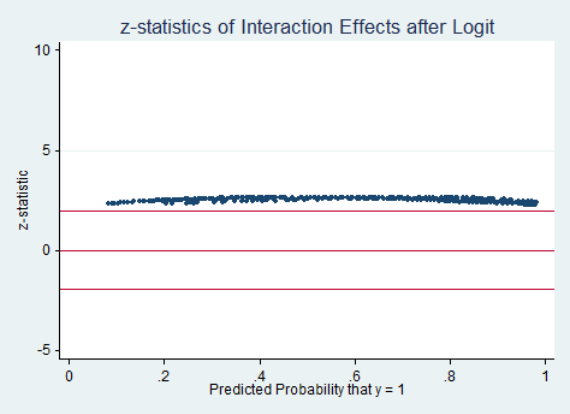
There were no statistically significant main or interaction effects when economic conditions are measured by national unemployment rate. Measuring the state of the economy using recessions gives statistically insignificant main effects of a downturn in the economy. However, when the interaction between recession and black race and recession and the inter-

Figure 10: Marginal Interaction Effects: Blacks and High Unemployment

(a) Marginal Effects



(b) z-statistics



action between mothers education less than 12 and high unemployment were included, like the model using regional unemployment, the main effects became negative. However unlike the regional unemployment models these effects were never statistically significant. The interaction between black race and recession is statistically significant with the odds ratio and marginal effects nearly identical to the models using regional unemployment. Using probit instead of logit models gives nearly identical results, thus results for these models are not shown.

The interaction between high unemployment and the other independent variables are not significant, suggesting that the effect of high unemployment does not differ based on income, gender, and ability. This result is consistent over different measures of economic conditions and over different model specifications.

Table 3: Logit Regression Results: Odds Ratio

Variables	Eq 0	Eq 1	Eq 2	Eq 3	Eq 4	Eq 5	Eq 6	Eq 7	Eq 8	Eq 9
Main Effects										
HighAvgRegionalUnemp	.91^{ns}	.89^{ns}	.86^{ns}	.91^{ns}	.84^{ns}	**.77*****	.95^{ns}	**.86*****	.91^{ns}	.88^{ns}
LowAbility	.08	.08	.09	.09	.09	.09	.09	.09	.09	.09
MedAbility	.24	.24	.22	.24	.24	.24	.24	.24	.24	.24
LowIncome	.57	.57	.57	.57	.57	.57	.57	.57	.57	.57
MedIncome	.62	.62	.62	.62	.57	.63	.62	.62	.62	.62
MomEd<12	.53	.53	.53	.53	.53	.41	.53	.52	.53	.53
MomEd>12	3.28	3.29	3.28	3.29	3.28	3.29	3.28	3.28	3.29	3.29
Black	2.84	2.86	2.84	2.84	2.85	2.87	2.85	2.43	2.85	2.84
Hispanic	2.47	2.47	2.47	2.47	2.46	2.44	2.46	2.46	2.44	2.47
Female	1.33	1.33	1.33	1.33	1.33	1.34	1.33	1.33	1.33	1.29
Interaction Effects										
LowAbility*HighAvgUnemp		1.19^{ns}								
MedAbility*HighAvgUnemp			1.09^{ns}							
LowIncome*HighAvgUnemp				1.01^{ns}						
MedIncome*HighAvgUnemp					1.17^{ns}					
MomEd<12*HighAvgUnemp						**1.65*****				
MomEd>12*HighAvgUnemp							.72^{ns}			
Black*HighAvgUnemp								**1.48*****		
Hispanic*HighAvgUnemp									1.02^{ns}	
Female*HighAvgUnemp										1.07^{ns}

ns- not significant

***- significnt at the .001 level, all others significant at .01 level or Bettsr

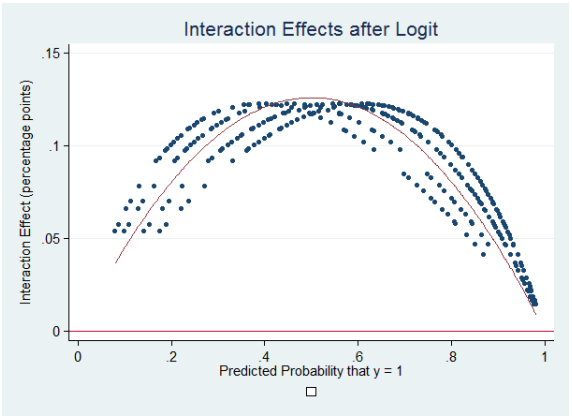
Table 4: Average Marginal Interaction Effects

Variables	Marginal Interaction Effects (Percentage Points)
LowAbility*HighAvgUnemp	$.03^{ns}$
MedAbility*HighAvgUnemp	$.014^{ns}$
LowIncome*HighAvgUnemp	$.003^{ns}$
MedIncome*HighAvgUnemp	$.03^{ns}$
MomEd<12*HighAvgUnemp	$\mathbf{.10}^{***}$
MomEd>12*HighAvgUnemp	$-.06^{ns}$
Black*HighAvgUnemp	$\mathbf{.07}^{***}$
Hispanic*HighAvgUnemp	$.004^{ns}$
Female*HighAvgUnemp	$.013^{ns}$

ns- not significant
***- significnt at the .001 level

Figure 11: Marginal Interaction Effects: Mom'sEd<12 and High Unemployment

(a) Marginal Effects



(b) z-statistics

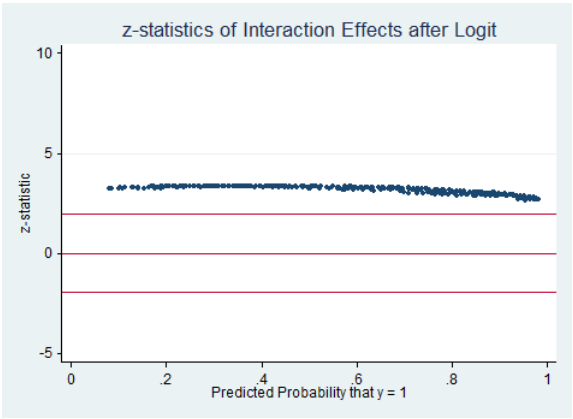


Figure 12: Participation Rates for Blacks and Non-blacks over High and Low Unemployment

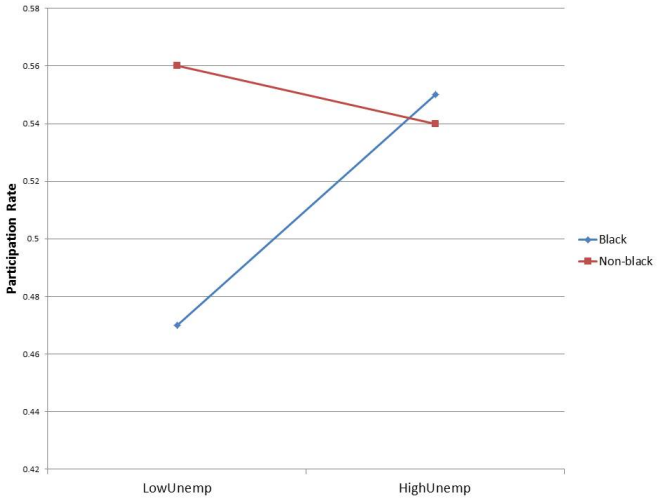


Figure 13: Participation Gaps Over Low and High Unemployment: Blacks vs Non-blacks

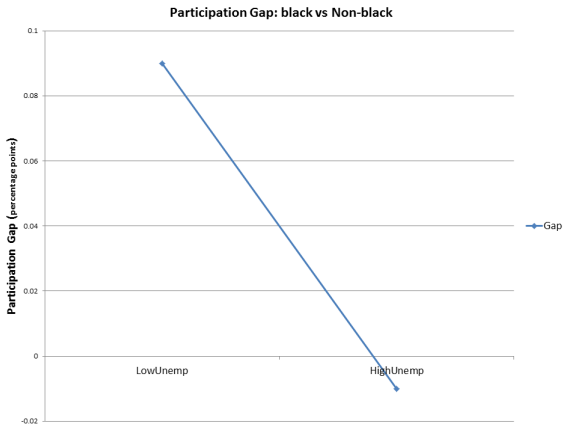


Figure 14: Participation Rates for Low Mother's Ed over High and Low Unemployment

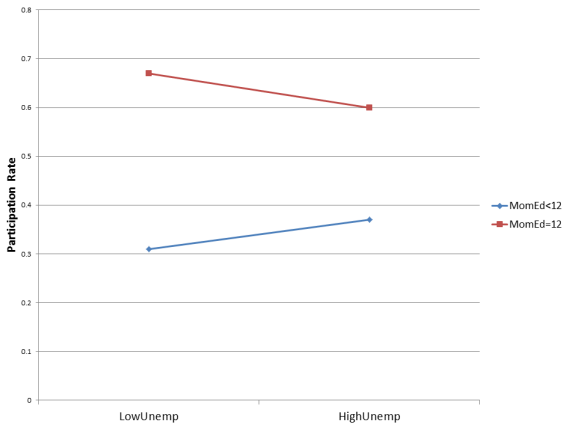
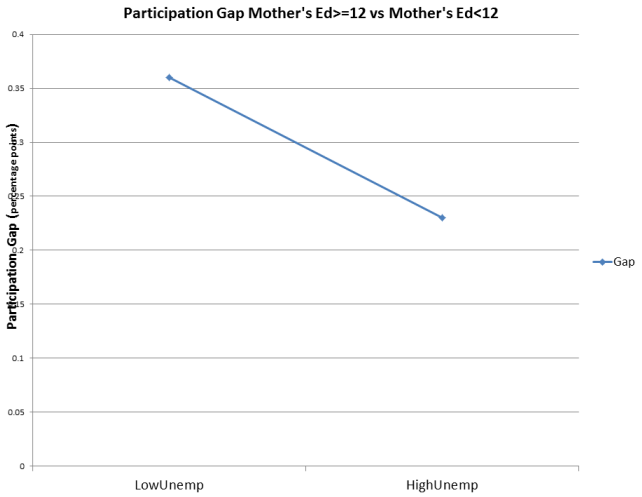


Figure 15: Participation Gaps over Low and High Unemployment: Mother's Ed Less than 12 vs Mother's Ed>=12



2.6 Discussion/Conclusion

Unlike papers the previous literature which just studies the average effect of labor market conditions on college participation, this chapter studies within-group variation in the effects of labor market conditions on college participation. I therefore account for the college participation gap among different demographic groups and test how the unemployment rate affects these gaps due to heterogeneous effects.

I find that the main effects of high unemployment are negative and mostly statistically insignificant. However, when interaction between black race and high unemployment and interaction between mother's education less than 12 and high unemployment are taken into consideration, the main effects become negative and significant. In addition, the interaction terms for black race and mothers education less than 12 are positive and significant. This suggests that looking just at average main effects obscures the effect of labor market conditions on some demographic groups.

This also means that after controlling for the positive interaction between black race and high unemployment and interaction between mother's education less than 12 and high unemployment, high unemployment rate during young adulthood contributes to a participation gap between individuals who experience high unemployment and those who experience low unemployment.

The positive interactions between being black and high unemployment shows that the college participation gaps between blacks and non-blacks shrinks during periods of high unemployment. However, the racial gap shrinks partly because the labor market effect is negative for non-black individuals. While we want to see the racial participation gap shrinking, ideally it should be because black individuals are catching up and not because non-black individuals are losing ground. Because educational opportunities that are lost during a downturn are not fully made up made up when the economy rebounds (Flug, Silimbergo, & Wachtenheim (1999)), policies should consider how to preserve participation rates for non-blacks during a downturn but without further increases in the participation gaps between blacks and non-blacks.

When the economy weakens, the unemployment rate for blacks rises more than that for whites in percentage points (Couch and Fairlie 2010). That black individuals are more likely to enroll than whites when the unemployment rate is high ceteris baribus, means that the racial participation gap should continue to improve as black individuals face higher unemployment rates. This higher unemployment rate coupled with the finding that black participation rates are positively affected by high unemployment may explain the recent trend of the shrinking college participation gaps between blacks and whites.

The findings from this paper also show that mother's education is the single most important factor in predicting participation rates. The participation gap between individuals whose mothers have more than twelve years of education and those whose mothers hve less than twelve years of education stands at about 4 to 1; the largest of all the ratios. This is in line with previous findings by Willis and Rosen 1979; Kane 1994; Rouse 1994; Evans and Schwab 1995; Averett and Burton 1996; McElroy 1996; Ellwood and Kane 2000. I also find that this gap shrinks when unemployment rates are high. In this case, the gap shrinks because individuals with low mother's education are more likely to participate while individuals with mothers education greater than twelve years are not significantly affected. This is the best case scenario, where high unemployment causes traditionally underrepresented individuals to increase their participation without hurting participation rates for traditionally overrepresented individuals.

One possible shortcoming of this study is that due to data limitations, regional prime

age unemployment is used rather than the 16-24 unemployment rate. A consequence of this is that the model may be capturing the effects of high parental unemployment on youth enrollment decisions. However, youth unemployment and prime age unemployment tend to move together so some of these effects should hold if youth unemployment is used instead. Indeed, assuming youths are more sensitive to youth unemployment, these results probably understate the impact of youth unemployment on college participation decisions.

The finding that minority youths and youths from lower education maternal backgorund are more likely to enroll during a downturn raises an important implication. These traditionally underrepresented students are more likely to enroll while the college environment is deteriorating and college funding is decreasing. These individuals typically need more support and more supportive college environment inorder to succeed. Thus, while a downturn in the economy may cause more traditionally underrepresented individuals to enroll in college, it may also cause them to be less likely to graduate. This relationship is beyond the scope of this essay and addressed in a subsequent essay.

CHAPTER 3

3 THE IMPACT OF ENTERING COLLEGE IN A DOWNTURN: A COMPETING RISK ANALYSIS

3.1 Introduction

This chapter studies schooling outcomes for young adults who enrolled in college during a downturn in the economy. Anecdotal and statistical evidence suggest that due to lower opportunity costs, more people enroll in college during a downturn, although results differ for certain demographic groups. As a result of these findings, the impact of a downturn on the educational outcomes of young adults is not always a major policy concern.

There are many disadvantages of entering college in a poor economy. During a downturn public appropriations are usually lower, resulting in more students competing for fewer resources. This forces colleges to either raise tuition or engage in other cost cutting measures such as, increasing class size, reducing course offerings, hiring more adjuncts or part-time instructors, closing undergraduate majors and minors, and terminating graduate programs (Berg-Cross and Green, 2010). In addition, there is a psychic cost or psychosocial strain to being in school during a poor economy as mental health declines during a downturn (Ruhm, 2000, Charles and DeCicca, 2008). This may induce more students to leave college prematurely.

In theory, the net effect of an economic downturn on completion rates is not clear. On the one hand, lower opportunity costs should induce students to remain enrolled, foregoing a weak labor market. On the other hand, a negative college environment coupled with ability to pay considerations could force individuals to drop out in order to work. In the worst case scenario, caught in a morass of higher tuition, less student support, and lower job availability, an individual may be squeezed out of both the labor market and the educational system, resulting in college dropout and inactivity. A recession that leads to higher dropout rates can dampen economic recovery and may lead to persistent negative effects on productivity and economic potential.

Additionally, a labor market downturn may divert to 2-year degree, students who may

have otherwise opted for a more beneficial 4-year degree (Brint and Karabel, 1989; Rouse, 1995). A survey conducted in Colorado in 2009 found that a quarter of parents with children in 2-year colleges planned on sending their kids to 4-year institutions before the most recent recession (CollegeInvest 2009). In addition to higher wages, completion of a bachelor's degree is beneficial because it, permits an individual to pursue higher levels of education in the future (known as the option value of a college degree) (Cohn and Geske,1992). Thus, even a one-time downturn in the economy can have persistent long term effects. Yet given the possible effects of an economic downturn on college completion and dropout rates, it is surprising that few studies investigate this connection.

This chapter makes two major contribution to the literature. First, most studies that look at the effect of a downturn on higher education focus on enrollment rates. While enrollment rates are a good measure of college access, this measure does not give a complete picture of the supply of college degrees. This chapter complements the literature on the impact of labor market conditions on enrollment rates, by picking up where they left off. This chapter focuses on individuals who have already enrolled in school and identify relationships between their economic environment at enrollment and subsequent school and labor market outcomes. Little evidence exists on whether enrollment is successfully transformed into completed education for recession era enrollees. Given the economic and social implications of dropping out of college, college graduation and dropout rates are an increasingly important policy and research issue (Desjarnis, Alburg & McCall 1999).

Second, this chapter is also useful from an econometric point of view. It studies schooling decisions in a competing events survival analysis framework. In the previous discussion, we saw that students may fail to complete a bachelors degree due to the occurrence of competing events such as dropping out or completing a two-year degree. In a competing events setting, students enrolled in college can exit enrollment due to more than one mutually exclusive event. Many studies consider the completion event or drop out events but not both simultaneously. The main advantage of studying this issue in a competing events framework over a single outcome framework is that it allows us to compare which event is most likely to happen and how soon in the enrollment process each event happens. This advantage is eschewed by studying the different outcomes individually. Few authors who analyze data on

education, and in particular the incidence of 4-year degree completion, use competing risks survival analysis.

