

Human Capital Investments of Young Hispanics: The Bright Side of the Great Recession?

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Abstract

In this paper, I analyze the impact of the labor demand shocks induced by the Great Recession on the human capital investments of young Hispanics, a disadvantaged sub-group in United States on the basis of their education. I use a Bartik approach where I construct labor demand shocks separately by race group and ethnicity at the metropolitan area level to analyze their impact on schooling decision of young cohorts. I find that the higher responsiveness of young Hispanics, even conditional on the differential size of the shock experienced by Hispanics relative to other groups, can explain more than half of the observed convergence in High School dropout rates and college attendance rates between Hispanics and other groups following the Great Recession. My results are robust to specification checks for endogenous migration and highlight the impact shocks to opportunity cost can have on educational decisions of a historically disadvantaged group.

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I Introduction & Motivation

Labor demand shocks not only affect cohorts already in the labor market but also have implications for younger set of cohorts who are still in school. A shock like the Great Recession adversely affects the labor market opportunities for young cohorts, particularly those at the margin of dropping out from High School, and might induce them to stay in school longer. However, other factors such as increases in tuition and tightening of liquidity constraints, also as a result of the Great Recession, may act as countervailing forces hindering the ability of these cohorts to finance their schooling. Consequently, schooling may go up or down in response to labor demand shocks such as the Great Recession.

Focusing on the schooling investments of younger cohorts as a response to labor demand shocks such as the Great Recession is critical since educational attainment has implications for lifetime earnings of concerned individuals, as well as (future) productivity of overall the economy. Moreover, social benefits associated with college attendance extend beyond increased earnings and employment opportunities (Moretti & Lochner 2004, LLeras-Muney 2005, McCary and Royer 2011). It is therefore important to study the effect of labor demand shocks on the schooling decision of young cohorts particularly in the aftermath of the Great Recession.

Whereas schooling levels have been going up, on average, in the United States over time, the overall trends mask differing underlying patterns across groups based on race and ethnicity. Figure 1 depicts the High School dropout rates for young cohorts aged 16-24 based on their race and ethnicity. There are level differences in the dropout rates

between the different groups with Hispanic trends clearly standing out. Not only are the Hispanics more likely to drop out of High School at any given point in time, they also experience bigger changes in their dropout rates over time as compared to other groups (Whites, Blacks, and Asians). It is also worth noting in Figure 2 that the High School dropout rates between Hispanics and Whites¹ have partially converged in recent years particularly in the aftermath of the Great Recession. Existing studies looking at the effect of labor demand shocks on the schooling decision treat all the groups as a whole² are therefore unable to provide explanations for the observed trends in educational attainment by race and ethnicity as depicted in Figures 1 and 2.

This paper attempts to explore whether incidence of and responsiveness to labor demand shocks at the metropolitan area level, induced by the Great Recession, differs across sub-groups based on their race and ethnicity. Moreover, it explores whether recent trends in educational attainment such as the partial convergence in schooling levels between Hispanics and other groups in recent years are a function of labor demand shocks induced by the Great Recession. In order to guide the empirical work and the underlying mechanisms, the paper builds a simple conceptual framework which takes into account the several different factors by which a labor demand shock might affect educational attainment such as shocks to outside option, changing tuition fees, tightening of liquidity constraints and changes to High School/ college premium. However, given that these effects could be differentially important for different population subgroups the overall effect of a labor demand shock is likely to differ across sub-groups based on race and ethnicity. This paper

¹Whereas the figure shows the convergence between Whites and Hispanics, the results also hold if Hispanics are plotted against all other groups.

²See Charles, Hurst and Notowidigdo (2018) for a quick summary.

provides an empirical answer to this question by creating group specific demand shocks and analyzing their impact on educational attainment of young cohorts. It also allows us to disentangle differences in schooling due to differences in the size of the shock as well differential responsiveness even conditional on the size of the shock.

The paper employs a Bartik type approach to model shocks to labor demand and constructs these measures separately by race and ethnicity to better capture the relevant demand shocks for each group. Since the Bartik approach only uses the demand driven component of employment changes, it mitigates any concerns regarding employment changes being driven by labor supply responses. The group-specific Bartik measures are constructed using an older set of cohorts (aged 25-55)³ in order to avoid the simultaneity issue associated with joint measurement of educational attainment and labor market outcomes for the set of young cohorts aged 16-21. The paper then uses these measures in order to analyze the impact of labor demand shocks on the educational outcomes of cohorts at both the High School dropout margin as well as college attendance. Focusing on both these dimensions using data from American Community Survey allows us to develop a better understanding of any effects and their underlying mechanisms.

My results show that the incidence of labor demand shocks does differ by groups based on race and ethnicity both across and within a geographical area. Moreover, different groups exhibit different degrees of responsiveness to labor demand shocks even after we account for differences in intensity of the labor demand shock experienced. Whereas Hispanic and Blacks are affected more by labor demand shocks relative to Whites, His-

³Table 3 presents results on the validation of these measures against actual employment changes. Please see Section IV for a detailed discussion in this regard.

panics are most responsive to these shocks and respond to adverse shocks by increasing their educational attainment in hardest hit area. This effects holds true both at High School dropout margin as well as for college attendance. The results are able to offer part of the explanation for the observed trends in educational attainment between Hispanics and other groups with higher responsiveness of Hispanics to Whites being able to 55%⁴ of the convergence in High School dropout rates between Hispanics and Whites in this time period. Moreover, the results for Hispanics seem to be driven predominantly by males at the High School level whereas both males and females contribute to the college attendance increases. It is worth noting that results from the full sample largely mimic those of Whites implying that any analysis which treats all groups as one, is likely to pick up effects (or lack thereof) driven mainly by the White sub-samples.

The paper therefore contributes to the existing literature in a meaningful way for four main reasons. Firstly, it builds upon Charles, Hurst & Notowidigdo (2017), which analyzes the effect of labor demand shocks on college attendance around the housing boom, to explore the effects around the subsequent recession by race and ethnicity. The paper finds heterogeneity in treatment effects which provides evidence that responsiveness to labor demand shocks varies by race and ethnicity as well as gender. Whereas Dellas & Sakellaris (2003) did provide suggestive evidence that there might be heterogeneity in treatment effects between Blacks and Whites in their schooling response to labor demand shocks, this paper provides credible empirical evidence in this regard. Secondly, this paper improves upon existing work⁵ looking at effects by race and ethnicity by providing a

⁴Higher responsiveness of Hispanics is able to explain 0.44 pp change in HS dropout rates out of a total of 0.8 pp convergence between Hispanics and Whites between 2006-10

⁵See for instance Britton-Tolani (2017) which uses variation in state level unemployment rates, a measure which is likely to introduce endogeneity in shape of labor supply decisions and responses.

better measure of labor demand. The group-specific Bartik thus constructed not only mitigates concerns about the measure being contaminated by labor supply induced responses but also provides more precise measures of incidence of labor demand shocks for each group. Moreover, the paper restricts analysis to not include immigrants⁶ and conducts analysis at the metropolitan area level⁷ in order to lend credibility to the research design. Thirdly, by focusing on relevant shocks and the schooling response of each group, this paper is able to provide suggestive evidence explaining recent trends in educational attainment such as the convergence in educational outcomes between Hispanics and other groups. Heterogeneity in treatment effects also brings to forth the differential importance of different underlying factors in explaining the responsiveness of different cohorts to respective labor demand shocks. Lastly, this paper looks at outcomes both at High School and college margin and is therefore able to provide a better understanding of the persistence of effects over time as well as the underlying mechanisms. The paper, therefore, serves as a motivation to study the long term impacts of human capital investments undertaken as a response to labor demand shocks.