This chapter also uses data from the NSLY79 survey. This data set provides a few advantages for this chapter. First, it supplies rich information about schooling and labor market activity in a longitudinal framework, allowing event history analysis. Second, it provides schooling and labor market activities during the highly economically volatile period of the early 1980's. The sample under consideration entered young adulthood during the early 1980s, which means some individuals experienced a recession during young adulthood, and some experienced highly prosperous years within the same decade. This provides a natural experiment. The two recessions of the early 1980s were unusually long and deep. Combined they are comparable to the most recent recession of 2007. The recession of the early 1980's had the highest unemployment peak of any post war recession of 10.8%. The 2007 recession is a close second with 10.1% peak unemployment rate. During the 1980s recessions GDP fell by a combined 4.9% compared to 4.1% during the 2007 recession. While the causes of both recessions may have being different, the similar pattern of unemployment and GDP changes means that the effect of the earlier recessions can inform to some degree what can be expected with the most recent recession.

Results show that, compared to individuals who enrolled in college at age 18 in prosperous years, individuals who enrolled during an economic downturn are less likely to end the spell in college with a 4-year degree, are slightly more likely to earn a 2-year degree are more likely to drop-out and become inactive and are more likely to drop out and remain active. This result suggests that a downturn leads individuals to substitute the most desirable outcome, bachelors degree completion, for less desirable outcomes, 2-year degree completion and dropping out without a degree. The implications of this result are discussed.

3.2 Conceptual Framework and Related Work

The present chapter adds to a very limited number of empirical studies that research the effect of labor market conditions at the initiation of college on completion and dropout rates. In this literature review, I first explain the possible channels through which economic conditions at college entry may affect completion and dropout rates. Next, I review the

empirical studies that address this issue. While these empirical studies inform us of how labor market downturn affects college outcomes, they mainly focus on economic conditions throughout the enrollment period. As a result, they do not inform us of the effects of a recession at enrollment. In addition, they consider different aspects of the college outcome process, for example time-to-degree, completion rates and drop-out rates, individually.

Theoretical Review of the Impact of Economic Downturn on College Outcomes

The first rationale for why a downturn may affect attainment is due to economic factors. In human capital theory the ability to pay and the opportunity costs of college affect an individual's decision to, first, enroll in college and then to remain enrolled until completion or when economic conditions favor work rather than schooling (Becker, 1967; Mincer, 1974; Stratton, O'Toole, and Wetzel, 2008). It is unclear apriori how labor market conditions affect school persistence because opportunity cost and ability-to-pay counteract each other over the business cycle. On the one hand, Bowen and Finegan (1969) rightly argues that if jobs are readily available to them, young people from poor families may be able to enroll in school, supporting themselves through part-time work. When few or no jobs are available, some young people may be unable to afford school expenditures and may drop out (p. 404). On the other hand, readily available employment opportunities for youth may simply raise the probability of dropping out and working full-time (Gustman and Steinmeier, 1981), as working crowds out time spent in school. According to Tinto (1975), most students who enter school do so because it is the best use of time and will withdraw when they sense that an alternative investment of resources will yield greater benefits over time than staying in college.

One critique of these studies is that they tend to focus solely on economic costs. Other non-economic costs, such as mental and psychological effects, are the second channel through which a recession may affect collegiate outcomes. A recession raises the psychological and mental costs of being enrolled, directly harming student outcomes. The psychological costs of being enrolled during a poor economy are frequently overlooked. These psychological costs include the adverse impacts of economic downturn on mental health. Reports continue to reveal adverse impacts of economic stress and the increasing perceived stress (Guo, Wang,

Johnson & Diaz; Cokes and Kornblum, 2010) and the potential pathological reactions to economic-induced stress (Fujita and Rao, 2009; Paton, 2008 and 2010; Sian, 2009).

The literature supports the relationships between economic-induced stress and mental or physical health (Catalano, 1991; Catalano and Dooley, 1981). Unstable economic condition and unemployment have contributed to behavioral difficulties (Catalano and Dooley, 1981; Catalano, Snowden, Shumway, and Kessell, 2007; Dooley, Brook, and Catalano, 1987), less development of self-esteem (Dooley and Prause, 1995), substance abuse (Dra-gun, Russo, and Rumboldt, 2006), increasing needs of psychiatric care (Catalano and Har-tig, 2004), and suicidal behavior (Platt and Hawton, 2000). Poorer mental and psychological health means more students require support in the form of mental health counseling. However, during a recession, universities are usually affected by budget cuts and falling endowments directly impacting the amount of support services universities can offer.

Lower funding coupled with the theories of educational persistence and attainment explains the third channel through which a downturn affects collegiate outcomes. The models of persistence and attainment consider that the university environment faced by students have significant impact on the probability of staying in college and ultimately attaining a degree. These theories suggest that such factors as resources per student (Bound and Turner, 2007), academic and social integration opportunities while enrolled in post secondary education (Pascarella and Terenzini, 2005; Tinto, 1993); sufficient guidance and counseling (Grubb and associates, 1999); alignment of educational and occupational expectations (Schneider and Stevenson, 1999) directly impact educational outcomes. A decline in funding means that resources per student are lower and that there are fewer opportunities to promote academic and social integration and to provide adequate guidance and counseling. The negative impact of a recession on the college environment may not only affect student's commitment to the academic process but may lead to a decline in the student's assessments of their chances to be successful in institutions of higher education.

The fourth channel through which a downturn may influence completion and dropout rates is based on evidence that some students treat enrollment in college as an experiment (Altonoji, 1993; Manski and Wise, 1989). According to Altonji (1993), students may initiate enrollment as an experiment to gather new information about preferences and academic

performance, and this new information influences the decision to stay in school or to drop out. During a downturn, lower opportunity costs mean that this experiment is less costly, so more individuals may enroll in order to gather information. This means that more students who do not know whether completion will be feasible or desirable enroll during a downturn. The student integration model stresses the importance of the student's academic and institutional commitment in influencing outcomes (Spady, 1970; Tinto, 1975, 1988, 1993). In addition, these experimenting students enroll at a time when university environments are negatively affected. During a downturn, lower resource per student, less academic, emotional and social support may induce these students to a conclusion that persistence is unfavorable.

The fifth channel through which a downturn may affect completion and dropout rates is higher unemployment acting as a disciplining device. Higher unemployment may stimulate student effort, as the potential costs of not completing given participation are higher in a downturn, according to Reiling and Strøm (2013). The efficiency wage models employ a similar argument to explain the positive relationship between work effort and unemployment (Reiling and Strøm, 2013). Individuals may work harder to stay in school to avoid a poor labor market. That individuals without a college education suffer more when there is a downturn in the labor market may motivate students to persist and complete a degree.

The sixth channel through which a downturn may affect completion and dropout rates is the cyclical variation in the composition of students. There is some evidence, put forth by Bradley (2013), that students who are at the margin of enrolling in college are more likely to pursue a college degree during a downturn. Older individuals and lower ability individuals may also be more likely to enroll in college during a recession. These older students and more marginal students are more likely to drop out without completing a degree (Ahlburg, McCall, and Na (1997). Thus the proportion of students who earn a degree may be lower among students who enter during a recession. In these cases, a downturn at enrollment may influence dropout and enrollment rates directly. The composition of enrollees may also affect completion and drop-out rates indirectly through peer effects. Peer quality is often included as an argument in an educational production function. Research on peer effects shows the quality of a student in terms of motivation to complete and grades, affect not only a student's probability of completing a degree but also affect peer's probability of completing

a degree (Winston and Zimmerman, 2004).

Empirical Review

There are some empirical studies that consider the impact of economic downturns on different measures of collegiate attainment. Messer and Wolter (2010) looked at the effect of economic conditions throughout the educational process on time-to-degree. They find that a high unemployment rate shortens the time-to-degree in Swiss universities. Their research looks at time-to-degree given that an individual completes a degree. This does not tell us how likely individuals are to complete a degree in the first place. They posit that on account of lower opportunity costs, recessions increase the probability of initiating a university education. At the same time recessions are likely to be associated with shorter individual times-to degree because students find it less easy to engage in paid work instead of concentrating on their studies during their time at university.

Reiling and Strom (2013) analyzed the relationship between completion of upper secondary education and regional unemployment using Norwegian regional panel data on students graduating from compulsory school 1981 to 2004. They find that students finishing compulsory school in a downturn are more likely to have completed upper secondary school five years afterward. Kienzl, Alfonso and Melguizo (2007) analyzed the impact of local labor market conditions on the year-to-year persistence and ultimate attainment decisions of a sample of traditional-aged students who attended community colleges during the 1990s. They study attainment decisions of these first-time community college students as a function of the relative change in both tuition and labor market conditions. They find that changes in these costs have a greater influence on the enrollment behavior of students who are at the margin between school and work. Students who are making decisions at the margin are more likely to modify their behavior once new information about costs becomes available. For these students, the tendency is to drop out of post secondary education. Kienzl et al, attribute this higher dropout probability solely to the ability-to-pay effect, without taking the college environment into consideration (Kienzl, Alfonso and Melguizo, 2007). Using the 1989-1994 Beginning Post-secondary Longitudinal Survey, Stratton, O'Toole & Wetzel (2008) find that a higher unemployment rate increases the probability of remaining contin-

uously enrolled in college, but it does not affect the probability of dropping versus stopping out (more permanent versus less permanent withdrawals).

Light (1996) finds that higher wages, working more hours a week and increased school costs significantly reduce the probability of re-enrollment. Although she focuses on re-enrollment of previous dropouts, her results are relevant since they highlight the close inter-relationship between the job market and schooling decisions. Arkes (2005), uses the 1980 Census micro-sample and finds that higher unemployment rates led to increased educational attainment.

3.3 Methods

This paper incorporates the discrete time method suggested by the models of Singer and Willet (1999) and Scott and Kenndy (2005) , as well some model based techniques for defining events, plots and summaries proposed by Scott and Kenndy (2005). Finally, the method of Fine and Grey is used to analyze covariate effects on the cumulative incidence of each event. In addition to analyzing covariate effects on the cumulative incidence, this paper differs from the previous studies using competing risks in an educational setting in that the effect of economic conditions are either not an integral aspect of the discussion or it is not discussed at all in the other papers.

Risk Set, Analysis Time and Failures

In standard, single-risk survival analysis, the concepts of hazard and the survival function are mainly studied. In a single-risk setting, the hazard is the instantaneous rate at which events occur, given no previous events. The cause-specific hazard and the cause-specific cumulative incidence functions are analogous concepts of rate and risk in the context of competing risks. The cause-specific hazard of a given event type reflects the failure rate from the event per unit of time among those have not failed from other events in previous periods.

The cause-specific hazard rate and the cumulative incidence function for each event are defined as follows. Suppose that there are K outcomes of interest $1, ..., K$, as well as the non-outcome 0 (i.e., no outcome of interest occurs in a period). For discrete time points t,

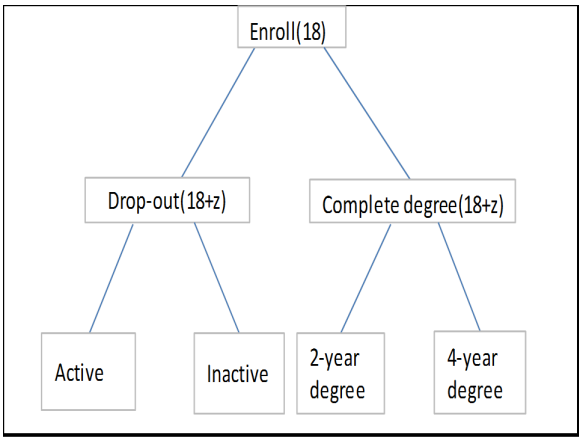
we define $h(k,t)$, the hazard of outcome k at time t, to be the probability that k happens at t, given that the non-outcome 0 has happened at every period before t. The cumulative probability of k at time t, is the probability that k occurs in the first t periods.

In any survival or event history analysis, some well-defined set of criteria establishes who is at risk. In order to establish who is at risk, an unambiguous time origin is needed. In this paper, I use individuals who entered college between ages 18 and 19. Using survey data, subjects are then followed each year until they experience one of several outcomes of interest or until they turn 25. Individuals did not all turn 18 the same year so more than one cohort is represented. Individuals enroll either full-time or part-time and in either two-year or four-year college. I only use individuals who had labor market activity data for the entire period. The data set consisted of 1890 individuals and 11040 person-period data.

In the competing risks setting, only one outcome can occur, and once an outcome occurs, the subject is no longer at risk. Time at risk is measured in years since initial enrollment at age 18. The individual can end the stint in college by either dropping out and remaining active, dropping out and becoming inactive, completing a 2-year degree or completing a 4-year degree. An individual is considered active if she is engaged in some market related activity such as being in the labor force or in the armed forces and inactive otherwise.

Some outcomes, such as obtaining a degree are easy to define. Others, such as dropping out, are more complex. A student may by considered a dropout if she ceases to be enrolled for the duration of the data without a degree. Scott and Kennedy (2004) caution that defining dropout is this manner would not be an appropriate standard since students who break from enrollment late in the data need to break for a shorter time to be regarded as dropouts. At the same time, there is a growing body of evidence indicating that a substantial fraction of students who withdraw during their first year actually return to some institution of higher education shortly thereafter. By failing to distinguish between dropouts and stop-outs (more permanent versus less permanent withdrawals), researchers may incorrectly identify the factors associated with true dropout behavior (Scott and Kennedy, 2004). One way of dealing with this issue is to define any break in enrollment as a dropout. However, since many interrupting students resume enrollment, this approach seems unsuitable. Following Scott and Kennedy (2004), I count an individual as a dropout if he or she shows two consecutive

Figure 16: Educational Outcomes



years without any enrollment. A two-year disruption in enrollment is long enough to classify any subsequent enrollment as a separate spell in schooling. The dropout event is assigned to the last period of enrollment before a break of two years. The dropout event is further divided based on the reason for dropping out. An individual who drops out of school for two consecutive years and joins the labor force is considered "dropout and working". An individual who drops out and leaves the labor force is considered "drop out and inactive".

Co-variate Analysis in Competing risk setting

In the single-risk setting, the failure probability is equal to 1-survival function. In true single-risk models, the fundamental concepts of rate and risk are connected through a well-defined one-to-one relation. A consequence of this one-to-one relation is that the hazard (the rate) immediately dictates how the co-variates relate to the survival function (the risk) (Anderson, Geskeus, de Witte and Putter, 2012). In single risk setting, the coefficients are estimated using a proportional hazard model such as Cox's model. Due to the-one-to-one relation between the hazard and the probability, the coefficients estimated in the hazard model also give the effects on the probabilities.

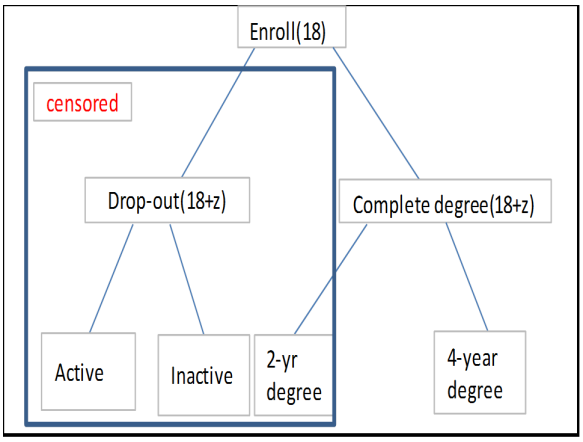
This one-to-one correspondence between cause-specific hazard and cumulative incidence, is lost in competing risk settings (Anderson, Geskeus, de Witte and Putter, 2012). In competing risk setting, the failure probability is equal to the cumulative incidences but is not the same as 1-the survival function. This is due to how the issue of censoring is handled.

In a single-risk setting, individuals who fail from an event other than the single event under study are censored, meaning that they leave the risk set. Because individuals who experience an outcome other than the outcome of interest leave the risk set each period, there is a one to one correspondence between the hazard of each outcome and the probability. This censoring assumes that the censoring events are independent of the event of interest.

In a competing risk setting, such as in the present paper, all the possible failure events are assumed to be dependent. In a competing risk setting, individuals who experience some event other than the event of interest are not censored. Instead individuals who have "died" from other causes remain in the risk set but because they already experienced another event, the overall probability that failure from event j will occur declines. This way, the other causes are competing with cause j in that they reduce the probability that cause j will occur. In this set-up, the cumulative incidence of each event depends on the cumulative incidences of the other events. As a result, in competing risk setting, there is no longer a direct relationship between the cause-specific hazard rate of event j and the probability of event j (the cumulative incidence). When competing risks are taken into account, the appropriate estimate of the failure probabilities is the cumulative incidence and not 1-the survival function as is the case in the single risk setting.

The main issue with modeling competing rather than single risk outcomes is that the co-variates are not associated with the cumulative incidence function in the same way that they are associated with the cause-specific hazard. Such properties have motivated the development of models that directly link the cumulative incidence to explanatory variables. Based on the relationship between the hazard and survival functions, Fine and Gray (1999) define a sub-distribution hazard function so that there is a direct link between the sub-distribution hazard and the cumulative incidence function. The cause-j sub-distribution hazard does not censor individuals who "die" from causes other than cause j. Because individuals who failed from other causes remain in the risk set, the sub-distribution hazard cannot be interpreted as a failure risk (Andersen et al. (2012)), but there is a one to one relation of co-variates effects between the sub-distribution hazard and the cumulative incidences. Thus, the empirical analysis involves covariate analysis using the sub-distribution hazard.