The main takeaway of this paper is that whereas incidence of labor demand shocks does differ across groups based on race and ethnicity, it is actually higher responsiveness of Hispanics compared to other groups that explains more than half of the observed convergence in schooling outcomes between Hispanics and Whites in recent years. This higher responsiveness of Hispanics to labor demand shocks even conditional on the size of the shocks underlines the important role shocks to outside option play for Hispanic

⁶Immigrants are a highly mobile group in the aftermath of the GR and thus are likely to induce composition changes to the sample (Kovak & Cadena 2015).

⁷This allows better approximation to local labor markets (as compared to state level) and greater identifying variation in order to detect effects on schooling.

males in particular. The lower (or lack of) effect for Whites can be partly explained by mechanisms such as shocks to housing values which lead to tightening of the liquidity constraints. The results of this paper are consistent with and bring to fore the differential importance of different factors for each of the sub-groups and motivate a move away from looking at labor demand shocks from a singular lens. Moreover, the paper also provides evidence against using changes in employment as a measure for labor demand shocks since these measures are prone to labor supply induced responses.⁸

II Conceptual Framework

In order to better understand the responses by younger cohorts, I present a basic model based on seminal work by Becker (1964) regarding how individuals make schooling decisions and how Great Recession affected this decision. The simple model highlights how labor demand shocks affect schooling decision by exploring the key considerations emphasized in existing models of human capital investment. Moreover, it illustrates, in particular, the role of shocks to students' outside option of working.

The model for attending school implies that individuals will decide to stay in High School/ enroll in college only if marginal benefit of attending school is greater than the marginal cost. This marginal decision can be represented by the following equation where left hand side represents the benefits of additional schooling whereas right hand side represents the costs.

$$\sum_{t=1}^T \frac{\pi_{ct}}{(1+r)^t} \geq Y_{h0} + C + p \quad (1)$$

⁸Section 5.2 tackles this issue in detail

In this case, $\pi_{ct} = Y_{ct} - Y_{ht}$ represents the college premium which is simply the difference between earnings for college goers as compared to High School graduates. Y_{h0} represents opportunity cost (foregone earnings) if the student decides to enroll in college. C represents the tuition and borrowing costs net of financial aid whereas p represents psychic costs of getting additional education.

We can envision the Great Recession having an effect on schooling through channels both on the marginal benefit and marginal cost side as outlined in equation 1. We can see that a negative labor demand shock will tend to increase schooling if it affects current labor market opportunities for young adults to the extent that they override any other effect of the shock that might act in the other direction. One such counteracting effect is the tightening of liquidity constraints that persons from home-owning families might experience if their falling house values during the Recession makes it harder for them to borrow to finance the direct costs of college. However, given that these effects are not of the same sign, and are likely to be differentially important for different population subgroups (for example based on home ownership), the overall effect could therefore differ across sub-groups. The net effect of a shock such as the Great Recession for each group in the population would then be determined by how the different channels affect the marginal benefits and costs of attending school for that group.

Existing literature allows us to evaluate the relative importance of these factors for the different sub-groups. There is broad consensus in the literature that the college premium did not change during the Great Recession. In this vein, Charles, Hurst, & Notowidigdo (2017), considers this channel unlikely to explain changes in enrollment as a result of labor demand shocks. They also document that college tuition fees actually went up

during this period but do not find evidence that average tuition changed as a function of the size of the shock that an area experienced. Given suggestive evidence that college premium did not change much and tuition did not change as a function of the size of the employment shock in the aftermath of the Great Recession, these factors are unlikely to drive differences in effects across sub-groups. A factor that can, at least in theory, lead to different effects across sub-groups is liquidity constraints. This is because the Great Recession, along other dimensions, also acted as a shock to family wealth which implies higher borrowing costs and tighter liquidity constraints- effects which imply decrease in enrollments around the Great Recession. However, given that average house ownership varies across sub-groups, with Blacks and Hispanics less likely to own homes compared to Whites, this mechanism is likely to be more important for Whites as compared to Blacks and Hispanics. Therefore, if home ownership was a key mechanism it could help explain lower enrollment effects for Whites compared to Black and Hispanics in response to the shock induced by the Great Recession.

Another important factor that can lead to heterogeneity in schooling responses are shocks to outside option. It is worth noting that the unemployment losses caused by the Great Recession differed greatly across industries as shown in Figure 4. Whereas industries such as construction and manufacturing suffered heavy job losses and most sectors of the economy in general lost jobs, some sectors such as mining actually gained jobs. Regions more concentrated in harder hit industries such as manufacturing and construction would therefore experience bigger shocks. Moreover, given that the industrial composition might differ across groups based on race and ethnicity, this implies that the incidence of the labor demand shock might differ across groups. Figure 3, which plots

unemployment rates in US at the group level over time, helps make the point that the incidence of labor demand shocks as induced by the Great Recession does differ on the basis of race and ethnicity. Blacks and Hispanics not only have, on average, traditionally higher unemployment rates than Whites, but their labor market outcomes also experience greater volatility particularly during downturns such as the Great Recession. Thus, Hispanics and Blacks are likely to be hit harder by labor demand shocks induced by the Great Recession.

This paper models labor demand shock as potentially acting through shocks to outside option as the main mechanism which could lead to increases in schooling. However, given the different levels of educational attainment as well labor market outcomes by sub-groups (based on gender and race and ethnicity), we do not expect effects to be identical across sub-groups particularly given that factors such home ownership which are relevant to incidence of shock do differ by sub-groups. By constructing shocks to the outside opportunity cost separately by sub-groups, the paper will be able to test firstly if it is the case that some groups get affected more by shocks to labor demand and secondly if some groups are more responsive in their schooling response even conditional on the size of the shock.

III Data and Descriptive Statistics

The key question of interest in this paper is to answer *if the schooling response of young cohorts to labor demand shocks induced by Great Recession differs by race and ethnicity*. My empirical strategy examines changes in a group's schooling (separately by sex and race group and ethnicity) as a function of relevant demand shocks at the MSA level,

constructed using a group-based Bartik approach.