Figure 17: Educational Outcomes in Single Risk Setting



Empirical Model

The cumulative incidence for a particular cause of failure is the probability of experiencing this cause of failure by age 25, in the presence of all the other possible causes. In standard survival analysis, when testing a group (or treatment) difference, the usual steps are to estimate Kaplan Meir survival or cumulative incidence curves, test the difference of these survival curves using a log-rank test, and perform a proportional hazards regression analysis (Fine and Grey 1999). As mentioned above, in the competing risk setting, the hazard function does not have a direct interpretation in terms of survival probabilities for the particular failure type. In a competing risks situation, the equivalent steps are to generate cumulative incidence curves using the competing risk method described in Fine and Grey, test the difference between cumulative incidence curves using the Gray method, and perform a sub-distribution hazard regression analysis.

Following Fine and Gray (1999), the basic Cox competing risk model specification is as follows, where $h_{ij}^{sub}(t)$refers to the sub-distribution hazard of event j occurring at time t for student i. The regression coefficients are estimated separately for each type of event.

$$h_{ij}^{sub}(t; x, z, q) = exp(\beta_{1j} * X_i + \beta_{2j} * Z_i + \beta_{3j} * Q_{it}) h_{0j}^{sub}(t),\ j = 1, 2, 3, 4$$

Here $h_{0j}^{sub}$is the baseline sub-hazard of event j and $exp(\beta_{1j})$ and $exp(\beta_{2j})$ are the exponentials of the regression coefficients or the sub-distribution hazard ratios. The different

events are coded as; drop out and enter work force, $j = 1$, drop out and become inactive, $j = 2$, complete 2-year degree, $j = 3$, and complete 4-year degree, $j = 4$. The coefficients of interest are the β_{2j}, the effects of economic conditions at age 18 on the sub-hazard function of event j. The other co-variates are dummy variables for low and medium ability levels, low and medium average family income levels, (high ability and high income are the comparison groups) and dummy variables for mother's education greater than 12 years, black race, Hispanic ethnicity and female. Q_{it} are controls for year and regional effects. Regions are dummy variables based on BLS classifications, with North East as the comparison group.

The co-variates affect the sub-hazard and the cumulative incidence equally. The sub-hazard ratio is interpreted in the same fashion as an odds ratio. If the sub-hazard ratio for event j is less than one (say $\beta_{2j} = 0.3$), the effect of experiencing a recession at age 18 reduces the sub-hazard (and therefore the probability) for event j (say $j = 1$, drop out but remain active) by 70 percent (1-subhazard ratio=1- 0.30). This is also interpreted as individuals who experience a recession at 18 has a 70 percent lower probability of experiencing event j than an individual who did not experience a recession. On the other hand, if the sub-hazard ratio is greater than one (say $\beta_{2j} = 1.82$) , the effect of experiencing a recession at age 18 suggest an increase in the probability for event j by 82 percent. The coefficients are estimated using the competing risk program for STATA by Fine and Gray. Co-variates affect the sub-distribution hazard proportionally, similar to Cox regression.

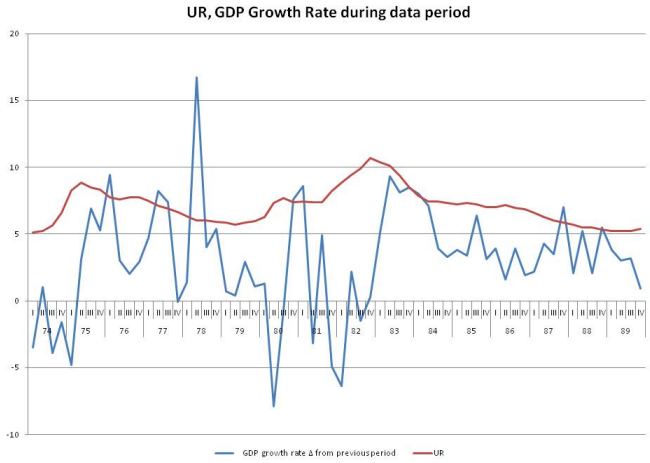
3.4 Data

Individual background and school participation data are taken from the NLSY79 surveys. The NLSY79 survey is a nationally representative sample of individuals who were between ages 14 and 22 when first interviewed in 1979. The sample data consists of students who were of traditional college age (18-24) between 1979 and 1989 and had already completed a high school degree. The survey contains information on respondents' sex , race/ethnicity, date of birth, and region of residence. The armed forces qualifying test (AFQT) scores available in the NLSY79 data set are used as a measure of ability. National and regional unemployment data are from the BLS and BEA.

The data cover the years 1979 to 1989. The oldest cohort was between18 and 19 in 1978/

1979 and the youngest was ages 18 to 19 in 1983/1984. During the 11-year period, 1979-1989, there were three recessionary years in the early part of the decade in the United States, 1980, 1981 and 1982 (NBER). Therefore three of the five cohorts experienced a recession between their 18th and19th birthday and the two cohorts that came of age in 1978/1979 and 1983/1984 were recession-free. Individuals who were between 18 and 19 years between 83 and 84 experienced zero years of recession, individuals who were between 18 and 19 years between 82 and 83 experienced one year of recession, individuals who were between 18 and 19 years between 81 and 82 experienced 2 years of recession and individuals who were between 18 and 19 years between 1980 and 1981 experienced three years of recession. Individuals who were between 18 and 19 years between 1979 and 1980 also experienced three years of recession throughout the six year post enrollment under study. This allows me to study the effects of experiencing a quick versus a persistent downturn at college entry.

Figure 18: Labor Market Conditions 1975-1989



Sample Selection

It is possible that the demographic background of students who enter college during a recession differs from students who enter when the economy is doing well. If for example, lower ability students enter during a downturn they may not fare as well in school and may drive the results. A result that during a recession "lower quality" students are more likely to enroll and are thus less likely to complete is interesting in and of itself. However, that

Table 5: Sample Means/Proportions by Labor Market Conditions at College Entry

	Mean		t-value	Pr(T≠t)
	Recession	NoRecession		
Ability	62.33	62.69	.45	.32
Income	23305	21428	-5.86	.001
Mother's Ed>12	.35	.38	2.91	.001
Black	.26	.24	-2.44	.01
Hispanic	.14	.11	-4.84	.001
Female	.55	.56	.99	.11

is not the main research question. To test for this, I use a simple test of means and test of proportions to compare background characteristics of entrants across economic conditions at entry. I test the hypothesis that individuals who enter college between age 18 and 19 do not differ over the business cycle based on race, gender, ability, income and maternal education. The results are presented in table 5. The results show that the mean income of individuals who enroll during a recession are higher than the income for individuals who enroll when there is no recession. The difference in income over the business cycle is statistically significant. The proportion of enrollees who has a mother with education greater than the 12 grade level is lower during a recession by a statistically significant amount. The proportion of black and Hispanic students who enroll during a recession is higher than when there is no recession by a statistically significant amount. The proportion of enrolless over the business cycle does not differ by ability or gender. In sum, these results show that students who enroll during a recession has higher mean income than those who enroll when the economy is doing well. This result may lead to higher completion rates among recession era enrollees. Additionally, the proportion of individuals who enroll during a recession are more likely to be black, or Hispanic and more likely to have a mother whose education level is below the 12th grade. These characteristic may lead to lower completion rates among enrollees. To deal with this selection issue, I control for these variables in my regression equations.

Table 6: Six-year Outcomes for Students who Enrolled at 18

Outcome	Percent
Dropout Active	43
Dropout Inactive	2
2-yr Degree	13
4-yr Degree	30
Still Enrolled	12

Demographic Outcomes

Figure 6 shows that of all students enrolled at age 18 in the data set, 30 percent completed a four-year degree by age 25. Thirteen percent have completed only a two-year degree, 43 percent dropped out but remained active and two percent dropped out and become inactive. The remaining 12 percent were still enrolled at age 25.

Demographic	Subgroup Proportion	Dropout-Active	Dropout-Inactive	2-yr degree	4-yr degree	Still Enrolled
Gender						
Male	44%	42%	0.8%	12%	33%	12%
Female	56%	41%	4%	14%	29%	11%
Race/Ethnicity						
Black	26%	50%	4%	12%	21%	13%
Hispanic	12%	52%	2%	14%	17%	14%
Non-Black,Non Hispanic	62%	37%	2%	13%	37%	11%
Ability Quartile						
Q1	25%	56%	5%	13%	14%	12%
Q2	25%	47%	3%	15%	25%	10%
Q3	25%	38%	2%	16%	34%	10%
Q4	25%	27%	0.2%	8%	50%	15%
Family Income Quartile						
Q1	25%	44%	3%	13%	28%	12%
Q2	33%	63%	3%	5%	10%	19%
Q3	23%	15%	0.8%	24%	57%	3%
Q4	19%	38%	1%	13%	38%	9%

Table 7: Demographics

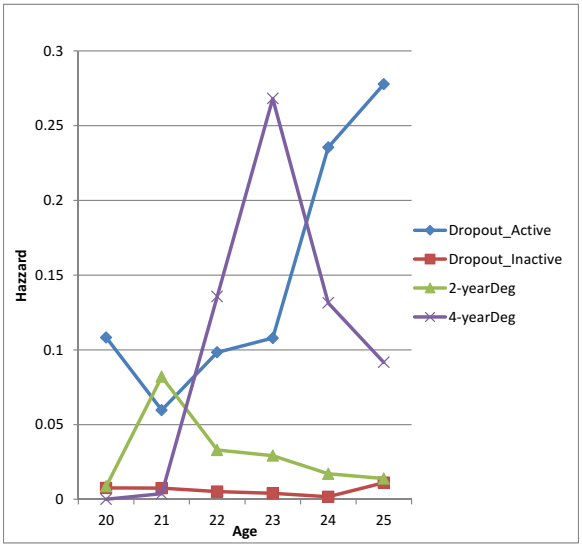
In Table 7 column 1, I provide demographic descriptives for students who had enrolled by age 19, followed by a rough sense of the outcome process in the remaining six columns. For each subgroup defined by a covariate, the proportion experiencing each of our four outcomes is provided along with the proportion of students who were still enrolled at age 25.

Men are more likely to complete a 4-year degree than women but women are more likely to drop-out and remain active and more likely to earn a 2-year degree than men. Women are also more than four times more likely than men to drop-out and become inactive. This may be due to marriage and or pregnancy. For non-black, non-Hispanic students 37% drop out and remain active, 2% drop out and become inactive and 37% receive a 4-year degree. Compare this to black students, of whom 50% drop out and remain active, 4% drop out and become inactive and 21% receive a 4-year degree. The ratio of drop out and remain active to 4-year degree outcomes particularly stands out as one compares these two groups. The proportion of students who drop out also depends on ability quartile. Fifty-six percent of individuals in quartile 1 drops out and remains active, followed by 47%, 38% and 27% for quartiles 2 through 4 respectively. Thus higher ability individuals are less likely to drop out. The opposite pattern emerges when looking at 4-year degree completion by ability quartiles. Of the students in quartiles 1 through 4, 14%, 25%, 34% and 50%, respectively, complete a 4-year degree. The effect of income on the different outcomes is not as straightforward as the effect of ability. Students in the bottom income quartile fare better in terms of degree outcomes and drop-out risk than students in the second quartile. Students in the second income quartile are also more likely than students in any other quartiles to be still enrolled past age 25. Students in income quartile 3 are the least likely to drop out for any reason, and the most likely to complete either type of degree.

Exploratory Analysis

In this descriptive analysis, the hazards of the outcomes (dropout_Active, dropout_inactive, complete 2-year degree and complete 4-year degree) for each age for individuals who enrolled at 18 are estimated.

Figure 19: Hazard Estimates



The hazard estimates in Figure 19 give a series of instantaneous pictures of the enrollment process: what can be expected, in each period, of those students who have persisted to that period. The hazard of dropout due to inactivity is quite low over the enrollment period. The hazard estimates looks as one would expect. At age 20, 11% of all enrollments drop out and remain active. Between ages 20 and 21, hazard of 2-year degrees surpasses that of dropouts. At age 22, the hazard for 4-year degree as expected, jumps sharply to a high of 27%. Students who remain enrolled after age 22 are more likely to dropout than to complete a degree. Less than 10% of those who survive complete a degree at age 25. This picture is in line with findings by van Ophem and Jonker (1999), who also note that the completion rate is very low initially, but the drop-out rate is high already in the beginning of the educational spell. Thus, completion of the first year and enrollment in the second year have a significant impact on long-term persistence and the likelihood of obtaining a degree (Stratton, Otool et al). Messer and Wolter (2004), note that the longer students take to complete their degrees the less likely they are to graduate. These hazard estimates bear this out, as the the hazard rates indicate that with each passing period, students who have not completed a two year degree by age 21 or a four year degree by age 23 are more likely to drop out than to ever complete a degree. This underscores the importance of investigating the effects of economic conditions early in the enrollment process. Labor market conditions

may discourage students from dropping out early in the process leading to higher completion rates later or it may induce early dropouts leading to less degrees later on.

Figure **??** displays the cumulative plot, estimates of $M(\hat{k}, t)$. At each period, the figure shows the estimated proportion of the initial student population that has experienced each outcome by that period. Approximately, 45% of students completed a degree (2-yer and 4-year) by age 25, on par with the 6-year degree completion national average from that period. In this sample approximately 32% of students complete a 4-year degree by age 25, which is 8% percent lower than the national average 4-year degree attainment for individuals who were 25 years old in 1990. Figure **??** shows the cumulative hazard for all events which shows that 90 percent of individuals experience an event by age 25.

In order to get a first idea of the influence of the explanatory variables on the hazard profile of 4-year degree completion, we can compute the hazard and cumulative hazard functions for sub-samples of individuals with different values of explanatory variables. However, it is important to note that the impact of other variables are not controlled for and the presence of competing activities are not controlled for. In Figure 20 I compute the cumulative hazard function of completing a 4-year degree separately for the sub-sample of individuals who experienced a recession at age 18 and the sub-sample of individuals who did not experience a recession at age 18. Looking at the sample cumulative hazards, it seems that experiencing a recession at age 18 have some impact on each outcome by age 25. Individuals who experienced a recession at 18 has a 25% probability of completing a 4-year degree by age 25 compared to 40% for individuals who did not experience a recession at 18. Individuals who experienced a recession at 18 has a 47% probability of dropping out and remaining active by age 25 compared to 37% for individuals who did not experience a recession at 18 **??**. The cumulative proportion of individuals who completed a 2-year degree only by age 25 is 13% for individuals who experienced a recession and 12% for those who did not experience a recession at age 18 (Figure21). Experiencing a recession at age 18 makes individuals more likely to drop-out and less likely to complete a 4-year degree. In the next section, I test whether the differences in outcomes hold when income, ability, parental education, race and gender are controlled for and test the statistical significance of these differences.

Figure 20: Estimates of Cumulative Proportion for 4-Year Degree

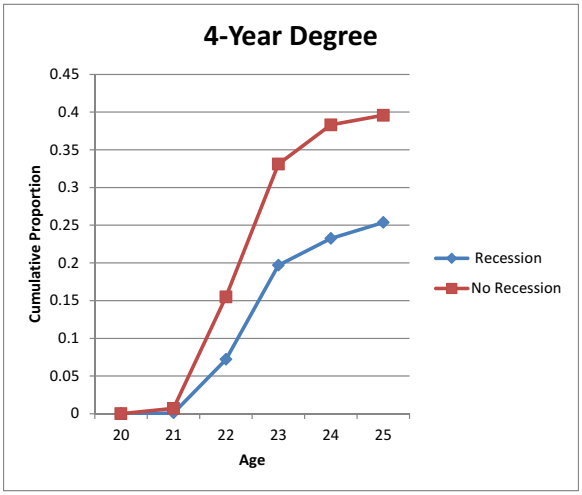
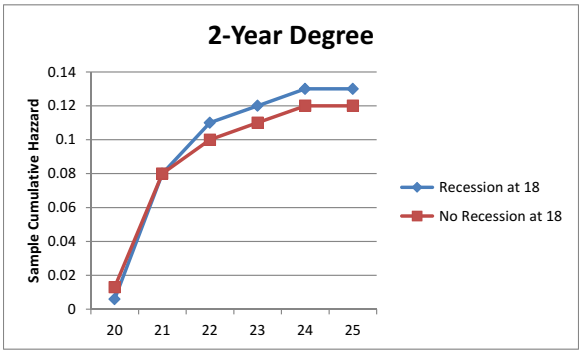


Figure 21: Estimates of Cumulative Proportion for 2-Year Degree



3.5 Results

Recession at age 18

Table 8: Regression Results: Sub-hazard Ratio Recession at 18

Co variates	Drop-out Active	Drop-out Inactive	2-year Degree	4-year Degree
Recessionat18	1.41	1.63	1.15	.59
Year	.90	.98^{ns}	.90	.96
NorthCentral	1.02^{ns}	1.81	1.01^{ns}	.98^{ns}
South	1.12	1.52	1.10^{ns}	.90
West	1.30	1.60	1.00^{ns}	.69
LowIncome	1.02^{ns}	8.30	1.15	.71
MedIncome	.97^{ns}	3.97	1.27	.81
LowAbility	2.32	16.35	1.64	.27
MedAbility	1.69	8.84	1.87	.54
MomEd>12	.85	1.66	.72	1.26
Black	1.11	.76	.73	.95^{ns}
Hispanic	1.24	.77^{ns}	.98^{ns}	.66
Female	.88	8.86	1.19	.95^{ns}

ns- not significant.ns- not significant. All others significant at the .001 level or better

Results from the sub-distribution hazard model are presented in Table 8. They show that individuals who experienced a recession at age 18, have a higher probability of dropping out and lower probability of completing a 4-year degree than individuals who did not experience a recession. Individuals who experienced a recession at 18 have a 17 percent higher odds of ending their college career as a dropout who is working or is in the labor force. Individuals who experience a recession at 18 have a 34 percent higher odds of dropping out and becoming inactive. In the descriptive analysis, we see that the incidence of two-year degree is higher for the recession group. This result also holds when other variables are controlled for.

I also find statistically significant effects of race, gender, income and ability on dropout and completion rates. Individuals from low income backgrounds have about 30 percent lower odds of completing a four-year degree (SHR= .71) and are about 8.5 times more likely to drop out and become inactive. Individuals from medium income households are about 20 percent less likely to complete a four year degree, 24 percent more likely to complete a two year degree and about four times more likely to drop out and become inactive than individuals from high income households. This is expected as previous research shows that

students from lower-income families are more likely to have to stop or drop out and are less likely to have aspirations that promote persistence ((Kane, 1994; Manski and Wise, 1983)). While other studies find evidence that low income students drop out in order to work (DeJardins, Austin and McCall, 2002), I find that low and middle income students are more likely to drop out and become inactive during a recession.

Low-ability individuals have the lowest completion odds. Low-ability individuals are about 73 percent less likely to complete a four-year degree than high-ability students and about 58 percent more likely to complete a two-year degree. Low ability individuals are over 17 times more likely to drop out and become inactive and more than twice as likely to drop out in order to work. Medium ability individuals are 45 percent less likely to complete a four year degree, about 88 percent more like to earn a two year degree and about 61 percent more likely to drop out in order to work. Medium ability individuals are also 9 times more likely to drop out and become inactive. This result may be explained by previous research that suggest that students with higher ability have (relatively) more academic potential and are less likely to exit before graduation (Spady, 1970), that poorly prepared students find college more difficult and are thus less likely to graduate (DeBrock et al., 1996) and that higher ability lowers student's educational costs and increases their demand for schooling (DeJardins, Ahlburg and McCall, 2002).

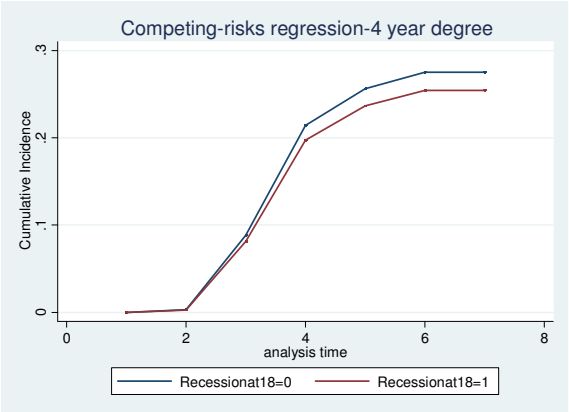
Individuals whose mother has more than 12 years of education are 25 percent more likely to earn a four year degree, 30 percent less likely to earn a two year degree, 17 percent less likely to drop out in order to work and are about 60 percent more likely to drop out and become inactive. The result that individuals from high maternal education background are about 60 percent more likely to drop out and become inactive is surprising. This may be explained by the way the inactive event is defined. The inactive definition is given to individuals who are not in the labor force or not in school, it is possible than these individuals are doing some other non-market activity, like traveling.

There is no statistically significant difference in four-year degree completion between Black and Non-black individuals. Black individuals are less likely to complete a two year degree (SHR= .73). Black individuals are more likely to drop out in order to work (SHR=1.11) and less likely to drop out and become inactive (SHR=.76). Hispanic students display the

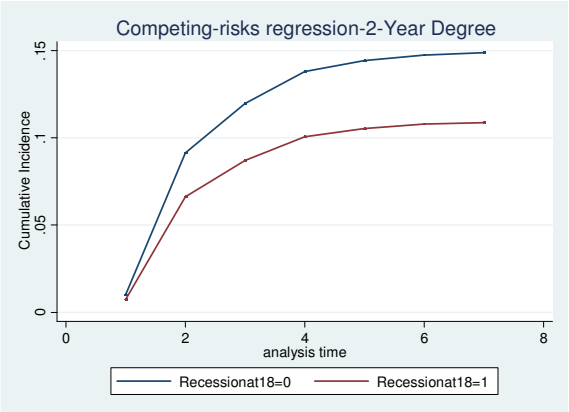
similar outcomes as black students. Hispanic students are more likely than non-Hispanics to drop out and become active (SHR=1.24), less likely to drop out and become inactive (SHR=.63), more likely to complete a two year degree (SHR=1.07) and less likely to complete a four year degree (SHR=.629).This result confirms previous results by DeJardins, Austin and McCall who find that minority students have higher probabilities of dropout and stop out and lower probabilities of graduation than their majority counterparts. I also find that women are less likely to dropout in order to work (SHR=.88), more likely to drop out and become inactive (SHR=8.87), more likely to complete a two year degree (SHR=1.96), and more likely to complete a four year degree (1.018) than men. The cumulative incidence functions for each outcome are plotted in 22

Figure 22: Cumulative Incidence Functions- Recession at 18

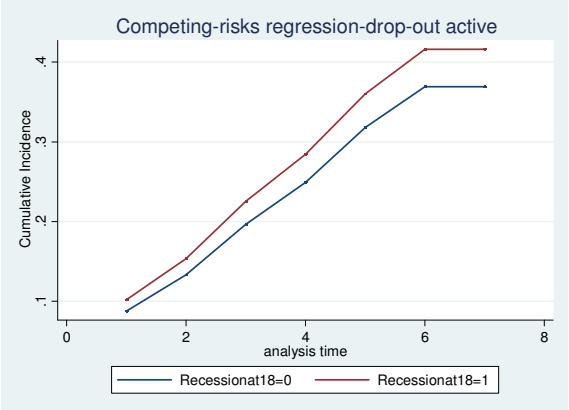
(a) CIF for 4-year degree completion



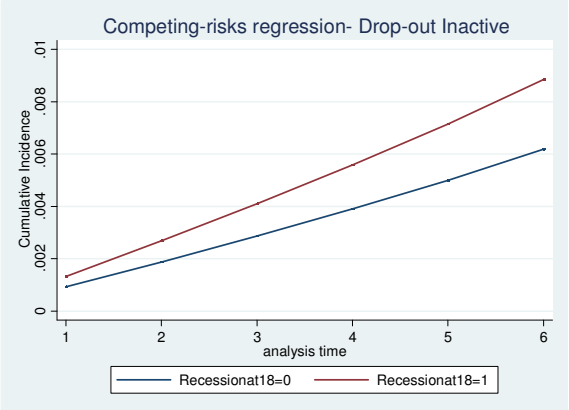
(b) CIF for 2-year degree completion



(c) CIF for drop-out active



(d) CIF for drop-out inactive



Regional Unemployment Rate

As a robustness test, I use regional unemployment rate to define economic conditions instead of recession. A recession is characterized by declining national income which moves inversely with the unemployment rate. Thus the direction of the effects should be similar when economic conditions are identified by a recession and when economic conditions are identified by unemployment rate. The magnitude of the effect may differ since unemployment rate usually lags real GDP. For example, during the study period, unemployment was relatively high even when there was no recession. Figure 23 shows that individuals from the south who were 18 in 1984, had unemployment rate around 8 percent with no recession and individuals from the same region who were 18 in 1980 had unemployment rate around 7 percent with a recession.

Comparing tables 8 and 9 reveal that the direction of the effect is similar when both recession and unemployment are used, but the effect of a recession is stronger than the effect of high unemployment rate. I find that a one percent increase in the regional unemployment rate at age 18 decreases the 4-year degree completion odds by 11 percentage points, increase the odds of drop-out inactive by 13 percent and increase the odds of drop-out active by 7 percentage points. An increase in the unemployment rate at 19 increases the odds of completing a 2-year degree by five percentage points. This result is similar when recession is used to measure economic conditions. Cumulative incidence functions comparing minimum, mean and maximum unemployment rates on 4-year degree completion and drop-out active probabilities are shown in 24

Persistent labor market conditions.

A possible shortcoming with the specification thus far is that labor market conditions at college entry may capture the impact of economic conditions in later periods to the extent that economic conditions are serially correlated. Thus, Table 10 shows estimates that controls for subsequent economic conditions. These estimates shows the impact of a recession at ages 18 and 19 and at ages 18, 19, and 20. The results confirm the negative effect of experiencing a recession at 18. This result also shows that the effect of a persistent economic

Figure 23: Recessions and Unemployment Rate in the 1980s

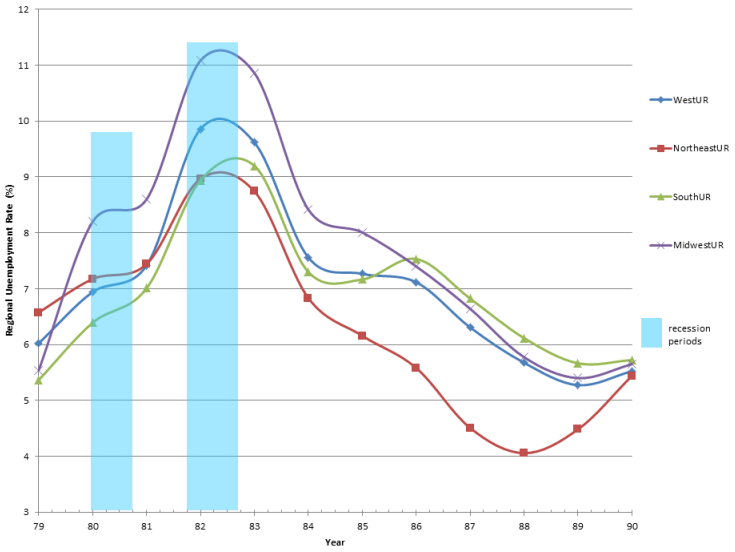


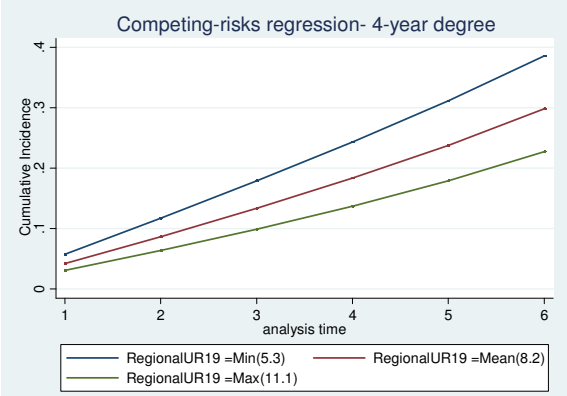
Table 9: Regression Results: Sub-hazard Ratio Unemployment at 18

Co variates	Drop-out Active	Drop-out Inactive	2-year Degree	4-year Degree
UE Rate at18	1.19	1.12	1.05	.88
Year	.88	.97^{ns}	.89	.97
NorthCentral	.77	2.07	.97^{ns}	1.15
South	1.09	1.97	1.09^{ns}	.89
West	1.18	1.96	1.00^{ns}	.72
LowIncome	1.02	8.76	1.19	.71
MedIncome	.94^{ns}	3.74	1.30	.86
LowAbility	2.36	18.40	1.51	.28
MedAbility	1.71	8.87	1.80	.56
MomEd>12	.84	1.86	.73	1.24
Black	1.13	.66	.78	.90
Hispanic	1.28	.78^{ns}	.98^{ns}	.63
Female	.88	8.86	1.22	.95^{ns}

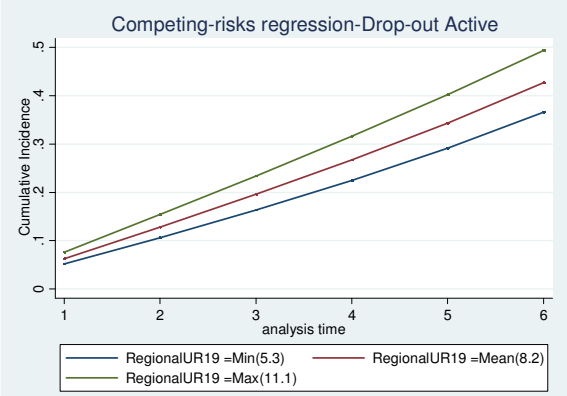
ns- not significant.ns- not significant. All others significant at the .01 level or better

Figure 24: Cumulative Incidence Functions- Regional Unemployment Rate at 18

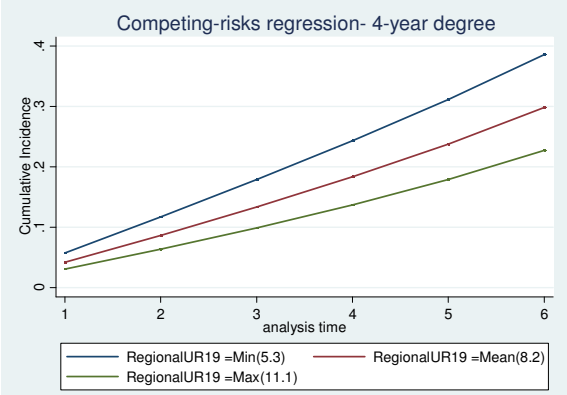
(a) CIF for 4-year degree completion



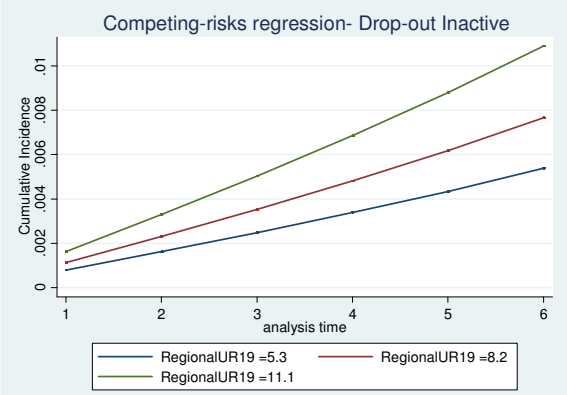
(b) CIF for 2-year degree completion



(c) CIF for drop-out active



(d) CIF for drop-out inactive



downturn is negative for four year degree completion rates, and is not statistically significant for two-year degree completion rates. The results also show that a recession that lasts more than one year post-enrollment increases the incidence of dropout. The negative impact on completion rates is larger the more persistent the recession. The sign of the effects hold when economic conditions are measured by regional unemployment rates but the magnitude of the unemployment rate effect is smaller than the recession effect. The result that economic downturn early in the college years decreases the probability of completing a degree and increases the probability of dropping out does not support previous conclusion by Reiling and Strom (2013), Stratton et al. (2005), Arkes (2005), Light (1996) all of who find that a poor economy is associated with higher probability of persistence and degree attainment. The results support conclusion by Kienzl et al, who find that the relative change in schooling costs and labor market conditions induce more marginal students to enroll, who are then more likely to drop out of post secondary education.

Table 10: Persistent Labor Market Conditions: Recessions

Co variates	Drop-out Active	Drop-out Inactive	2-year Degree	4-year Degree
Recssion18and19	1.36	1.69	.99^{ns}	.57
Recssion18,19and20	1.63	1.477	1.008^{ns}	.33
LowIncome	1.05^{ns}	8.3	1.17	.679
MedIncome	.96^{ns}	4.13	1.27	.77
LowAbility	2.3	17.3	1.57	.26
MedAbility	1.63	9.15	1.85	.54
MomEd>12	.846	1.62	.70	1.24
Black	1.11	.74	.75	.95^{ns}
Hispanic	1.3	.69^{ns}	.96^{ns}	.58
Female	.88	8.76	1.2	.96^{ns}

ns- not significant.ns- not significant. All others significant at the .01 level or better

3.6 Conclusion/Discussion

In this paper I investigate whether an economic downturn at college enrollment lead to greater dropout or greater degree completion probability among young adults who enrolled in college at age 18 during the early 1980s. I use competing risk models where the outcome of interest is four-year degree completion with two-year degree completion and dropout and remain active and dropout and remain inactive are competing outcomes. After controlling

Table 11: Persistent Labor Market Conditions: Unemployment Rate

Co variates	Drop-out Active	Drop-out Inactive	2-year Degree	4-year Degree
AvgUERate18and19	1.10	1.26	1.02^{ns}	.82
AvgUERate18,19and20	1.09	1.28	1.11	.80
LowIncome	1.05^{ns}	8.39	1.18	.70
MedIncome	.94	4.14	1.26	.80
LowAbility	2.25	17.6	1.59	.26
MedAbility	1.65	9.1	1.84	.54
MomEd>12	.84	1.64	.71	1.22
Black	1.14	$.78^{ns}$	.76	.92
Hispanic	1.33	$.75^{ns}$	$.98^{ns}$	.56
Female	.89	8.6	1.2	$.96^{ns}$

ns- not significant.ns- not significant. All others significant at the .01 level or better

for income, ability, race, gender and year and region effects, I find that individuals who experience a recession at 18 are less likely to complete a four year degree, are more likely to complete a two year degree by age 25, and are more likely to dropout for any reason. I also find that the more persistent the economic downturn during the early college years the lower is the completion probability and the higher is the dropout probability.