Labor demand shocks are constructed using the County Business Pattern data (CBP). The primary advantage of using CBP is that it contains data from the universe of establishments in covered industries and allows us to obtain time series data on employment by occupation classification at the metropolitan level. Since the CBP data does not cover employment in agricultural production, private household services, or the government, I use changes in employment using calculations from ACS.⁹ The labor demand shocks are constructed using cohorts aged 25-55 as to avoid the problem of simultaneity since employment and schooling changes are likely to be contemporaneous.¹⁰ The schooling measures, which include high school dropout rates as well as college attendance for individuals aged 16-21, are calculated using data from American Community Surveys for the years 2006-2010 at the MSA level for each group.

This paper restricts sample by dropping immigrant population since they are a highly mobile group based on findings from Kovak and Cadena (2015).¹¹ Moreover, we restrict analysis to metropolitan areas which are representative of young cohorts at the group level. This leaves us with around 264 metropolitan areas for the full sample and around 159 metropolitan areas for Blacks and Hispanics.

⁹This approach is similar to the one used by Kovak & Cadena (2015).

¹⁰I present the correlation results between employment changes for older cohorts with younger cohorts in Section 4.2 and find them to be strongly correlated for most groups. This mitigates any concerns about the "relevance" of the labor demand shocks.

¹¹We also conduct analysis by restricting the sample to contain only individuals who do not move states within the last 5 years but the main results hold.

A Summary Statistics: Employment Changes 2006-10

Table 1 shows changes in employment rates caused by the Great Recession as measured as changes between 2006-2010 across groups based on race, ethnicity and sex for young (aged 16-21) and old cohorts (aged 25-55). Descriptive statistics from table 1 show that employment rate changes differ both by race and ethnicity, as well as by gender. Based on table 1, it seems to be the case that males experienced bigger changes to employment rates compared to females and it is the case within all sub-groups. Given that the baseline employment rates for males are somewhat higher than females in 2006, these changes translate into somewhat smaller percentage changes.

Moreover, younger cohorts experienced more volatility in their employment rates as compared to older cohort of workers. It is worth noting however, that there is not as much variation in employment rates for younger cohorts. Even within the younger cohorts, males are hit harder as compared to females as observed in the pattern in table 1. The relatively adverse changes in employment rates for younger cohorts as reflected in bigger employment rate changes is possibly a mechanism that could explain increased attachment to school for these younger set of cohorts.

Based on Table 1, we can see that Great Recession affected the employment opportunities of different cohorts differently based on their gender, age and their racial group and ethnicity with Hispanics and Blacks affected more adversely than White cohorts. It is for this reason that this paper motivates constructing group specific labor demand shock measures that incorporate differences in race and ethnicity as well as gender. This paper aims to use this variation in the intensity of shock across different groups to look at the

impact of these labor demand shocks on human capital investments of younger cohorts.

It is worth noting however, that changes in employment rate could be driven both by changes in labor demand due to the Great Recession as well as labor supply induced responses. Given that some groups might be able to adjust better to adverse labor market conditions as compared to other groups implies that these measures of employment changes are a function both of the labor demand shock as well as the ability of the group to adjust to the shock.¹²

B Summary Statistics: Schooling Changes 2006-10

Table 2 presents changes in average educational attainment by race and ethnicity. Descriptive Statistics shows that Hispanics and Blacks registered the biggest drops in fraction of High School dropouts in this period. Given that Blacks and Hispanics had higher baseline dropout rates relative to Whites this implies that percentage changes in dropouts seem to be similar across racial groups. Whereas the dropout rates are higher for males relative to females even within racial groups yet drops in dropout rates are similar. This pattern of changes in dropout rates around the business cycle is consistent with findings of Walstrum (2015) who finds that gender gap in schooling tends to decrease around Recessions.

Educational outcomes related to college (current college attendance or attendance at any point in time) also seem to suggest that Hispanics and Blacks experience bigger changes compared to Whites particularly when we take into account the lower enroll-

¹²This paper motivates constructing Bartik type shocks in order to mitigate any concerns about employment changes being driven by labor supply responses. Section 4.1 discusses this in more detail.

ment rates for these groups relative to Whites. This paper will look to investigate what fraction of these changes in educational attainment can be explained by the group-specific labor demand shocks. Moreover, Panel C of Table 2 shows that Hispanics are most likely of all the groups to have witnessed biggest changes in fraction of young cohorts that get "some college" in the 2006-10 period. This margin is interesting since increased enrollment might not necessarily lead to increased graduation.¹³

To summarize, summary statistics on employment rates and enrollment levels show that changes in employment and changes in educational attainment over this time do differ by groups particularly for Hispanics and Blacks relative to Whites. This leads us to core research question that this paper attempts to answer: *Does responsiveness of schooling outcomes vary as a function of the labor demand shocks and if so, how well can it explain the schooling trends that we observe around the Great Recession?*

IV Empirical Strategy

In order to be able to answer the research questions, I run the following primary specification¹⁴

$$\dot{S}_{gm} = \alpha + \beta \dot{L}_{gm} + \epsilon_m, \quad (2)$$

¹³This finding perhaps serves as motivation for a different study which looks at persistence of impacts over a longer time horizon.

¹⁴I also run a specification for all groups with interaction terms for groups. Whereas I do not report it here the main results are very similar to those of the White sample.

where \dot{S}_{gm} is the change in the relevant schooling measure between 2006-10 for group g calculated at the MSA level using ACS data. \dot{L}_{gm} is the measure of labor demand shock constructed for group g in metropolitan area m using employment changes by industry level in the CBP data and taking into account the share of each group's share of employment in a given sector. Groups g are defined on the basis of race & ethnicity and gender.

The model predicts that negative labor demand shocks will induce a higher fraction of the young cohort's population at the MSA to stay in school, and therefore we expect $\beta < 0$. Moreover, differential importance of the different factors could possibly lead β 's to differ across sub-groups.

A Measuring Labor Demand Shocks: Constructing the Bartik

This paper uses the substantial variation in labor demand shocks across geography and demography induced by the Great Recession in order to be able to credibly estimate β . Empirical analysis is done at the metropolitan area level since these approximate local labor markets better. In order to mitigate any endogeneity concerns regarding the measure of labor demand shock, I instrument for local labor demand using a group-based Bartik (1991) measure that relies on each group's pre-Recession industrial composition of local employment at the metropolitan area level. The identifying assumption, as in standard bartik measure, is that changes in each industry at the national level are allocated proportionately across groups, based on each groups initial industry composition of employment at the MSA level.

In order to construct the group-specific Bartik measure, we calculate the relevant

demand shock for each group as weighted average of industry-specific (i) employment changes, with weights equal to industry's share of total employment in initial period.

$$\dot{L}_m = \sum_i \varphi_{im}^{t_0} \dot{L}_{im}, \text{ where } \varphi_{im}^{t_0} \equiv \frac{L_{im}^{t_0}}{L_m^{t_0}} \quad (3)$$

where \dot{L}_{im} represents changes in employment in industry i in metropolitan area m , \dot{L}_m represents changes in overall employment for metropolitan area, m , and $\varphi_{im}^{t_0}$ represents the fraction of metropolitan area population working in sector, i in the base period (2006).

Moreover, given that different groups are likely to have different outside options, I will create group specific shocks as to better capture the shocks for each sub-group. I create these shocks on the basis of race& ethnicity and/or gender.