The implication of this result is that not only will the stock of bachelors degree be lower for cohorts who enrolled during a recession, but the number facing inactivity is also higher. Inactivity during youth has measurable persistent effects relating to the stagnation of human capital growth. Individuals exposed to higher levels of unemployment and inactivity during young adulthood fare systematically worse in the labor markets when older, experiencing lower future wages and higher risk of future unemployment (Mroz and Savage, 2006) .

Dropping out of college for any reason has varied and far-reaching economic consequences for students and for society. For the student, the costs of dropping out include the foregone returns to a college degree and lower relative unemployment rates for college educated individuals. For example, in 2007, workers with bachelor's degrees made close to 50 percent more on average than those who attended college but did not finish, according to the Labor Department. Also during the economic downturn between 2007 and 2009, the employment declines for those with a high school degree was 16 percent, compared with 7 percent for those with a college degree.

In addition, Brent (2013) finds that while all tertiary credentials have been increasing

their advantage against those who only attended high school, those who attended some college without completing the requirements for a credential have lost ground to those who never went to college. For society, the costs of dropping out of college include reduced economic output as college graduates are more productive than students who drop out, and lower public revenue since college graduates tend to earn more than others and college graduates usually enjoy a more rapid increase in their incomes (Psacharopoulos, 1985). College graduates are less likely to need government transfer payments (Blank, 1989), less likely to become unemployed (Kiefer and Neumann, 1979), less likely to become incarcerated and less likely to engage in anti-social behavior (Haan, 1975). Also, there may be adverse inter-generational effects if a person's socioeconomic status is linked to the amount and quality of education of parents (Bowles, 1972). If intergenerational effects exist, high rates of drop-outs by low-income and minority individuals may result in socioeconomic bipolarization in future generations.

Dropping out is additionally costly as a large portion of individuals who drop out of school do not return to complete a degree. Light (1996) finds two thirds of individuals who dropped out of school between 1978 and 1990 did not return by 1991. Marcus (1986) reports that 72 percent of the respondents in the National Longitudinal Survey young men cohort who left school in 1966 did not re-enroll by 1973.

Given that the net effect of a downturn at college entry on completion rate is negative we can conclude that the lower opportunity costs during a downturn are outweighed by a number of possible negative effects of a recession. There are a number of possible reasons why students who experience a recession early in the college years are more likely to drop out. The first is that a recession raises the psychological and mental costs of being enrolled during a downturn, directly harm student outcomes. There may also be more students who enroll in college as an information gathering experiment during a recession as opportunity costs are lower. These students are more likely to drop out if the college environment is negatively affected by the recession. If the composition of students entering college in terms of ability and motivation to graduate varies cyclically then this may also be contributing to higher dropout rates directly and indirectly through peer effects.

To counteract the effects of poorer mental and psychological health during a downturn

means more students require support in the form of mental health counseling. Universities can also offer more academic support and counseling to offset a negative effects of changes in the university environment during a recession. However, during a recession, universities are usually affected by budget cuts and falling endowments directly impacting the amount of support services they can offer. Thus, the procyclicality of appropriations to universities seems to be the largest single factor that may affect completion and dropout rates. More research is needed to concretely determine which of these factors affect completion rates the most.

This research should help decision makers make informed policy choices. Like academic research, there is a tendency to focus on enrollment rather than completion within policy making. Less attention is given to how successful individuals are in converting enrollment into completion. There are a number of reasons why it is important that the dropout-completion be understood, and that the effect of economic environment at college entry be isolated. First, degree completion is the true bottom line for college administrators, state legislators, parents, and most importantly students (Adelman, 1999, p. iv). Second, because the unemployment incidence is high among college dropouts (Reiling and Strøm, 2013), the higher probability of dropping out may dampen economic recovery and contribute to a sluggish labor markets.

Finally, recessions are frequent phenomenons. If these negative effects of an economic downturn do not even out when the economy picks up, there may be permanent negative effects on the supply of college-educated workers needed to meet demand, on inter-generational differences in education and earnings and on the levels of income and wealth inequality. Setting aside revenues in a trust fund to offset the revenue reductions faced during recessions, similar to the unemployment insurance trust fund, would help schools and policy makers to better offset the negative effects of a recession.

CHAPTER 4

4 THE IMPACT OF COLLEGE-AGE ECONOMIC CONDITIONS ON LONG-TERM EDUCATIONAL OUTCOMES

4.1 Introduction

In this chapter, I study the college degree outcomes of young adults as a function economic conditions during their college-aged years. Specifically, I test whether educational attainment for individuals who experience a adverse economic conditions during college-aged years differ from those who experience relatively prosperous economic conditions during young adulthood. I estimate differences in educational attainment at the end of the college-aged years and see whether these differences persist into the post-college-aged years or if degree outcomes eventually equalized.

By reducing the incentives and capacity to invest in human capital, economic downturns can affect aggregate productivity, national income distributions, social and intergenerational mobility, and economic growth and development (Becker, 1975). Research has established that business cycles impact educational investment in the short to medium term, specifically enrollment and 4- 6 year completion rates. If cycle-driven educational patterns do not cancel out when averaged over the business cycle, then macroeconomic fluctuations may affect long-term prospects (Dellas and Koubi, 2003).

Post-secondary educational attainment during young adulthood is one of the biggest determinants of future earnings and income. Individuals who forego schooling investments during young adulthood put themselves at a higher risk of never completing a degree, as degree completion probability decreases with age (Dellas and Sakellaris, 2003) . The main cost to delaying or foregoing a college education includes the foregone returns to a college degree. Even if an individual completes a college degree later in life, he or she faces higher opportunity costs and has a shorter time horizon over which to recoup returns on his or her college investment. Thus even if a recession only delays college investment, there are negative consequences.

Not only does increased educational attainment lead to higher wages and incomes for

individuals and their families down the road (Card 1999), but it also leads to a greater likelihood of educational achievement for their offspring (Hertz et al , 2007; Fox et al. 2005; Irons, 2009). Early childhood investments are made by young parents at the beginning of their careers. A large literature analyzes the impacts of college-age policies on schooling and labor market outcomes (e.g. Cameron and Heckman 1998, Heckman, Lochner and Taber 1998, Keane and Wolpin 2001, Caucutt and Kumar 2003, Hanushek, Leung and Yilmaz 2003, Johnson 2013, Gallipoli, Meghir and Violante 2013). These studies find that college-age policies not only affect college-going, but they also have significant impacts on earlier investments in children. Ignoring these early childhood investment responses may lead researchers to underestimate the total impact of college-age investment. Policies that favor higher education have benefits that persists far into the future. If educational differences persist through time, procyclical higher education funding will have sizable but hidden costs.

While the impact of a downturn may have long-term costs due to the impact on college investment, most analyses of the potential impacts of adverse economic conditions on college outcomes focus only on contemporaneous enrollment effects. This focus may be quite shortsighted, particularly for young adults. This research estimates of the effects of economic downturns during young adulthood on educational outcomes later in life and adds to a growing literature on the long-term effects of recessions.

Two main theories inform how economic conditions during college-age years affect longer term outcomes; the "long-term scarring" view and the "rational catch-up" response. The long-term scaring view holds that high unemployment rates during young adulthood lead to persistent negative effects on a host of long term outcomes. For example, a study by Bell and Blanchflower (2010) finds evidence that "spells of youth unemployment have harmful impacts on a number of outcomes - happiness, job satisfaction, wages and health - many years later." Khan (2010) and Oreopolous, Wachter, & Heisz (2012) show that graduating from college and entering the labor market during a downturn has negative labor market consequences up to 10 years into the future. Mroz and Savage (2006) find that individuals exposed to higher levels of unemployment and inactivity during young adulthood fare systematically worse in the labor market when older, experiencing lower future wages and higher risk of future unemployment.

The second theory regarding the impact of economic conditions during college-age years is that individuals may engage in a rational catch-up response to the negative effects of the recession. There are two forms of human capital investment; formal schooling and on-the-job training. During a recession, individuals who enter the labor market are more likely to be unemployed and underemployed, thus the level of skill-specific on-the-job training is lower. Individuals may turn to formal schooling as a way of catching up in response to the negative effects of the recession on on the job training (Mroz and Savage, 2006). In this chapter, I investigate whether the long-tern educational scarring view or the rational catch-up view holds.

For the empirical strategy I use a class a probit and logit models to estimate the probability of completing an associates, bachelors or postgraduate degree as a function of labor market conditions during the traditional college-aged years (18-24). I first establish the effects of labor market conditions during the college-aged years on initial degree outcomes at age 24. Then I investigate whether the effects of youth labor market conditions on degree outcomes are still present up to ten years beyond the traditional college-age. I find evidence for both a scarring effect and for a catch-up response. I find that high unemployment early in the college years (18-21) leads to lower levels of degree completion. However, higher unemployment later in the college years (22-24) leads to higher level of degree completion. This may be explained by previous studies that find that students who experience a recession as they get closer to a degree may be more likely to persist and finish that degree and are more likely to enroll in higher levels of education (Khan, 2010). I also find that the positive effects of higher unemployment at ages 22-24 disappear by age 28. The negative effects of high unemployment at ages 18-21 are still present but become weaker up to ten years after traditional college-age, as the effects of contemporaneous labor market conditions become more relevant for degree attainment during the post-college-years. This suggest that long-tern scarring of higher youth unemployment dominates the rational catch up response.

The results suggest that policies that target college outcomes should focus on the early in the college age years, as individuals who are younger during a period of high unemployment suffer negative effects, while individuals who are older experience positive educational effects. Policies targeted at people between ages 18 and 21 can attenuate the negative effects

of downturns during college years on college outcomes. While a downturn during young adulthood merely delays completion, even a delay in completion can have negative effects on the individual, on the next generation and on society.

4.2 Conceptual Framework and Literature Review

This paper adds to the literature that looks at the long-term effects of youth unemployment on outcomes later in life. In this section, I explore in detail, the two main theories that inform how economic conditions during college-age years affect longer-term educational outcomes; the "long-term scarring" view and the "rational catch-up" response. The long-term scarring view holds that high unemployment rates lead to persistent negative effects on a host of long-term outcomes including education. In the long-term scarring view, there is usually some scarring in the short-term that then persists over a period of time. In essay 1, I find evidence that an economic downturn during the college-aged years negatively affects degree attainment.

There are a host of reasons why long-term educational outcomes may be harmed by college-age unemployment rates. One reason is that young adults who experience a recession during college-age years likely saw falling incomes during those years leaving, fewer accumulated resources to attend college in subsequent years. Additionally, individuals who delay college education may find it harder to complete when they are older, as they have more responsibilities such as marriage and children that require them to spend time working for income, or spend time at home providing home production. Research shows that older college students are less likely to go on to complete a degree (Taniguchi and Kaufman, 2005). Thus young adulthood is critical time to invest as individuals who delay college degree may never complete it in the future. Those who cannot afford to enroll in college when they come of age during a prolonged recession and whose college attendance skills are eroded with time (Dellas and Koubi, 2003).

The second reason why scarring effects may persist is known as the option value to education (Cohn and Geske,1992). This means that later investments build on earlier investments; individuals who completed a bachelors degree have the option of pursuing masters, doctorates or other professional degrees. Thus, individuals who exit their college age years with

higher levels of education may continue to have higher levels of education.

The final rationale for a long-term scarring view is evidence that economic downturns change the individuals in some fundamental way that makes them less likely to invest in the future. There is evidence that individuals who experience a recession during young adulthood, when beliefs about what drives success in the labor market are being formed, may develop beliefs that are not conducive to higher levels of education. For example, Giuliano and Spilimbergo (2014), find that individuals who experience a recession during youth are more likely to believe that luck rather than hard work is more important for success in the labor market. This belief may affect the individual's commitment and ability to complete a degree. Research on college outcomes shows that the individual's beliefs about and commitment to success are important inputs into the educational production function ((Spady, 1970; Tinto, 1975, 1988, 1993)). In addition, Malmendier and Nagel (2009) find that individuals who experience a recession are more risk averse and less likely to invest in the stock market. This may mean that they have less income to fund education later on and that they are less likely to undertake the investment in college education as there are some risks associated with doing so.

The second theory that can guide our thinking about how economic downturn during college-age years affect long term education outcomes is the "catch-up" view. Individuals may engage in a rational catch-up response to the negative effects of an economic downturn. Individuals who enter the labor market during an economic downturn are more likely to be unemployed and underemployed, thus the level of skill specific on-the-job training is lower (Khan, 2010). Individuals may turn to formal schooling in a rational catch-up response to the negative effects of the recession on on the job training.

The negative effects of entering a the labor market during a recession may extend far into the future. Khan (2010) and Oreopolous Wachter, & Heisz (2012) find that those who graduate into a recession suffer lower job placements and lower wages up to ten years into the future. Khan (2010) finds evidence that individuals who are close to graduation when a recession hits are more likely to complete the degree and complete higher levels of education to delay entrance into the labor market. This delay offsets losses in human capital due to on the job training.

The long-term scarring view predicts that adverse economic conditions during young adulthood will have negative effects on educational outcomes initially and that these effects will persist over time. The rational catch-up view predicts that individuals will enroll in higher levels of education to delay entrance into a poor labor market and may opt for even higher levels of education in an attempt to offset the decline in job-specific human capital. In the empirical section, I look for evidence first, of whether an economic downturn during young adulthood resulted in higher or lower college completion rates by the end of the college-age years. Next, I determine whether these differences persist or whether they are relatively short-lived.

4.3 Methods

I estimate probit and logit models according to the equation:

$$Pr(E_{ijt}) = \Phi(UR_c, AFQT, Income, Race, Gender, Marriage, Kids)$$

Equation 4.3says that probability that individual i attains education level E_j by age t is a function of observable variables which include individual level-characteristics; race, gender, income level, ability level marital and parental status and the variable of interest, college-aged unemployment rate, UR_c. Education level $j \in \{1..4\}$,where 1 =high school degree only, 2 = associates degree only, 3 = bachelors degree only, 4 =postgraduate degree. Marital and parental status variables are included to control for the increasing effects of these variables as the individuals age.

First, I estimate a baseline equation using multinomial probit/logit models. In this equation, I estimate the differences in the probability of each outcome relative to a high school degree by age 24 as a function of the 18-21 unemployment rates and the 22 to 24 unemployment rates while controlling for demographic variables. Using the multinomial model, I test whether economic conditions affect bachelors degree completion differently than post-graduate degree completion. Here the coefficients for the high school degree category are normalized to zero, so the coefficients for the other three degree outcomes are

interpreted in reference to the high school only outcome. The goal of this first equation is to establish whether experiencing a labor market downturn during the college age years leads to more or fewer college degrees by age 24.

Next, I estimate whether the differences in outcomes seen at age 24 persist or if these differences eventually disappear. In the second set of equations, I use ordered logit/probit models to estimate whether the college age unemployment rate affects the probability of completing a higher level college in the post-college years.

In the ordered models, the probability that the individual chooses exactly education level j is given by the probability that the error term is between two thresholds. When deciding between two educational levels, individuals compare the additional cost to the additional returns of the higher educational level. A higher threshold means that the additional costs of opting for education level $Ej+1$ rather than Ej are greater than the additional returns. Thus, if one individual has a higher threshold than another, the probability that he or she attains at least education level $Ej+1$ will be lowerl. Note that in this model, it is not necessary to assess the actual costs and returns of each educational alternative. It is enough to determine how the observed characteristics influence the perceived marginal ratios of costs to returns and therefore educational attainment.

The ordered model is given by the following equation:

$$Pr(E_j|x) = \Phi(\mu_j - \beta x) - \Phi(\mu_{j-1} - \beta x) \tag{21}$$

where $\mu_j's$ are the cut values (thresholds) described above. The assumption regarding the functional form of Φdetermines whether this this an ordered logit or probit model. As a robustness check, I use both logit and probit. Since results are consistent between the two, I report results from the probit models.

In order to assess the impact of the independent variable on each degree outcome, I employ marginal analysis after running the ordered model. The marginal analysis tells us the percent change in the probability of each outcome for a one-unit change in the independent variable. I run separate regressions for every even number years between 24 and 34. I also investigate the role of the post college-age unemployment rate in mitigating or exacerbating

Table 12: Ages 18 to 24 National Unemployment Rates

Year turned 24	Frequency	18-24 National UE rate (Average)	National UE rate group
81	183	6.9	Low
82	982	7.2	Low
83	993	7.7	Medium
84	1042	7.9	High
85	1082	8.1	High
86	1109	8.1	High
87	1167	7.8	Medium
88	1122	7.1	Low
89	307	6.4	Low
Total	7987	Average= 7.5	

the effects of the college age unemployment rate effects.