Based on equation (3), I calculate relevant change in employment for a given demographic group, g , using industry employment shares that are specific to each group rather than shares for the whole economy such that

$$\dot{L}_m^g = \sum_i \varphi_{im}^{gt_0} \dot{L}_{im} \quad (4)$$

In the primary specification, I use changes in labor demand for cohorts aged 25-55 as a proxy for the labor demand shock received by the younger cohorts. I do not construct the measure using younger individuals since the decision to attend college or to work might be taken contemporaneously.¹⁵

¹⁵Section 4.3 provides evidence to support this specification.

B Validating the Bartik measure with Employment Rate changes of older cohorts

Before analyzing the impact of labor demand shocks on educational outcomes it is important to establish that my measure of labor demand shocks constructed is strongly correlated with actual changes in employment. For this purpose, I first run regressions of the group-based Bartik measure on actual changes in employment rates for cohorts aged 25-55. These are the cohorts which are used to construct the measure and therefore even allowing for endogenous supply response by cohorts, the measure should be significantly correlated with changes in employment rates.

Results from Table 3 Panel A provide supporting evidence that the group-specific Bartik measure constructed is correlated with actual changes in employment rates for the full sample and particularly for the White and Hispanic sub-samples. When we split the sample by gender, the correlations are stronger for males relative to females and the measure does a particularly good job for White and Hispanic males, who are the primary interest group of this study. Given that actual changes in employment do not line up well with predicted changes in employment in some cases such as Black sub-samples as well as results at the sub-group for females, this paper will exercise caution in interpreting their results. It is worth noting, however, that the full sample results seems to be driven mainly by White Males so any analysis that treats all groups as a whole is likely to be driven mainly by White Males.

C Using older cohorts as a proxy for labor demand shock for younger cohorts

Based on the results in Table 3 Panel B, we see that there is strong correlation between the Bartik measure for shocks to outside option and actual employment rate changes for younger cohorts. The magnitudes in Panel A and B are consistent with younger cohorts getting hit more by adverse labor demand shocks, a pattern driven by White cohorts. It is interesting to note that the magnitudes for older and younger Hispanic cohorts are quite similar which lends greater credibility to using older cohorts as a proxy for the labor demand shock received by the younger cohorts. Moreover, when we run analysis by sub-groups we observe strong correlation for all male sub-groups despite reasonably large standard errors. The correlations are statistically significant for the sample on the whole and for Whites and Hispanic sub-groups implying that my measure is doing a reasonably good job at capturing employment rate changes for young male White and Hispanic cohorts. The measure does not seem to do a good job for Blacks in general which is suggestive evidence that they are not responding in a systematic way to labor demand shocks. Given this insight, we will interpret their schooling outcome results with caution.

The results from Panel A and B of table 3 also raise the importance of factors such as endogenous response by certain sub-groups in response to labor demand shocks. We therefore need to proceed with caution in interpreting results for their changes in schooling since it could be that some groups adjusted relatively quicker than others in the aftermath of the Great recession or it could be that some groups do not have strong attachment

to labor market occupations. This seems to be particularly true for females as in consistent with findings of Walstrum (2015). It is important to notice the heterogeneity in effects by sub-groups implying that a "one size fits all" approach to modelling labor demand shocks is not likely to work well with measuring relevant labor demand shocks for each sub-group.

V Results¹⁶

A Summary of regression results

In this section, we present the paper's main results, which assess how local demand shocks during the Great recession affected average educational attainment among young cohorts. We use multiple measures of educational attainment and combine them with range of specifications by race and ethnicity as well as gender.¹⁷

Table 4 presents the results from my main specification: where we run effect of group specific Bartik measures of labor demand on schooling responses of young cohorts at High School dropout and college attendance margin. Based on results in Panel A, areas that got hit harder (shock value is more negative), on average, experienced a bigger decrease in their dropout rates. This implies that a 1 standard deviation shock (which is around 0.0138) is associated with 0.24 pp (calculated as $0.0138 * 17.7$) decrease in High School Drop out rates for the full sample. Given that the High School dropout rate was

¹⁶All Results presented are weighted using relevant cohort's population in 2006 at the MSA level.

¹⁷We present results from the main specifications here but results are fairly robust to alternative specifications

around 6.3% in 2006, this implies a 3.8% drop in High School dropout rates. In terms of magnitude, these effects are larger than previous economic downturns, however, they are not statistically significant.

Splitting the sample by gender, we only see marginally significant results for the male sample which is again driven by the Hispanic sub-sample. A one standard deviation change in labor demand for older male Hispanics is associated with 0.86 (calculated as $0.0138 * 62.1$) percentage point decrease in High School Drop out rates for the younger male Hispanic cohorts. This translates into a 8.9% drop in High School dropout rates for young male Hispanics, a result which is statistically significant at 5% level. The results for the full sample lie within the effects estimated in existing literature. The results for the full sample are largely driven by the White sub-sample and this paper is able to pick up heterogeneity in effects for Hispanics relative to Whites by splitting analysis along race and ethnicity. Higher responsiveness of Hispanics is able to explain 55% of the observed convergence in High School Dropout rates between Hispanics and Whites in the aftermath of the Great Recession.

Panel B of Table 4 present the results for College attendance. Effects again differ for Hispanics from rest of the groups. Whereas areas with high shocks are witnessing decreases to college attendance for Whites and Blacks, Hispanics are responding by increasing their college attendance. These results also provide evidence that effects of labor demand shocks on schooling differ across sub-groups based on race and ethnicity. Existing studies that treat all groups as a whole are likely to miss this heterogeneity in treatment effects and are likely to driven by results for Whites. Results in Panel B helps further illustrate the point that full sample results are driven mainly by White cohorts.

The results for Hispanic sub-samples for college attendance seem to be driven both by male and female sub-samples. In order to understand better the magnitude of the effect, a one standard deviation increase in labor demand shock is associated with 1.14 (calculated as $0.0138 * 82.7$) percentage point increase in college enrollment rates for the Hispanic sample. Given that the High School dropout rate was around 13.1% in 2006, this implies a 8.7% drop in High School dropout rates for Hispanics. These results are statistically significant at 5% level and help explain 62% of the observed convergence in educational attainment between young Hispanic cohorts and Whites.

These results help illustrate making the case that not only is it the case that incidence of shocks such as the Great Recession differs across sub-groups, it is actually the responsiveness of Hispanics relative to other groups that drives the convergence in educational attainment. Moreover, the differences in magnitudes (and possibly sign) of the effects hint at differential importance of the underlying factors that affect the schooling decision both at the marginal benefit and cost side. Whereas Hispanics are a group with low home ownership, they are highly dependent on outside labor market opportunities for work. This implies that a adverse labor demand shock leads younger cohorts to substitute away towards school. Blacks do not seem to respond systematically to labor demand shocks and therefore we exercise caution in interpreting their responsiveness. Whites are affected through multiple channels and the net effect was predicted to be less in magnitude due to the shock to housing values and the estimates obtained are consistent with this hypothesis.

B Why using changes in employment rates as the independent variable is flawed?

In order to contribute to the literature, it is also important to explain results of existing empirical work. For this purpose, I also report results if we were to regress schooling outcomes at the High School and college attendance simply on changes in employment for older cohorts. Table 5 presents these results.

Panel A and B shows the results for High School drop out rates and college attendance. We do not find any significant effects in these specification for High School dropouts and but do find a small effect for college enrollment driven by the Hispanic sample. These results are consistent with findings of Britton-Tolani (2017), who uses state variation in unemployment rates and only finds effects in enrollment at 2-year colleges and does not find any differential impacts by groups. I argue against using unemployment rates as a measure for labor demand shocks since these measures are susceptible to labor supply induced responses as well as selection on the labor force participation margin. My measure of labor demand shocks mitigates any endogeneity concerns related to using unemployment rates by separating the labor demand component of employment changes by employing a Bartik approach. Moreover, I construct group based labor demand shocks to account for differences in incidence of labor demand shocks across groups and these measures allow me credible identifying variation which I use to analyze the schooling responses of young cohorts.

VI Discussion

My results show that the incidence of labor demand shocks does differ by groups based on race and ethnicity. Moreover, given differences in baseline employment rates, standard deviations of the shock and the geographical variation in high and low shock areas, across groups, these differences translate into bigger differences in incidence of shocks across groups. Therefore, existing studies that focus on analyzing schooling response to a common labor demand shock are likely to miss heterogeneity in treatment effects.

Moreover, different groups exhibit different degrees of responsiveness to labor demand shocks even after we account for differences in intensity of the labor demand shock experienced. Whereas Hispanic and Blacks are affected more by labor demand shocks relative to Whites, Hispanics are most responsive to these shocks and respond to adverse shocks by increasing their educational attainment in hardest hit area. This effects holds true both at High School dropout margin as well as for college attendance. Higher responsiveness by Hispanics is able to explain 55% of the convergence in High School dropout rates between Hispanics and Whites and 62% of the convergence in college attendance. These set of results seem to suggest the importance of analysis by race and ethnicity in order to develop a better understanding of the key mechanisms driving results for each sub-group.

Moreover, the results for Hispanics seem to be driven predominantly by males at the High School level whereas both males and females contribute to the college attendance increases. It is worth noting that results from the full sample largely mimic those of Whites implying that any analysis which treats all groups as one, is likely to pick up

effects (or lack thereof) driven mainly by the White sub-samples. The disparity in results between male and female samples also seems to provide suggestive evidence regarding the relative ability of two genders in adapting to shocks to the labor market.

It is worth exploring further reasons underlying the higher responsiveness of Hispanics as compared to other groups particularly Blacks who have similar baseline schooling outcomes as well as employment outcomes. Given that there does not seem to be a systematic relationship between trends in schooling with labor demand changes for Blacks but very much so for Hispanics seems to suggest the relative importance of shocks to outside option for Hispanics. Whereas Blacks have traditionally remained a low-employment group even conditional on higher schooling, Hispanics have made some progress in catching up in their schooling outcomes in recent years. While the housing boom might have slowed down some of this progress in college attainment as per (Charles, Hurst and Notowidigdo (2017), the recent bust is likely to have helped explain part of the observed convergence in educational attainment as shown in Figure 2.

The paper also makes the point that simply using changes in log employment or unemployment induced by the Great Recession is not appropriate since individuals might already respond on the supply side on these margins (See Table 5 for regressions results using employment rate changes as the independent variable). Therefore, it is important to use a Bartik type approach to study the affect of pure labor demand changes on human capital investments of younger cohorts.

Focusing on the schooling investments of younger cohorts is critical since there is a growing body of literature on "scarring" (Beaudry & DiNardo (1991), Kahn (2010),

Oreopolous et al. (2012), Bowlus & Liu (2007) which suggests that there are lifetime implications of graduating in a Recession. However, even if individuals decide to stay on in school, welfare implications for affected cohorts are not clear. There is existing literature which suggest that returns to college may be high for academically marginal students (Zimmerman 2014), however, there remains the outstanding concern that while many enroll few might graduate (Fry 2002). Moreover, social benefits associated with college attendance extend beyond increased earnings and employment opportunities (Moretti & Lochner 2004, LLeras-Muney 2005, McCary and Royer 2011).

These results also have implications for state and local appropriation for education during business cycles. Defaults on Student loans are likely to go up as tuition and borrowing costs go up (Mueller & Yannelis 2017). Whereas enrollments have typically been counter-cyclical, state and local appropriations have traditionally been pro-cyclical (Betts & McFarland 1995, Deming & Walters 2018). However, optimal financing of higher education depends not just on the magnitude of marginal returns for affected cohorts but also on the *responsiveness of college attendance to labor demand shocks*, a key point made in this paper. Given that these effects differ by sub-groups, an important question left unanswered by this paper is optimal design of policy in order to improve individual and social welfare in the aftermath of shocks such as the Great Recession.

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Table 1: Employment Rate Changes 2006-10

Employment Rate changes for cohorts aged 25-55				
Group	Employment Rate 2006	Employment Rate 2010	Change in Employment Rate 06-10	% Change in Employment Rate
White Male	0.880	0.834	-0.046	-5.2
White Female	0.745	0.736	-0.009	-1.2
Black Male	0.739	0.674	-0.065	-8.8
Black Female	0.710	0.694	-0.016	-2.3
Hispanic Male	0.824	0.775	-0.049	-6.0
Hispanic Female	0.690	0.682	-0.008	-1.1
Employment Rate changes for cohorts aged 16-21				
Group	Employment Rate 2006	Employment Rate 2010	Change in Employment Rate 06-10	% Change in Employment Rate
White Male	0.485	0.391	-0.095	-19.5
White Female	0.506	0.444	-0.061	-12.1
Black Male	0.320	0.242	-0.078	-24.3
Black Female	0.350	0.291	-0.059	-16.8
Hispanic Male	0.410	0.319	-0.091	-22.2
Hispanic Female	0.387	0.326	-0.061	-15.7

Notes: This table provides summary statistics for employment changes before and after the Great Recession.

2006 observations are pooled from 3 year ACS centred at 2006 whereas 2010 observations are pooled from 3 year ACS centred at 2010.

Only Whites and Blacks of non-Hispanic ethnicity are considered for these calculations whereas Hispanics may belong to any race.

Employment Rates are calculated as a fraction of the total population for the given age. Immigrants are not included in the analysis because of concerns outlined in Kovak and Cadena (2015) regarding their higher mobility driving composition changes in sample.