4.4 Data

I also use the National Longitudinal Survey of Youths 1979 (NLSY79) in this chapter. I restrict the sample to students who completed a high school degree by age 24. Individuals turned 24 between 1981 and 1989. I use unemployment rate and recession data from the Bureau of Labor Statistics and the National Bureau of Economic Research, respectively. I use the average unemployment rate between ages 18 and 24 to construct the college unemployment rate. Table 1 shows the year individuals turned 24, the frequency of individuals in each cohort, the college unemployment rate, and the number of recession years experienced during the college years. Unemployment rates are categorized into three groups; low medium and high. The categories are chosen so that each group contains roughly one-third of the sample. The 18- 24 national unemployment rate groupings (shown in table 1) are as follows; high includes years 84, 85, and 86, medium includes years 83 and 87 and low includes years 81, 82, 88 and 89. There is some indication that the effects of high unemployment early in the college age years differ from the effects later in the college age years. I summarize and categorize unemployment rates when individuals were between 18 and 21 and when individuals were between 22 and 24.

Table 13: Ages 18-21 Unemployment Rates

Year turned 21	Frequency	18-21 National UE rate (Average)	National UE rate group
79	960	6.7	Low
80	941	6.6	Low
81	992	6.7	Low
82	1035	7.6	Medium
83	1081	8.5	High
84	1047	8.6	High
85	1094	8.5	High
86	678	7.8	Medium
Total	7828	Average= 7.6	

Table 14: Ages 22-24 Unemployment Rates

Year turned 24	Frequency	22-24 National UE rate (Average)	National UE rate group
81	183	6.7	Low
82	982	8.2	Medium
83	993	9	High
84	1042	8.9	High
85	1082	8.1	Medium
86	1109	7.2	Medium
87	1167	6.7	Low
88	1122	6.1	Low
89	307	5.6	Low
Total	7987	Average= 7.5	

Degree Outcomes

The degree outcome variable looks at degree completion rates between ages 18 and 34. I include individuals who have at least a high school diploma by age 24 so that I can focus solely on college degree completion over this period. I count only the highest degree completed. For example, someone may have completed three years at a four year college but is still coded as having only a high school degree even though these individuals technically have more years of education than someone who completes an associate degree in two years. Individuals are coded as having an associates degree only if they have completed the associates degree but not a bachelors degree. Individuals who have both an associates and a bachelors are coded as having a bachelors and individuals who have completed a masters, PhD or a professional degree (JD, MD etc.) are coded as post-graduate. There is some indication that there is a lot of movement within the postgraduate category (e.g. many people going from masters to PhD). However it becomes prohibitively demanding to estimate a model with more than four categories especially since this last category is relatively small.

Table 15 shows the percent of students who complete a degree by age group. By age 24, approximately 30 percent of all students have completed a degree. This number increases to 34 percent by age 34. This shows that degree completion rates drop off tremendously after age 24. Looking closer at degree completion by type of degree, we see that, of the additional four percent of degree completers, one percent complete an associates only, and three percent complete a bachelors degree. The bachelors degree completion rate declines over the period because, while some individuals are moving into the bachelors degree category, some are moving out of this category and into the post-graduate category. An additional 3 percent of individuals complete a post graduate degree between 24 and 34. This means that, of the 34 percent who completed a degree by age 34, 27 percent does so by age 24. This highlights the importance of completing a degree during the college-age years, as the probability of ever completing a degree declines significantly after the college-age years. This also highlights the importance of policies that encourage completion during the college age years.

Figures 25 to 28 break down the degree completion rates by age 24 and the percent change in the degree completion rates between 24 and 34 by the college unemployment

group. Figure 25 shows that, when looking at unemployment rate at 18 to 21, individuals in the high unemployment category have higher rates of high school only, and lower rates of college degree completion by age 24. When we consider the unemployment rate at 22 to 24 the opposite pattern appears; individuals in the higher unemployment rate category have lower rates of high school degree only and higher rates of college degree completion by age 24.

Figures 25 and 26 show the degree completion rates by age 24 and Figures 27 and 28 show the change in the degree completion rates between ages 24 and 34 for the unemployment rate between ages 18 and 21 and the unemployment rate between 22 and 24 respectively. In Figure 27, the greatest change in degree outcomes occurs for the low-unemployment group. Note that individuals cannot regress in educational attainment. Thus the HS-only group can only decline and any decline in the college degree outcomes signify that more people are moving out of that category into a higher category.

Individuals who face low unemployment between 18 and 21 have higher college completion rates at 24 to begin with and they are also more likely to complete a college degree between 24 and 34. Therefore, the gap in educational attainment between those who faced low unemployment between 18 and 21 and those who faced medium and high unemployment rate increased over the ten-year period between ages 24 and 34. Individuals in the high unemployment group between ages 22 and 24 had higher degree completion rates at age 24 and from Figure 28 we see that these groups also had larger increases in degree completion rates over the ten year period, suggesting that the gap in outcomes among the unemployment rate groups persists in this case as well.

In sum, individuals in the medium and high unemployment rate groups between ages 18 and 21 have lower degree completion rates at age 24, and this gap persists up to age 34. On the other hand, individuals in the medium and high unemployment groups between 22 and 24 have higher degree completion rates by age 24, and this gap persists up to age 34 as well. As we will see in the next section, these differences in outcome at age 24 are significant when other background variables are controlled for and the differences in outcomes persist to varying degrees among the different unemployment groups.

In table

Figure 25: Percent of students who Completed Degree by Age 24 by18-21 UE Rate Group

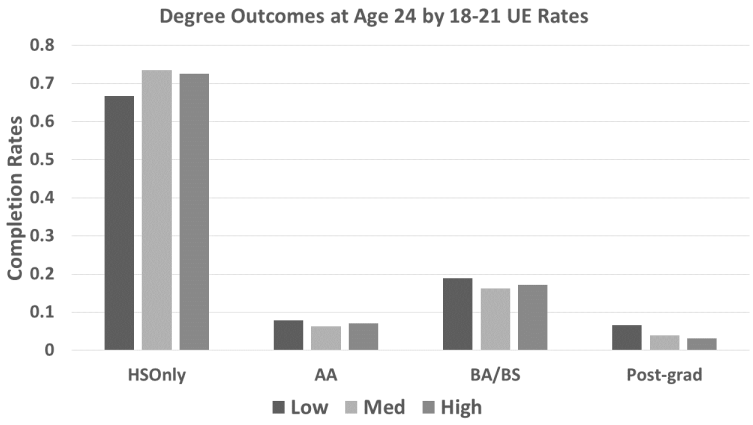


Figure 26: Percent of students who Completed Degree by Age 24 by22-24 UE Rate Group

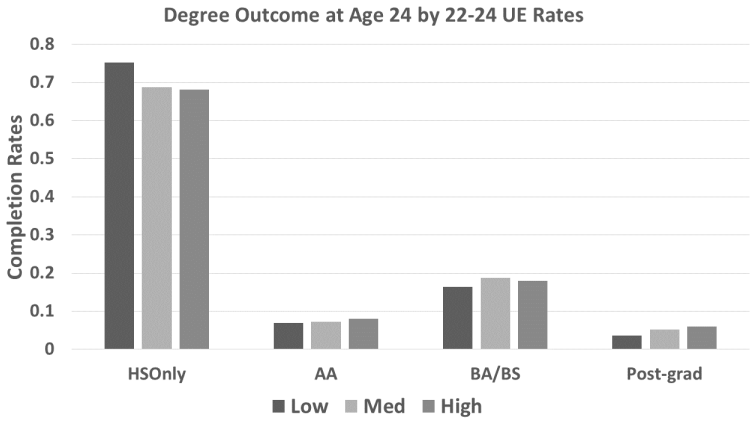


Figure 27: Percent Change in Degree Completion Rate between Ages 24 and 34 by18-21 UE Rate Group

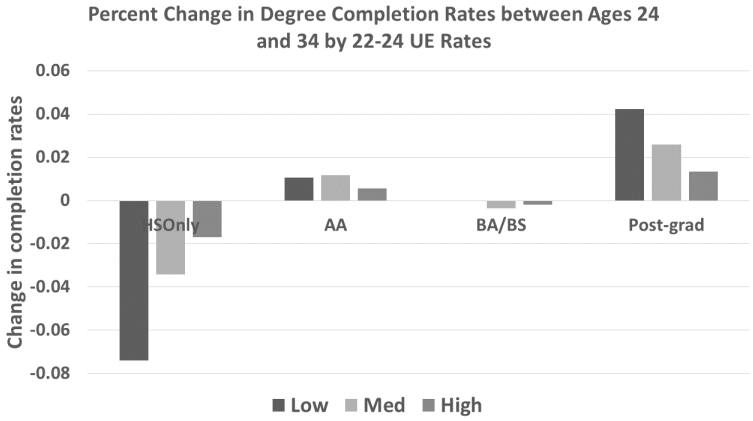


Table 15: Percent of Students who Completed Degree by Age

	Degree Outcome			
Age	HS Only	AA Only	BA/BS Only	Post-Grad
24	70.3	7.29	17.64	4.72
26	69.87	7.40	17.63	5.09
28	69.11	7.58	17.41	5.90
30	68.43	7.71	17.41	6.46
32	67.38	8.01	17.46	7.16
34	66.49	8.27	17.46	7.68
		N=8564		

Figure 28: Percent Change in Degree Completion Rate between Ages 24 and 34 by22-24 UE Rate Group

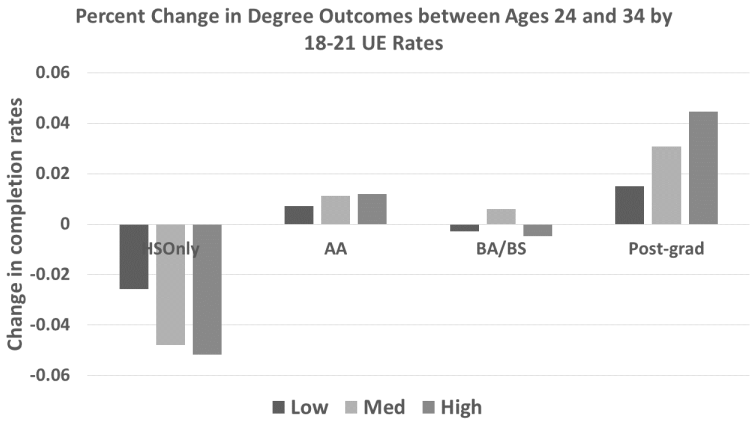


Table 16 presents summary statistics for the other variables used in the regression equations. Average family income more than doubled between the college years and the post college years increasing from approximately 17000 to close to 35000. The mean scores on the AFQT is in the 47th percentile. The sample consists of about 26 percent black, 15 percent Hispanic and 52 percent female.

Table 16: Other Summary Statistics

Variables	Observations	Mean
Mean Income 18-24	8564	16937
Mean Income 25-34	8564	34746
AFQT Percentile	8564	47.1
Black	8564	.26
Hispanic	8564	.14
Female	8564	.52

4.5 Results

Educational Outcomes by age 24

After controlling for income, ability, race, gender, marriage and children, I find strong evidence of a scarring effect on educational outcomes for individuals who were in the medium or high unemployment group versus those in the low unemployment group between 18 and 21. On the other hand, educational attainment improved for individuals who face medium and high unemployment between 22 and 24, . Figure29 shows the relative risk ratio (RRR) of high school degree to other degree outcomes. It compares degree outcomes for medium and high unemployment groups relative to low unemployment groups after controlling for ability, income, race, gender, marriage and children. In interpreting Figures 29and 30 imagine that high and medium unemployment are varying levels of a treatment that each individual is given and low unemployment means no treatment is given. Also imagine that degree completion is the response to the treatment of unemployment. When a treatment variable has an RR greater than 1, the risk of a higher outcome is increased by the treatment, when the RR is less than 1, the risk of a higher outcome is decreased, and when the RR is equal to one, the treatment has no effect.

Figures 29and 30 show that individuals in the medium and high unemployment groups, have a lower risk of completing an associates versus only a high school degree. That is, individuals in the medium and high unemployment rates are less likely than those in the low unemployment group to have completed an associates degree over a high school degree only. Individuals in the medium and high unemployment groups are even less likely than those in the low unemployment group to have completed a bachelors or a post graduate degree. The opposite patterns are observed when we look at individuals who are in the medium and high unemployment group between ages 22 and 24. Compared to individuals in the low unemployment group, those in the medium and high unemployment groups between ages 22 and 24 are more likely to complete an associates, a bachelors and a postgraduate degree versus a high school degree only (Figure 30).

Table presents the full results of the multinomial logit model for the other predictor variables. The impact of the other independent variables are as expected. Individuals

Figure 29: Age 18-21 Unemployment Groups

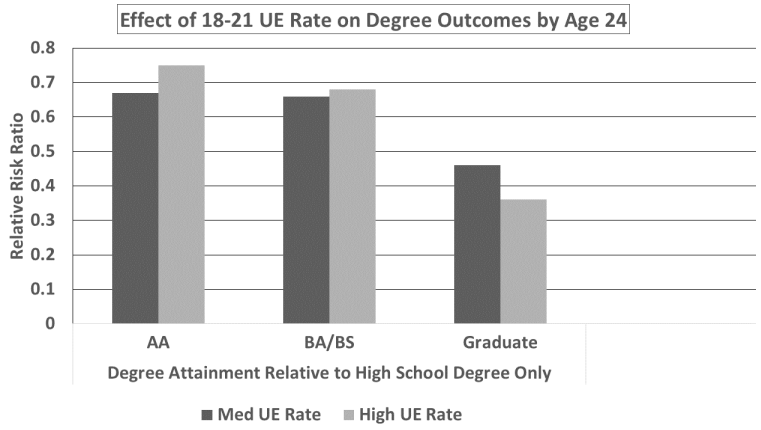


Figure 30: 22-24 Unemployment Groups

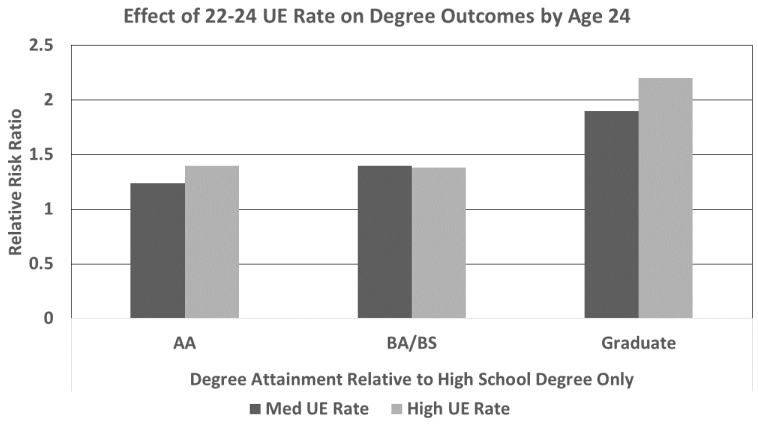


Table 17: Multinomial Logit Estimates of the Effect of UE Rate and Background Variables on Degree Outcomes at Age 24

	Multinomial Logit Estimates (relative risk ratio)[a]		
Predictor Variables	AA	BA	Post-grad
Medium 18-21UE Rate[b]	.67	.69	.50
High 18-21UE Rate	.76	.77	.42
Medium 22-24UE Rate	1.09[ns]	1.08[ns]	1.37
High 22-24UE Rate	1.25	1.06[ns]	1.62
AFQT	1.083	1.054	1.05
Income	1.018	1.015	1.009
Black	1.7	1.9	1.8
Hispanic	1.72	.88	1.46
Female	1.55	1.43	1.31
Marriedw/children	.62	.32	.42

N=8564
Prob>χ^2= .000
Pseudo R^2= .17
(a) base outcome= high school degree
(b) relative to low UE group
ns- not significant. All others significant at .05 level or better

with higher income and higher ability are more likely to complete an associates, bachelors or post-graduate degree over just a high school degree. Holding all the other variables constant, Black and Hispanic individuals are more likely than non-black, and non-Hispanic individuals to complete a college degree versus just a high school degree. Women are more likely to complete a college degree and individuals who are married with children are less likely to complete a college degree.

Additionally, we can compare the likelihood of one college degree versus another for individuals who do complete a degree. Table 18 shows that individuals in the medium and high unemployment groups between 18 and 21 are no more likely to complete a bachelors or a post-graduate degree over an associates and they are less likely to complete a post-grad over a bachelors degree. Individuals in the high unemployment group are more likely to complete an associates than a post-grad and a bachelors than a post-grad. When we consider unemployment later in the college years, we see that individuals in the medium and high unemployment categories between 22 and 24 are more likely to complete a post graduate degree than a bachelors but they are no more likely to complete a bachelors over an associates. This suggests that it is individuals who are closer to graduating with a bachelors

Table 18: Multinomial Logit Estimates of the Impact of College-age UE Rate on Degree Outcomes at Age 24

	College Degree at Age 24		
UE Rate Group[a]	BA/AA	Post-grad/AA	Post-Grad/BA
Med 18-21UE Rate	1.02^{ns}	$.73^{ns}$	.73
High 18-21UE Rate	1.01^{ns}	.55	.54
Med 22-24UE Rate	$.99^{ns}$	1.25^{ns}	1.27
High 22-24 UE Rate	$.85^{ns}$	1.29^{ns}	1.52

(a) relative to low unemployment
ns- not significant. All others significant at .05 level or better

degree experience the positive effect of high unemployment on further education. This is consistent with findings by Kahn (2010) who finds that individuals who approached the end of a degree during an economic downturn were more likely to enroll in a higher degree level.