Table 2: Changes in Educational Attainment 2006-10

Panel A: High School Dropout Rates for cohorts aged 16-19				
Group	Fraction of Dropout 2006	Fraction of Dropout 2010	Change in Dropout Rate 06-10	% Change in Dropout Rate
All Male	0.0700	0.0494	0.0185	29.4
All Female	0.0554	0.0389	0.0206	29.8
White Male	0.0612	0.0419	0.0193	31.5
White Female	0.0458	0.0331	0.0127	27.7
Black Male	0.1014	0.0744	0.0272	26.8
Black Female	0.0859	0.0572	0.0289	33.6
Hispanic Male	0.1070	0.0843	0.0228	21.3
Hispanic Female	0.0862	0.0588	0.0273	31.7
Panel B: Current College Attendance rates for cohorts aged 18-21				
Group	Fraction of Dropout 2006	Fraction of Dropout 2010	Change in Dropout Rate 06-10	% Change in Dropout Rate
All Male	0.1500	0.1624	0.0124	8.3
All Female	0.1798	0.1999	0.0201	11.2
White Male	0.1613	0.1681	0.0068	4.2
White Female	0.1937	0.2059	0.0122	6.3
Black Male	0.1014	0.1322	0.0310	30.6
Black Female	0.1291	0.1750	0.0466	36.1
Hispanic Male	0.1131	0.1515	0.0383	33.9
Hispanic Female	0.1488	0.1916	0.0427	28.7
Panel C: Any College Attendance Rates for cohorts aged 18-21				
Group	Fraction of Dropout 2006	Fraction of Dropout 2010	Change in Dropout Rate 06-10	% Change in Dropout Rate
All Male	0.2899	0.3202	0.0303	10.5
All Female	0.3578	0.3967	0.0389	10.9
White Male	0.3164	0.3444	0.0280	8.8
White Female	0.3887	0.4250	0.0363	9.3
Black Male	0.1899	0.2239	0.0342	18.0
Black Female	0.2634	0.3094	0.0461	17.5
Hispanic Male	0.1852	0.2310	0.0460	24.8
Hispanic Female	0.2531	0.3022	0.0489	19.3

Notes: Schooling Data comes from 3 year ACS centred at 2006 and 2010 respectively.

Only Whites and Blacks of non-Hispanic ethnicity are considered for these calculations whereas Hispanics may belong to any race.

Attendance Rates are calculated as a fraction of the total population for the given age. Immigrants are not included in the analysis because of concerns outlined in Kovak and Cadena (2015) regarding their higher mobility driving composition changes in sample.

Table 3: Validating Bartik Measure against Employment Rate Changes

Panel A: Changes in Employment Rates for older cohorts (age 25-55) with Group Based Bartik cohorts (age 25-55)				
Sex	Full Sample	Whites	Blacks	Hispanics
Full Sample	0.372*** (0.0662)	0.386*** (0.0942)	0.364* (0.200)	0.639*** (0.245)
Male	0.416*** (0.0746)	0.400*** (0.0838)	0.303 (0.213)	0.691*** (0.237)
Female	0.329** (0.142)	0.134 (0.162)	0.598* (0.307)	0.568 (0.365)
Mean (Bartik Shock)	-0.0655	-0.0684	-0.0489	-0.0659
Standard Deviation (Bartik Shock)	(0.0138)	(0.0111)	(0.0146)	(0.0158)
Panel B: Changes in Employment Rates for younger cohorts (age 16-21)				
Sex	Full Sample	Whites	Blacks	Hispanics
Full Sample	0.738*** (0.154)	0.847*** (0.212)	0.505 (0.308)	0.599*** (0.250)
Male	0.672 *** (0.174)	0.797*** (0.230)	0.263* (0.252)	0.528* (0.302)
Female	0.637*** (0.230)	0.903*** (0.308)	0.488 (0.474)	-0.0614 (0.462)
Mean (Bartik Shock)	-0.0655	-0.0684	-0.0489	-0.0659
Standard Deviation (Bartik Shock)	(0.0138)	(0.0111)	(0.0146)	(0.0158)

Notes: Only Whites and Blacks of non-Hispanic ethnicity are considered for these calculations whereas Hispanics may belong to any race.

Each regression is a first difference and therefore avoids the need for area fixed effects. Full Sample regressions include more aggregated controls such as state the MSA lies in.

Employment Rates are calculated as a fraction of the total population for the given age. Immigrants are not included in the analysis because of concerns outlined in Kovak and Cadena (2015) regarding their higher mobility driving composition changes in sample.

Standard errors, clustered at metropolitan area level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Changes in Schooling Response with Bartik Measure (Group)

Panel A: Changes in High School Dropout Rates (aged 16-19) with Group Based Bartik				
Sex	Full Sample	Whites	Blacks	Hispanics
Full Sample	-0.177 (0.111)	-0.167 (0.139)	0.113 (0.231)	-0.621** (0.269)
Male	-0.141* (0.0788)	-0.002 (0.0886)	-0.207 (0.159)	-0.997*** (0.200)
Female	-0.134 (0.119)	-0.347** (0.161)	0.322 (0.221)	-0.131 (0.254)
Mean (Bartik Shock)	-0.0655	-0.0684	-0.0489	-0.0659
Standard Deviation (Bartik Shock)	(0.0138)	(0.0111)	(0.0146)	(0.0158)
Panel B: Changes in College Attendance Rates (aged 18-21) with Group Based Bartik				
Sex	Full Sample	Whites	Blacks	Hispanics
Full Sample	0.176 (0.203)	0.313 (0.287)	0.465 (0.329)	-0.827*** (0.283)
Male	0.228* (0.133)	0.296* (0.158)	0.330 (0.258)	-0.431 (0.362)
Female	-0.294 (0.193)	-0.277 (0.289)	-0.185 (0.303)	-0.532 (0.350)
Mean (Bartik Shock)	-0.0655	-0.0684	-0.0489	-0.0659
Standard Deviation (Bartik Shock)	(0.0138)	(0.0111)	(0.0146)	(0.0158)

Notes: Only Whites and Blacks of non-Hispanic ethnicity are considered for these calculations whereas Hispanics may belong to any race.

Fraction of High School dropouts or fraction in college are defined using ACS data and are calculated at the MSA level for each group respectively. Only MSA's with more than 30 sampled individuals of each group are considered for these purposes.

Each regression is a first difference and therefore avoids the need for area fixed effects. Full Sample regressions include more aggregated controls such as state the MSA lies in.

Immigrants are not included in the analysis because of concerns outlined in Kovak and Cadena (2015) regarding their higher mobility driving composition changes in sample.

Standard errors, clustered at metropolitan area level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Changes in Schooling Response with Changes in Employment Rate (Group)

Panel A: Changes in High School Dropout Rates (aged 16-19) with Changes in Group Specific Employment Rate (Older Cohorts)				
Dependent Variable	Full Sample	Whites	Blacks	Hispanics
Fraction of High School Dropouts	0.0122 (0.0524)	0.0241 (0.0868)	0.0414 (0.0943)	-0.0471 (0.0880)
R ²	0.016	0.000	0.001	0.002
Observations	264	264	159	160
Panel B: Changes in College Attendance Rates (aged 18-21) with Changes in Group Specific Employment Rate (Older Cohorts)				
Dependent Variable	Full Sample	Whites	Blacks	Hispanics
Fraction in College	-0.115* (0.0598)	-0.126 (0.124)	-0.0643 (0.0841)	-0.168** (0.0747)
R ²	0.094	0.004	0.004	0.029
Observations	264	264	159	160

Notes: Only Whites and Blacks of non-Hispanic ethnicity are considered for these calculations whereas Hispanics may belong to any race.

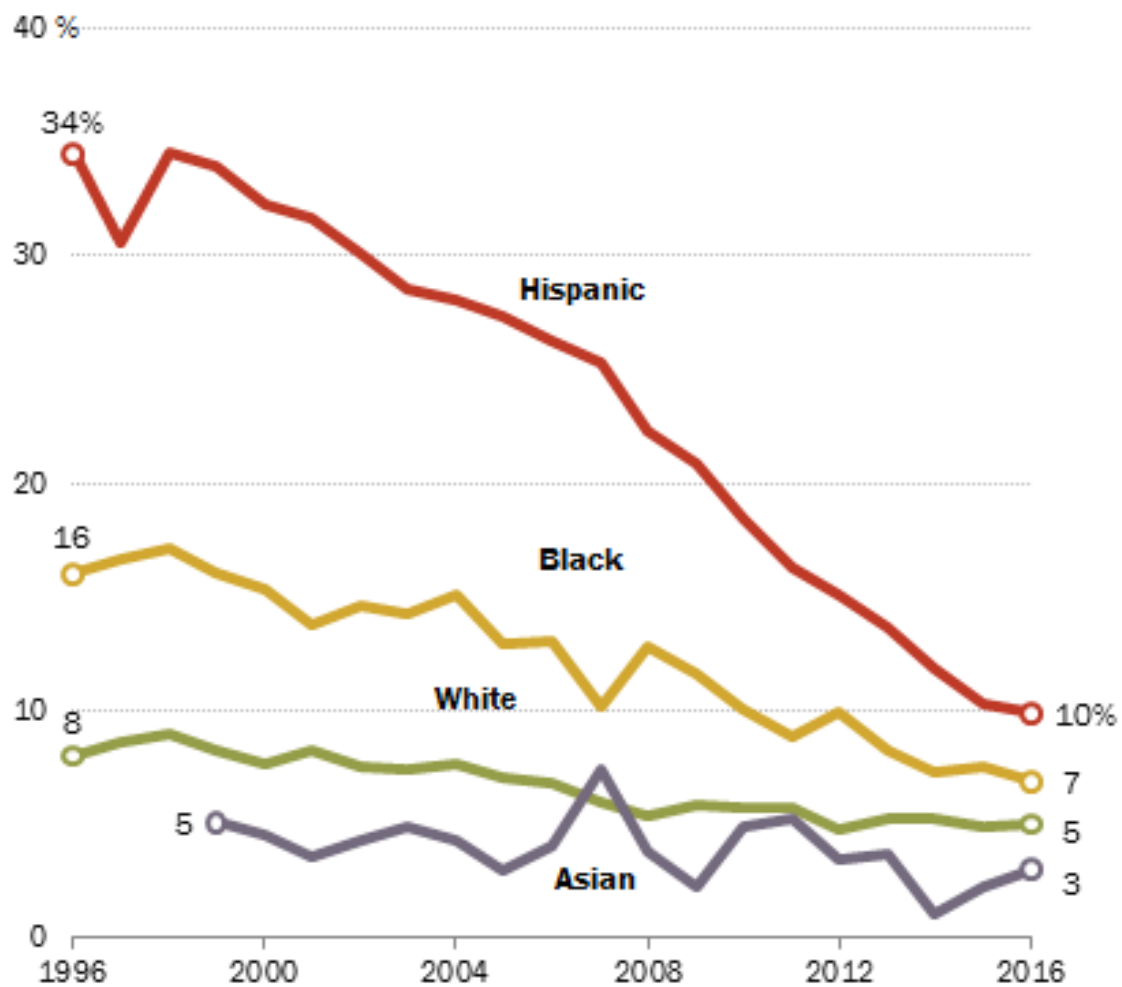
Fraction of High School dropouts or fraction in college are defined using ACS data and are calculated at the MSA level for each group respectively. Only MSA's with more than 30 sampled individuals of each group are considered for these purposes.

Each regression is a first difference and therefore avoids the need for area fixed effects. Full Sample regressions include more aggregated controls such as state the MSA lies in.

Employment Rates are calculated as a fraction of the total population for the given age. Immigrants are not included in the analysis because of concerns outlined in Kovak and Cadena (2015) regarding their higher mobility driving composition changes in sample.

Standard errors, clustered at metropolitan area level, in parentheses *** p<0.01, ** p<0.05, * p<0.1

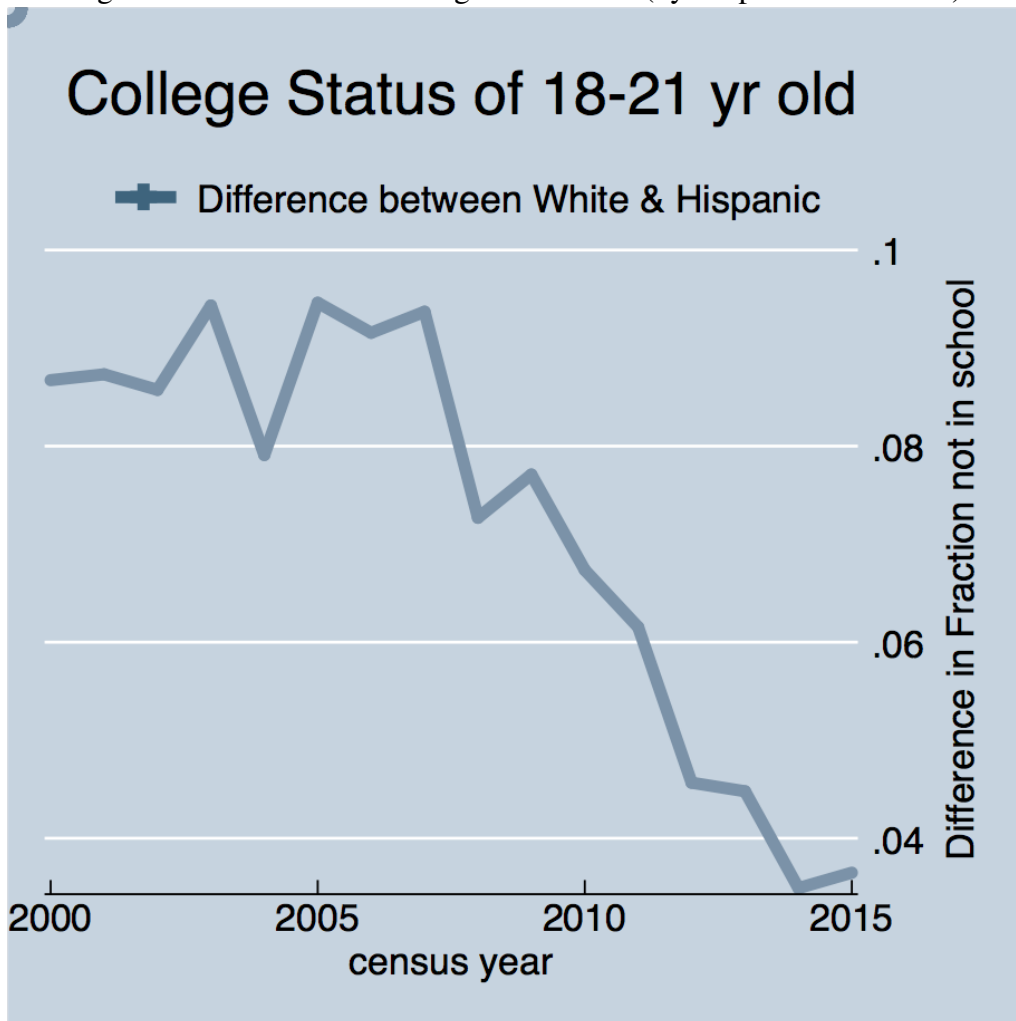
Figure 1: High School Dropout rates by Race and Ethnicity
% of 18- to 24-year-olds who dropped out of high school, by race and ethnicity (1996-2016)