Effects of College-age Unemployment Rate on Post College-age Educational Outcomes

In this section, I present estimates of whether the differences in educational outcomes among the different employment rate groups persist or whether these differences equalized over the 10-year period between ages 25 and 34 after controlling for ability, income, gender, race, marriage and children. The marginal effects presented in Table **??** are interpreted as the percent change in the probability of the degree outcome as a function of the college unemployment rate with low unemployment as the comparison group. Tables 19 to 22 confirm the results in the previous section that at age 24, individuals in the medium and high unemployment groups between 18 and 21 have higher probabilities of having only a high school degree and lower probabilities of completing any college degree. The opposite is true when looking at the unemployment rates between 22 and 24. In this case, those in the medium and high unemployment groups between 22 and 24 are less likely to have only a high school degree and more likely to have a college degree. Looking at the effects of unemployment rate on degree outcomes as individuals age, we see that the effect of unemployment rate is weaker over time and eventually disappears for all groups by age 34 meaning that educational outcomes eventually equalized after 10 years post-college age.

The negative effects of higher unemployment rate between 18 and 21 on degree attain-

ment do not disappear until age 34, while the positive effects high unemployment between 22 and 24 disappears by age 28. This is logical since individuals with higher degree outcomes slow down or end their schooling while individuals with lower attainment have more room to improve their degree outcomes. This outcome may also be explained by the fact the individuals who experienced low unemployment as they approached graduation probably had more favorable labor market outcomes and more opportunities to accumulate wealth which they could spend on education afterward.

The result that high unemployment rates between 18 and 21 led to lower degree completion rates up to age 34 is evidence of a long-term scarring effect. The positive effect of high 22-24 unemployment rate followed by neutral effects after age 28 suggests that, as found in previous literature, individuals who are close to graduation during periods of high unemployment may opt for higher degree levels to avoid the labor market. However, the results in this chapter suggest that the differences in degree outcomes are short lived, as individuals who face lower unemployment rates accumulate greater wealth with which to fund a degree in latter years. This result suggests that there is a short term educational advantage to graduating during a downturn but long term educational effects are neutral, while according to Kahn (2010), individuals who opt to enter the labor market during an economic downturn at graduation faces negative wage effects. Thus while individuals who face higher unemployment at graduation initially acquire more education, in the long run they are actually worse off than their counterparts who experience relatively prosperous economic conditions around that age. That is, there is no long run educational advantage and long-run labor market outcomes are harmed.

Contemporaneous Effects

To ensure that I do not spuriously attribute the effects of the post-college-aged unemployment rates on post-college-aged outcomes to the college unemployment rate, I include a vector of post-college-aged unemployment rates. The marginal effects of college-age unemployment rate on post college-age educational outcomes after controlling for the post college-age unemployment rates are presented in Tables 23 to 26. After controlling for the post-college-age unemployment rate, I find that the effects of high unemployment rate

Table 19: Percent Change in Probability of Completing High just a School Degree by age 34 as a function of College Unemployment Rate

	Age18-21UE Group[a]		Age22-24UE Group	
Age	Med	High	Med	High
24	.082	.089	-.066	-.075
26	.064	.081	-.042	-.051
28	.061	.058	-.021	-.021[ns]
30	.044	.041	-.021	-.011[ns]
32	.036	.035	-.029	-.009[ns]
34	.014[ns]	.014[ns]	-.013[ns]	-.005[ns]

a- relative to low unemployment group

ns- effect not significant. All others significant at 90% or higher

Table 20: Percent Change in Probability of Completing Associates by age 34 as a function of College Unemployment Rate

	Age18-21UE Group[a]		Age22-24UE Group	
Age	Med	High	Med	High
24	-.019	-.02	.014	.016
26	-.014	-.017	.009	.01
28	-.012	-.012	.004	.004[ns]
30	-.009	-.008	.004	.002[ns]
32	-.007	-.006	.005	.001[ns]
34	-.003[ns]	-.003[ns]	.003[ns]	.001[ns]

a- relative to low unemployment group

ns- effect not significant. All others significant at 90% or higher

between 18 and 21 are still negative until age 34 although the effects are smaller and in some cases the effects of the college-aged unemployment rate disappear earlier. This suggests that the contemporaneous unemployment rates are more important than the college unemployment rate for some individuals.

The effects of high unemployment rates between 22 and 24 are positive until age 28 at which point the effects become insignificant. At age 34, however, individuals in the high unemployment rate group has a statistically significant lower probability of completing a degree. This suggests that there is some catching-up by individuals who were in the low 22-24 unemployment group at age 34. In this case, they surpass those who opt for higher education at age 22-26 in response to a downturn in the economy.

Table 21: Percent Change in Probability of Completing Bachelors Degree by age 34 as a function of College Unemployment Rate

	Age18-21UE Group[a]		Age22-24UE Group	
Age	Med	High	Med	High
24	-.052	-.056	.042	.051
26	-.04	-.051	.026	.032
28	-.037	-.036	.013	.013[ns]
30	-.026	-.024	.012	.006[ns]
32	-.021	-.02	.017	.005[ns]
34	-.009[ns]	-.008[ns]	.007[n]	.003[ns]

a- relative to low unemployment group

ns- effect not significant. All others significant at 90% or higher

Table 22: Percent Change in Probability of Completing Post-grad Degree by age 34 as a function of College Unemployment Rate

	Age18-21UE Group[a]		Age22-24UE Group	
Age	Med	High	Med	High
24	-.011	-.012	.01	.012
26	-.011	-.012	.007	.009
28	-.011	-.011	.004	.004[ns]
30	-.009	-.009	.004	.003[ns]
32	-.008	-.008	.007	.002[ns]
34	-.004[ns]	-.004[ns]	.003[ns]	.002[ns]

a- relative to low unemployment group

ns- effect not significant. All others significant at 90% or higher

Table 23: Percent Change in Probability of Completing High School Degree Only by age 34 as a function of College Unemployment Rate After Controlling for Contemporaneous UE

	Age18-21UE Group[a]		Age22-24UE Group	
Age	Med	High	Med	High
26	.053	.055	-.03	-.069
28	.035	.019[ns]	-.011[ns]	-.015[ns]
30	.033	.021	-.021	-.016[ns]
32	.01	.022	.008[ns]	.01[ns]
34	.002[ns]	.004[ns]	.013[ns]	.026

a- relative to low unemployment group

ns- effect not significant. All others significant at 90% or higher

Table 24: Percent Change in Probability of Completing Associates by age 34 as a function of College Unemployment Rate After Controlling for Contemporaneous UE

	Age18-21UE Group[a]		Age22-24UE Group	
Age	Med	High	Med	High
26	-.011	-.011	.007	.013
28	-.007	-.004	$.002^{ns}$	$.0003^{ns}$
30	-.006	-.003	.004	$.003^{ns}$
32	-.008	-.004	$-.001^{ns}$	$-.002^{ns}$
34	$-.004^{ns}$	$-.001^{ns}$	$-.002^{ns}$	-.005

a- relative to low unemployment group

ns- effect not significant. All others significant at 90% or higher

Table 25: Percent Change in Probability of Completing Bachelors Degree by age 34 as a function of College Unemployment Rate After Controlling for Contemporaneous UE

	Age18-21UE Group[a]		Age22-24UE Group	
Age	Med	High	Med	High
26	-.03	-.034	.023	.042
28	-.02	-.012	$.007^{ns}$	$.009^{ns}$
30	-.019	-.012	.012	$.009^{ns}$
32	-.023	-.012	$-.004^{ns}$	$-.006^{ns}$
34	$-.011^{ns}$	$-.002^{ns}$	$-.007^{ns}$	$-.014^{ns}$

a- relative to low unemployment group

ns- effect not significant. All others significant at 90% or higher

Table 26: Percent Change in Probability of Completing Post-grad Degree by age 34 as a function of College Unemployment Rate After Controlling for Contemporaneous UE

	Age18-21UE Group[a]		Age22-24UE Group	
Age	Med	High	Med	High
26	-.01	-.011	.007	.014
28	-.007	-.004	$.035^{ns}$	$.003^{ns}$
30	-.007	-.005	.005	$.004^{ns}$
32	-.01	-.005	$-.002^{ns}$	$-.003^{ns}$
34	$-.006^{ns}$	$-.001^{ns}$	$-.003^{ns}$	-.007

a- relative to low unemployment group

ns- effect not significant. All others significant at 90% or higher

Finally, I find that higher unemployment rates in the post college-age years lead to higher degree completion rates for all cases after controlling for the college age unemployment rate. This suggests that if the post-college age labor market is performing poorly, individuals who delayed college during the college age years become more likely to complete a degree.

4.6 Conclusion/Discussion

I find evidence for long-term scarring effects as well as some degree of the catch up response among individuals who experienced poor labor market conditions during young adulthood. Individuals who experienced medium and high unemployment earlier in the college years (18-21) experience long-term scarring effects that are still present 10 years post college-age years. Individuals who experience medium to high unemployment later in the college years (22-24) are more likely to complete higher levels of education. This is consistent with previous research that finds that individuals who experienced poor labor market conditions at or close to college graduation are more likely to take up further studies to avoid entering a poor labor market. However, the differences in degree outcomes between the high and the low 22-24 unemployment groups disappear by age 28 and those in the low unemployment group eventually surpasses those in the high unemployment group. Thus, the positive effects of high unemployment eventually disappears.

I also find that individuals who experience higher unemployment in the post-college-age years are more likely to complete a degree in those years. Thus, individuals who delayed education during the college-age years are more likely complete a degree if unemployment is higher and are less likely to complete a degree if unemployment is lower during the post-college years. From a policy perspective, we would like for individuals who delayed college during the college-age years to eventually return and complete a degree. At the same time we would like for robust labor market and will likely try to achieve the latter. However, we see that if the economy rebounds during the college-age years those individuals are less likely to complete a degree leaving college outcomes lower, possibly permanently.

Many papers consider the effect of high unemployment rate on college enrollment. The enrollment literature mostly finds a positive effect of high unemployment on college enrollment, and this result seems to have influenced policy makers. This is among the first papers to look at long term effects of high unemployment during young adulthood on college outcomes. College degree completion and not mere enrollment should be the goal. Policy should be informed by studies that look at outcomes. The current policy seems to follow a hands-off approach when it comes to college funding, allowing funding to vacillate with the

business cycle. Given the long-term scarring effects among younger college-aged individuals, the main policy prescription would be to target individuals who experienced economic downturn earlier in the college age years (18-21) as these individuals suffer reduced education attainment up to their mid-thirties.

BIBLIOGRAPHY

[1] Adelman, C. (1999). Answers in the Tool Box. Academic Intensity, Attendance Patterns, and Bachelor's Degree Attainment.

[2] Ahlburg, D. A., McCall, B. P., & Na, I. (1997). Time to dropout from college: A hazard model of college dropout with endogenous waiting time (Working Paper). Minneapolis, MN: University of Minnesota, Industrial Relations Center.

[3] Ai, C., & Norton, E.C. (2003). Interaction terms in logit and probit models. Economics Letters, 80(1), 123-129.

[4] Altonji, J. G., (1993). The Demand for and Return to Education When Education Outcomes Are Uncertain. Journal of Labor Economics, 11(1), 48-83.

[5] Andersen, P. K., Geskus, R. B., de Witte, T., & Putter, H. (2012). Competing risks in epidemiology: possibilities and pitfalls. International journal of epidemiology, 41(3), 861-870.

[6] Arkes, J. (2005). Using Unemployment Rates as Instruments to Estimate Returns to Schooling, Rand Corporation, Unpublished manuscript, Santa Monica, CA.

[7] Arkes, J. (2007). Does the economy affect teenage substance use? Health Economics, 16, 19- 36.

[8] Averett, S. & Burton, M. (1996). College attendance and the college wage premium: Differences by gender. Economics of Education Review 15(1), 37-49

[9] Ball, Laurence M. (2014). Long-Term Damage from the Great Recession in OECD Countries. NBER Working Paper 20185

[10] Barrett, N. S., & Morgenstern, R. D. (1974). Why do blacks and women have high unemployment rates?. Journal of Human Resources, 452-464.

[11] Beattie IR. (2002). Are All 'Adolescent Econometricians' Created Equal? Racial, Class, and Gender Differences in College Enrollment. Sociology of Education. 75, 19–43.

[12] Becker, Gary S., (1964). Human capital. Columbia University Press (for the NBER) New York).

[13] Becker, G. S. (1975). Front matter, human capital: a theoretical and empirical analysis, with special reference to education. In Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education, 2nd ed. (pp. 22-0). NBER.

[14] Bell, D. & Blanchflower, D. (2010). Youth Unemployment: Déjà Vu?. IZA Discussion Paper 4705.

[15] Berg-Cross, L., & Green, R. (2010). The impact of the recession on college students. Journal of College Student Psychotherapy, 24, 2–16. doi:10.1080/87568220903400047.

[16] Berger, M.C., & Kostal, T. (2002). "Financial resources, regulation, and participation in US public higher education". Economics of Education Review, 21(2), 101-110.

[17] Betts, J.R., & McFarland, L.L. (1995). Safe port in a storm: The impact of labor market conditions on community college participation. Journal of Human Resources, 30(4), 741-765.

[18] Black, S., & Sufi A. (2002). Who goes to college? Differential participation by race and family background. NBER Working Paper 9310.

[19] Blank, R. M. (1989). Analyzing the length of welfare spells. Journal of Public Economics, 39, 245–273.

[20] Borus, M. E., & Carpenter, S. A. (1984). Factors associated with college attendance of high-school seniors. Economics of Education Review, 3(3), 169-176.

[21] Bound, J. & Turner, S. (2007). Cohort crowding: How resources affect collegiate attainment. Journal of Public Economics, 91(5-6), 877-89.

[22] Bound, J., Lovenheim, M., & Turner, S. (2009). "Why have college completion rates declined? An analysis of changing student preparation and collegiate resources". National Bureau of Economic Research Working Paper w15566.

[23] Bowen, W. G., & Finegan, A. T. (1969). Economics of labor force participation.

[24] Bowles, S. (1972). Schooling and inequality from generation to generation. Journal of Political Economy, 80, S219–S251.

[25] Bradbury, K. L. (2000). Rising tide in the labor market: to what degree do expansions benefit the disadvantaged?. New England Economic Review, 3-34.

[26] Bradley, E. S. (2013). The Economics of Student Transitions from High School to Postsecondary Institutions. Doctoral dissertation (University of Georgia).

[27] Breneman, D. W. (2002). "For colleges, this is not just another recession". The Chronicle of Higher Education, 14.

[28] Breneman, D. W. (2008). What colleges can learn from recessions past. The Chronicle of Higher Education, 55(7), A112.

[29] Brent, J. (2013). Labor Market Outcomes for U.S. College Dropouts 2001-12. http://www.unc.edu/~dgill/links/courses/Econ985/2013Fall/JasonBrent.pdf

[30] Brint, S., & Karabel, J., (1989). "The Diverted Dream. Community Colleges and the Promise of Educational Opportunity in America, 1900-1985". Oxford University Press, New York, 1989. xii, 312

[31] Brock, T. (2010). Young adults and higher education: Barriers and breakthroughs to success. The Future of Children, 20(1), 109-132.

[32] Browne, I. (1997). Explaining the black-white gap in labor force participation among women heading households. American Sociological Review, 236-252.

[33] Cameron, S. V. and Heckman J. J., (1998). Life cycle schooling and dynamic selection bias: Models and evidence for five cohorts of American males. Journal of Political Economy 106(2), 262-333.

[34] Card, D. (1999). The causal effect of education on earnings. Handbook of labor economics, 3, 1801-1863.

[35] Card, D., & Lemieux, T. (2001). Dropout and enrollment trends in the postwar period: What went wrong in the 1970s?. In Risky behavior among youths: An economic analysis (pp. 439-482). University of Chicago Press.

[36] Catalano, R. (1991). The health effects of economic insecurity. American Joumal of Public Health, 81(9), 1148-1152.

[37] Catalano, R., & Dooley, D. (1981). The behavioral costs of economic instability. Policy Studies Joumal, 10 (20), 338-349.

[38] Catalano, R., & Hartig, T. (2004). Economic predictors of admissions to inpatient psychiatric treatment in Sweden. Social Psychiatry & Psychiatric Epidemiology, 39, 305-310.

[39] Catalano, R., Snowden, L., Shumway, M., & Kessell, E. (2007). Unemployment and civil commitment: A test of the intolerance hypothesis. Aggressive Behavior, 33, 272-280.

[40] Caucutt, E. M., İmrohoroğlu, S., & Kumar, K. B. (2003). Growth and welfare analysis of tax progressivity in a heterogeneous-agent model. Review of Economic Dynamics, 6(3), 546-577.

[41] Caucutt, E., & Lochner, L. (2005). Borrowing constraints on families with young children. Innovation in Education, 39-48.

[42] Chae, J. (2000). Student departure from U.S. community colleges: A competing-risks survival analysis. Unpublished doctoral dissertation. Harvard School of Education, Cambridge, MA.

[43] Charles, K. K., & DeCicca, P. (2008). Local labor market fluctuations and health: is there a connection and for whom?. Journal of health economics,27(6), 1532-1550.