Note: Civilian noninstitutionalized population. Blacks and Asians include the Hispanic portions of those groups. Whites include only non-Hispanics. Hispanics are of any race.
 Source: U.S. Census Bureau October Current Population Survey.

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Figure 2: Differences in College Enrollment (by Hispanic vs. Whites)



Author's Calculations based on American Community Survey 2000-2015

Figure 3: Unemployment Rates by Race and Ethnicity

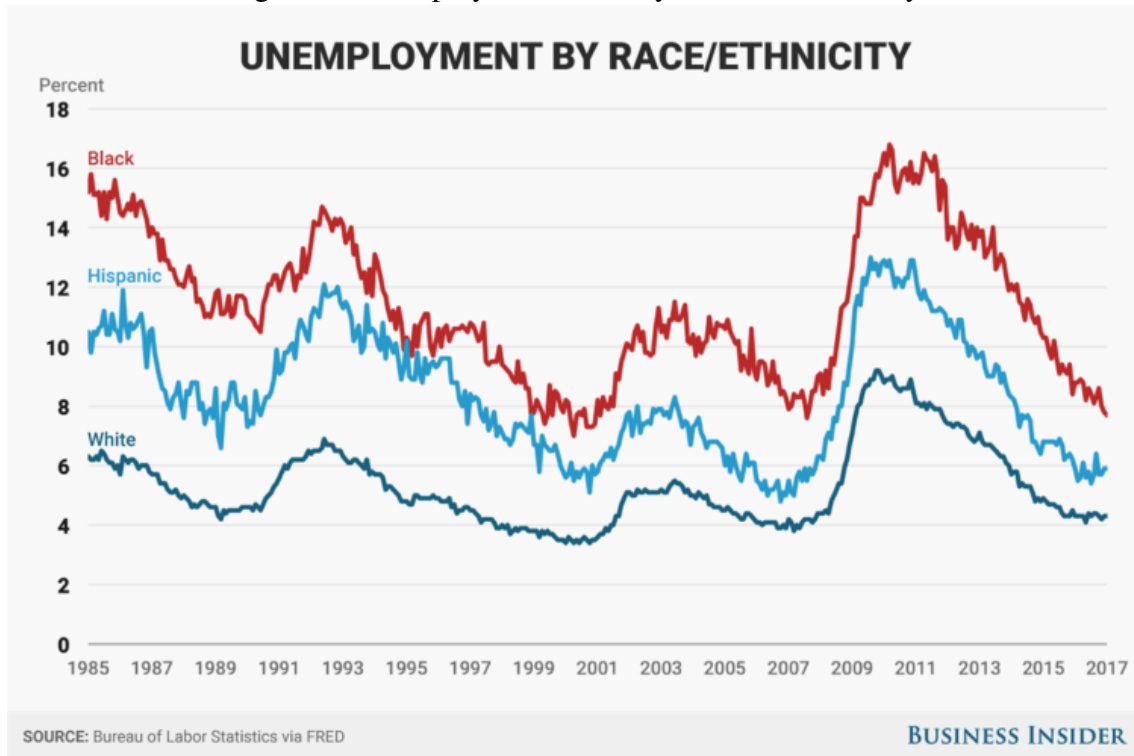
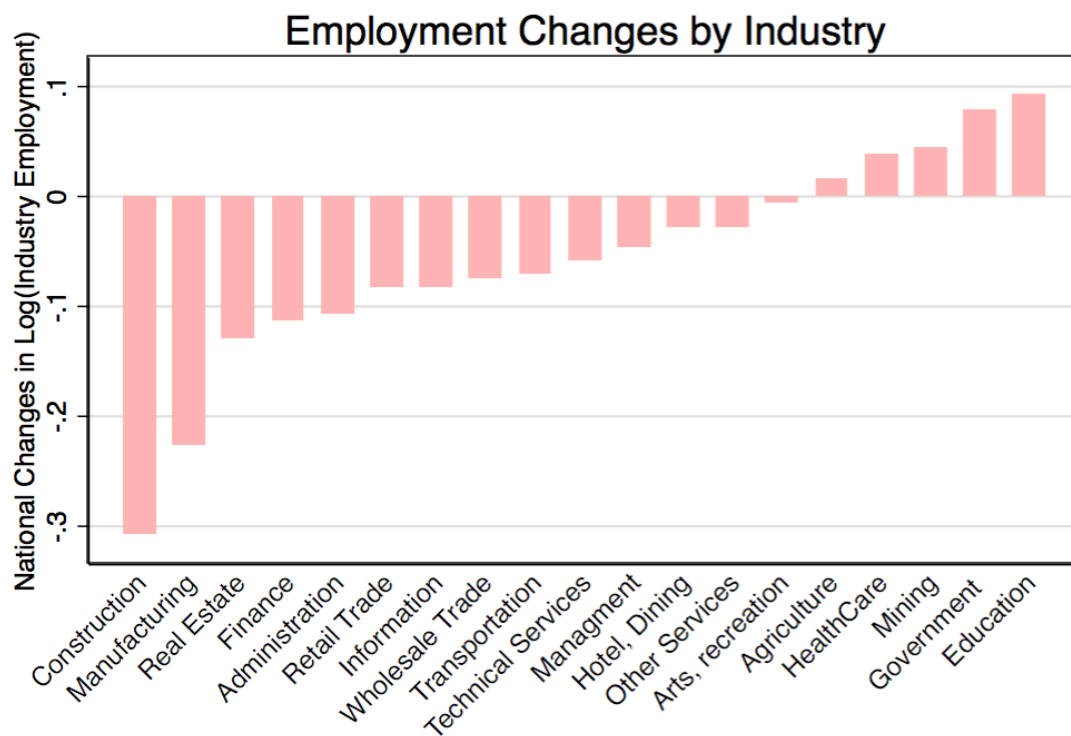


Figure 4: Employment Changes 2006-10 at the National Level by Industry



Author's Calculations based on County Business Pattern 2006,2010