[44] Clerici, R., Giraldo, A., & Meggiolaro, S. (2014). The determinants of academic outcomes in a competing risks approach: evidence from Italy. Studies in Higher Education, (ahead-of-print), 1-15.

[45] Cohn, Elchanan, and Terry G. Geske. (1992). Private Nonmonetary Returns to Investment in Higher Education. Pp. 173-195 in The Economics of American Higher Education, ed. W. E. Becker and D. R. Lewis. Norwell: Kluwer Academic Publishers.

[46] Cokes, C, & Kornblum, W. (2010). Experiences of mental distress by individuals during an economic downturn: The story of an urban city. The Western Journal of Black Studies, 34 (1), 24-35.

[47] CollegeInvest. (2009). Survey: Economy Weighing on Colorado Parents When Planning for College. at http://www.collegeinvest.org/PDF/CIPollResults_5.29.09.pdf.

[48] Corman, H. (1983). Postsecondary education participation responses by recent high school graduates and older adults. The Journal of Human Resources 18(2), 247-267.

[49] Couch, K. A., & Fairlie, R. (2010). Last hired, first fired? Black-white unemployment and the business cycle. Demography, 47(1), 227-247.

[50] Davalos, Maria E. & French, Michael T. (2011). "This Recession Is Wearing Me Out! Health-Related Quality of Life and Economic Downturns". Journal of Mental Health Policy and Economics, 14, 61-72.

[51] Deaton, A., (2012). The Financial Crisis and the Well-Being of Americans. Oxford Economic Papers, 64, 1-26.

[52] DeBrock, L., Hendricks, W., & Koenker, R. (1996). The economics of persistence: Grauation rates of athletes as labor market choice. Journal of Human Resources, 31, 513-539.

[53] Dellas, H., & Koubi, V. (2003). Business cycles and schooling. European Journal of Political Economy, 19(4), 843-859.

[54] Dellas, H., & Sakellaris, P. (2003). On the cyclicality of schooling: theory and evidence. Oxford Economic Papers, 55(1), 148-172.

[55] DesJardins, S. L., Ahlburg, D. A., & McCall, B. P. (1999). An event history model of student departure. Economics of Education Review, 18, 375-390.

[56] DesJardins, S.L., Ahlburg, D.A., & McCall, B.P. (2002). A temporal investigation of factors related to timely degree completion. Journal of Higher Education, 73(5), 555–581.

[57] Donohue, G., & Beyers, C. (2009). Internal memo: Information on economic impact on our students. Syracuse, NY Dooley, D., & Catalano, R. (2003). Introduction to underemployment and its social costs. American Joumal of Community Psychology, 32, 1-7.

[58] Dooley, D., & Prause, J. (1995). Effect of unemployment on school leavers' self-esteem. Journal of Occupational and Organizational Psychology, 68, 177-192.

[59] Dooley, D., Brook, K., & Catalano, R. (1987). Job and non-job Stressors and their moderators. Joumal of Occupational Psychology, 60, 115- 132.

[60] Dragun, A., Russo, A., & Rumboldt, M. (2006). Socioeconomic stress and drug consumption: Unemployment as an adverse health factor in Croatia. Croatia Medical Journal, 47, 685- 692.

[61] Dunbar, A., Hossler, D., Shapiro, D., Chen, J., Martin, S., Torres, V., & Ziskin, M. (2011). "National Postsecondary participation Trends: Before, during, and after the Great Recession". National Student Clearinghouse.

[62] Ellwood, D., & Kane, T. J. (2000). Who is getting a college education? Family background and the growing gaps in enrollment. Securing the future: Investing in children from birth to college, 283-324.

[63] Elwert, F., & Winship, C. (2010). Effect heterogeneity and bias in main-effects-only regression models. Heuristics, probability and causality: A tribute to Judea Pearl, 327-36.

[64] Engemann, K., & Wall, H.J. (2010). The effects of recessions across demographic groups. Review, Federal Reserve Bank of St. Louis, issue Jan, 1-26.

[65] Evans, W. N., & Schwab, R. M. (1995). Finishing high school and starting college: Do Catholic schools make a difference?. The Quarterly Journal of Economics, 941-974.

[66] Ewing Kris M., Beckert, Kim A., & Ewing, Bradley T. (2010) The response of US college participation to unexpected changes in macroeconomic activity. Education Economics, 18(4), 423-434. DOI: 10.1080/09645290903465739

[67] Fallon, P. R., & Lucas, R. E. (2002). The impact of financial crises on labor markets, household incomes, and poverty: A review of evidence. The World Bank Research Observer, 17(1), 21-45.

[68] Fine, J. P., & Gray, R. J. (1999). A proportional hazards model for the subdistribution of a competing risk. Journal of the American Statistical Association, 94(446), 496-509.

[69] Flug, K., Spilimbergo, A., & Wachtenheim, E. (1999). Investment in education: do economic volatility and credit constraints matter?. Journal of Development Economics, 55(2), 465-481.

[70] Fox, M. A., Connolly, B. A., & Snyder, T. D. (2005). Youth Indicators 2005: Trends in the Well-Being of American Youth. NCES 2005-050. US Department of Education.

[71] Freeman, R. B., Gordon, R. A., Bell, D., & Hall, R. E. (1973). Changes in the labor market for black Americans, 1948-72. Brookings Papers on Economic Activity, 67-131.

[72] French, M. T., & Davalos, M. E. (2011). This recession is wearing me out! Health-related quality of life and economic downturns. Journal of Mental Health Policy and Economics, 14, 61-72.

[73] Fujita, S., Rao, V. (2009). Eamings losses of job losers during the 2001 economic downturn. Business Review, Fourth Quarter, 1-9

[74] Gallipoli, G., Meghir, C., & Violante, G. (2011). Equilibrium effects of education policies: A quantitative evaluation. University of British Columbia, Working Paper.

[75] Gerhart, B. (1990). "Gender differences in current and starting salaries: The role of performance, college major, and job title". Industrial and Labor Relations Review, 43, 418-433.

[76] Giuliano, P., & Spilimbergo, A. (2014). Growing up in a Recession. The Review of Economic Studies, 81(2), 787-817.

[77] Grubb, W.N., and Associates. (1999). Honored But Invisible: An Inside Look at Teaching in Community Colleges. New York and London, Routledge.

[78] Guerin, K. J. (1997). Tracking student stop-out, transfer and graduation: an event history analysis of competing risks. Paper presented at the 37th Annual Forum of the Association for Institutional Researchers, Lake Buena Vista, FL.

[79] Guo, Y., Wang, S., Johnson, V., & Diaz, M. (2011). College students' stress under current economic downturn. College Student Journal, 45(3), 536-543.

[80] Gustman, A.L., & Steinmeier, T.L. (1981). The impact of wages and unemployment on youth participation and labor supply. Review of Economics and Statistics 63(4), 553-560.

[81] Haan, N. (1975). Hypothetical and actual moral reasoning in a situation of civil disobedience. Journal of Personality and Social Psychology, 10, 183–201.

[82] Hanushek, E. A., Leung, C. K. Y., & Yilmaz, K. (2003). Redistribution through education and other transfer mechanisms. Journal of Monetary Economics, 50(8), 1719-1750.

[83] Heckman, J., Lochner, L., & Taber, C. (1998). General-equilibrium treatment effects: A study of tuition policy. American Economic Review, Papers and Proceedings, 88(2), 293-297

[84] Hertz, T. (2006). Understanding mobility in America. Center for American Progress Discussion Paper.

[85] Hertz, T., Jayasundera, T., Piraino, P., Selcuk, S., Smith, N., & Verashchagina, A.

(2007). The inheritance of educational inequality: International comparisons and fifty-year trends. The BE Journal of Economic Analysis & Policy, 7(2).

[86] Hilmer, M. (2001). A comparison of alternative specifications of the college attendance equation with an extension to two-stage selectivity-correction models, Economics of Education Review 20(3), 263–278.

[87] Hilmer, M. (1998). Post-secondary fees and the decision to attend a university or a community college, Journal of Public Economics 67(3), 329–348.

[88] Hoynes, H. W., Miller, D. L., & Schaller, J. (2012). Who suffers during recessions?. National Bureau of Economic Research Working Paper w17951.

[89] Irons, J. (2009). Economic scarring: The long-term impacts of the recession. Economic Policy Institute, Washington DC.

[90] Jahoda, M. (1988). Economic recession and mental health: Some conceptual issues. Journal of Social Issues, 44 (4), 13-23.

[91] Johnson, M. T. (2013). "Borrowing constraints, college enrollment, and delayed entry". Journal of Labor Economics, 31(4), 669-725.

[92] June, Bowles, S. (1972). Schooling and inequality from generation to generation. Journal of Political Economy, 80, 219–251.

[93] Kahn, L. B. (2010). The long-term labor market consequences of graduating from college in a bad economy. Labour Economics, 17(2), 303-316.

[94] Kalbfleisch, J. D., & Prentice, R. L. (2002). The statistical analysis of failure time data. New York: Wiley.

[95] Kane, T. (1994). "College entry by blacks since 1970: The role of college costs, family background, and the return to education". Journal of Political Economy, 102(5), 878-911.

[96] Kantrowitz, M. (2010). Countercyclicality of college participation trends. FinAid.

[97] Keane, M. P., & Wolpin, K. I. (2001). The effect of parental transfers and borrowing constraints on educational attainment. International Economic Review, 1051-1103.

[98] Kiefer, N., & Neumann, G. (1979). "An empirical job search model, with a test of the constant reservation wage hypothesis". Journal of Political Economy, 87, 89–107.

[99] Kienzl, G. S., Alfonso, M., & Melguizo, T. (2007). The effect of local labor market conditions in the 1990s on the likelihood of community college students' persistence and attainment. Research in Higher Education, 48(7), 751-774.

[100] Lehr, D.K. & J.M. Newton. (1978). Time series and cross-sectional investigations of the demand for higher education. Economic Inquiry 16(3), 411-422.

[101] Leslie, D., & Drinkwatr, S. (1999). Staying on in full-time education: reasons for higher participation rates among ethnic minority males and females. Economica, 66(261), 63-77.

[102] Levy, F., & Murane, R. (1992). U.S. earnings levels and earnings inequality: A review of recent trends and proposed explanations. Journal of Economic Literature, 30, 1333-1381.

[103] Light, A. (1995). The effects of interrupted schooling on wages. Journal of Human Resources, 30, 472-502.

[104] Light, A. (1996). Hazard model estimates of the decision to reenroll in school. Labour Economics 2(4), 381-406.

[105] Long, B.T. (2004). "How have college decisions changed over time? An application of the conditional logistic choice model". Journal of Econometrics, 121, (1–2), 271–296.

[106] Malmendier, U., & Nagel, S. (2009). Depression babies: Do macroeconomic experiences affect risk-taking?. National Bureau of Economic Research Working Paper w14813.

[107] Manski, C. F. (1989). Schooling as experimentation: a reappraisal of the postsecondary dropout phenomenon. Economics of education review, 8(4), 305-312.

[108] Manski, C., & Wise, D. (1983). College choice in America. Cambridge, MA: Harvard University Press

[109] Marcus, Richard D., (1986). Earnings and the decision to return to school. Economics of Education, 5, 309-317.

[110] McIntyre, F., & Pencavel, J. (2004). The Effect of Macroeconomic Turbulence on Real Wage Levels and the Wage Structure: Brazil, 1981–1999*. Economic Development and Cultural Change, 52(4), 681-717.

[111] Abbott, B., Gallipoli, G., Meghir, C., & Violante, G. L. (2013). Education policy and intergenerational transfers in equilibrium (No. w18782). National Bureau of Economic Research.

[112] Messer, D., & Wolter, S. C. (2010). Time-to-degree and the business cycle. Education economics, 18(1), 111-123.

[113] Mincer, J., (1974). "Schooling, experience, and earnings". Columbia University Press (for the NBER), New York.

[114] Mroz, T. A., & Savage, T. H. (2006). The long-term effects of youth unemployment. Journal of Human Resources, 41(2), 259-293.

[115] Ordovensky, J. (1995). Effects of institutional attributes on enrollment choice: Implications for postsecondary vocational education, Economics of Education Review 14(4), 335–350.

[116] Oreopoulos, P., von Wachter, T., & Heisz, A. (2012). The short-and long-term career effects of graduating in a recession. American Economic Journal: Applied Economics, 4(1), 1-29.

[117] Pascarella, E., & Terenzini, P. (2005). How college affects students (Vol. 2): A third decade of research. San Francisco: Jossey-Bass.

[118] Paton, N. (2008). Economic downturn continues to put employee health at risk. Occupational Health, 60 (12), 5-5.

[119] Paton, N. (2010). Stress on the up after economic downtum. Occupational Health, 62 (6), 7-7.

[120] Pew Charitable Trusts. Pew Report Finds Recent College Graduates Well-Protected Against Worst Effects of Recession. http://www.pewstates.org/news-room/press-releases/pew-report-finds-recent-college-graduates-well-protected-against-worst-effects-of-recession-85899440518

[121] Platt, S., & Hawton, K. (2000). Suicidal behaviour and the labour market. In K. Hawton & K. van Heeringen (Eds.), The intemational handbook of suicide and attempted suicide (pp. 309-384). Chichester, NY: Wiley.

[122] Psacharopoulos, G., (1985). Returns to education: a further international update and implications. Journal of Human Resources, 20(4), 583–604

[123] Reiling, R. B. and B. Strøm (2013). Upper secondary school completion and the business cycle. Scandinavian Journal of Economics, 117(1), 195-219.

[124] Rice, P.G. (1999). The impact of local labour markets on investment in further education: Evidence from England and Wales youth cohorts. Journal of Population Economics ,12(2), 287- 312.

[125] Rivkin, S. G. (1995). Black/white differences in schooling and employment. Journal of Human Resources, 826-852.

[126] Ronco, S. L. (1996). "How enrollment ends: analyzing the correlates of student graduation, transfer and dropout with a competing risks model". Association of Institutional Research Professional File, 61, 1-16.

[127] Rosen, S. (1977). Human capital: A survey of empirical research. In R. Ehrenberg, Research in Labor Economics (Volume 1). Greenwich: JAI Press.

[128] Rouse, C. E. (1995). Democratization or diversion? The effect of community colleges on educational attainment. Journal of Business and Economic Statistics, 13(2), 217-224.

[129] Ruhm, Christopher J. (2000). Are Recessions Good for Your Health?. The Quarterly Journal of Economics, 115, 617-650.

[130] Sakellaris, P., & Spilimbergo, A. (2000). Business cycles and investment in human capital: International evidence on higher education. Carnegie-Rochester Conference Series on Public Policy 52(1), 221-256.

[131] Schady, Norbert R., (2004). Do Macroeconomic Crises Always Slow Human Capital Accumulation?. World Bank Economic Review World Bank Group, 18(2), 131-154.

[132] Schneider, B., and Stevenson, D. (1999). "The Ambitious Generation: America's Teenagers, Motivated But Directionless". New Haven: Yale University Press.

[133] Scott, M. A., & Kennedy, B. B. (2005). Pitfalls in pathways: Some perspectives on competing risks event history analysis in education research. Journal of Educational and Behavioral Statistics, 30(4), 413-442.

[134] Sian, E. (2009). Economic downturn and joblessness may herald an increase in suicides. Mental Health Practice, 13 (1), 11-11.

[135] Singer, J. D., & Willett, J. B. (1993). It's about time: Using discrete-time survival analysis to study duration and the timing of events. Journal of Educational Statistics, 18, 155–195.

[136] Spady, W. (1970). Dropouts from higher education: An interdisciplinary review and synthesis Interchange, 1, 64-85.

[137] Stratton, L.S., O'Toole, D.M., Wetzel, J.N. (2008). A multinomial logit model of college stopout and dropout behavior. Economics of Education Review, 27(3), 319–331

[138] Sum, A., Khatiwada, I., Pond, N., Trub 'skyy, M., Fogg, N, Palma, S. (2003). "Left behind in the labor market: labor market problems of the nation's out-of-school, young adult populations". Northeastern University, Center for Labor Market Studies. Prepared for Alternative Schools Network, Chicago, Illinois

[139] Taniguchi, H., & Kaufman, G. (2005). Degree Completion Among Nontraditional College Students*. Social Science Quarterly, 86(4), 912-927.

[140] Tefft, N. (2011). " Insights on unemployment, unemployment insurance, and mental health". Journal of Health Economics, 30, 258-264.

[141] Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. Review of Educational Research, 45, 89-125.

[142] Tinto, V. (1988). Stages of student departure: Reflections on the longitudinal character of student leaving. Journal of Higher Education, 59, 438-455.

[143] Tinto, V. (1993). Leaving college: Rethinking the causes and cures of student attrition (2nd edition). Chicago: University of Chicago Press.

[144] van der Haert, M., Arias Ortis, E., Emplit, P., Halloin, V., & Dehon, C. (2011). Dropout and degree completion in doctoral study: a competing risks survival analysis. ECARES Working Papers.

[145] William G. Bowen and T. Aldrich Finegan (1969).The Economics of Labor Force Participation. Princeton University Press.

[146] Winston, G., & Zimmerman, D. (2004). "Peer effects in higher education. In College choices: the economics of where to go, when to go, and how to pay for it". University of Chicago Press, 395-424.

[147] Wolfers, J. (2003). Is business cycle volatility costly? Evidence from surveys of subjective well-being. International finance, 6(1), 1-26.