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The Effects of Labor Market Competition with Immigrants on the Wages and Employment and Natives: What Does Existing Research Tell Us?

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1. Introduction

Since the passage of the 1965 Immigration and Nationality Act, the United States has experienced a sustained inflow of foreign migrants. These immigration flows increased the proportion of the U.S. resident population that is foreign born and has contributed disproportionately to U.S. population growth. In 1970, the foreign-born accounted for 4.7 % of the U.S. population. By 2000, the percent foreign born increased to 10.4%. During these three decades, the resident immigrant population increased by 16.2 million, accounting for roughly one-quarter of overall population growth (U.S. Census Bureau 2000).

Moreover, the source countries and relative skill profiles of this most recent wave of migrants differ markedly from those of previous immigrants. While most pre-1965 immigrants originated in southern and central Europe and had similar levels of educational attainment as natives, the most recent migrants come largely from Latin America and Southeast Asia and are on average relatively less educated (Borjas 1995, 1999).

Recent immigration trends coupled with the low average skill levels of recent immigrants have raised concerns that immigration to the U.S. has adversely affected the earning and employment of the least skilled native workers. Moreover, there have been several well-documented changes in native employment and earnings corresponding in time to this most recent immigrant wave. For example, the last three decades have witnessed pronounced increases in earnings inequality, with the premium associated with a college degree and work experience rising sharply beginning in the 1980s. Moreover, there have been marked declines in labor force participation and employment rates among relatively unskilled African-American men.

Despite the coincidence of these immigration and labor market trends, the economic research pertaining to the impact of immigrants on native labor market outcomes is far from conclusive, with reputable scholars in considerably disagreement as to the magnitude of these impacts. Complicating matters, a number of factors that determine employment and earnings have changed coincidentally with the most recent immigrant wave, making it difficult to disentangle the impact of immigrant competition from the effects of other forces in the economy. For example, the proportion of the U.S. workforce represented by unions has declined in recent decades, a fact likely to contribute to downward pressure on the wages. The value of the federal minimum wage has declined after accounting for the effects of price inflation. As one further example, the proportion of low-skilled men who have done time has increased at an alarming rate to the point where the Bureau of Justice Statistics estimates that one in every five African-American men is doing or has done prison time, a new factor that greatly compromises the labor market prospects of the lowest earning native-born Americans. Isolating the impact of immigration on native outcomes requires a research design that holds constant these other factors, a considerably challenging methodological problem.

In this paper, we provide an overview of the current debate among economists pertaining to the effects of recent immigration on the earnings and employment of native born workers. Since much of this debate revolves around methodological differences in research design, we devote much of our effort to discussing the various strategies that researchers have used to isolate immigrant competition effects, and the costs and benefits of each. Our overall assessment is that the central tendency of the research evidence suggests that recent immigration has had only a modest effect on the labor market prospects of native born Americans. At the conclusion of the paper, we offer several potential hypotheses that may explain this lack of a large impact.

2. Basic Economic Models of Immigration and Labor Market Competition

Plainly stated, a large increase in immigration will suppress the wages of those native-born workers in direct labor market competition with immigrants. The economic forces behind this proposition are best illustrated with a simple model of the overall economy. Suppose for the moment that all workers in the economy are exactly the same in that employers can perfectly substitute one employee for another. Assume further that this "perfect substitutability" extends to the ability of employers to substitute an immigrant worker for a native worker. We will also assume that the stock of productive capital (machinery, plant, and equipment used in the production of goods and services) is fixed. Under these conditions, an increase in immigration increases national output, lowers the wages and employment of native workers as well as aggregate wage and salary income, and increases total income accruing to the owners of capital.

Figure 1 illustrates these points in a simple supply-demand framework. The downward-sloping curve depicts the economy-wide demand for labor, with the height of the curve giving the maximum amount that employers would be willing to pay for one more worker at the corresponding level of employment. Incidentally, this amount equals the value of the output added by the last worker hired, a value that declines as the level of employment increases.[i] Thus, to induce employers to hire more workers relative to some given employment level, wages must decline. Since the height of the demand curve at any employment level provides the value added by the last worker, it follows that the area under the demand curve up until the actual employment level corresponds to the value of national output (or gross domestic product).

The upward-sloping line, S_0, provides the supply of native workers to the labor market, or the number of workers willing to work at a given wage. The upward slope indicates that as

wages increase, more people will want to work. In the absence of foreign migration, the market will settle where supply equals demand, at the wage w_o and the employment level E_0. Total wage and salary income is simply wages times employment (the area in the rectangle below the line at the wage level w_o and to the left of the employment level E_0).

In this simple framework, international immigration impacts the economy by augmenting the number of people wishing to work at any given level of wages. For example, at the equilibrium wage w_o, the quantity of natives who wish to work is E_0, and absent international immigration this is where the economy will settle. Immigration however, increases the number of people willing to work at this wage, effectively shifting the entire labor supply curve outwards to S_1. At the old wage level, there are now more workers seeking employment than employers are willing to hire. Competition for jobs will drive down wages, inducing employers to expand employment and some job seekers to leave the labor market. This continues until wages decline to w_1 in Figure 1, where labor demand and supply are once again equal to one another.

Note the impact of this "labor supply shock" on the labor market outcomes of native workers and on the economy as a whole. To begin, wages have declined for all workers, immigrant as well as native, and thus natives who are still working are clearly worse off relative to the outcome pre-immigration. Moreover, despite the fact that total employment has increased native employment has declined, since the decreases in wages causes some natives to withdraw from the labor market. This can be seen by looking at the number of native job seekers along the old natives-only supply curve S_0 at the new lower wage w_1. At the lower post-immigrant wave wage, only E_2 natives would be seeking work, a decline in employment equal to the distance between E_0 and E_2. Thus, in this simple model, it must be the case that native born workers are harmed by the influx of foreign-born labor.

In contrast, employers (or more specifically, the owners of capital) clearly benefit from the influx of immigrants. Since overall employment has increased and the value of national output is given by the area under the demand curve up through the actual employment level, the nation's gross domestic product must have also increased. Moreover, employers are now paying lower wages than they were previously. With higher national output and a lower wage level, the total income accruing to capital has clearly increased.

This is a relatively straightforward story. Immigration increases national output, harms native labor, but enriches the owners of capital. Stated in an alternate manner using terminology that we will more clearly define momentarily, immigration harms the "factors of production" with which it directly competes while benefiting the factors that it tends to complement. Given the large increases in immigration in recent decades and the clear predictions of these simple theoretical arguments, one may wonder what there is to debate.

Of course, the actual economy and the likely impacts of immigration operate within a far more complex model. Moreover, accounting for some of these complexities will help us interpret the research findings that we discuss below. Perhaps the best way to proceed is for us to relax some of the simplifying assumptions that permitted us to reduce the entire economy to Figure 1, and discuss how this impacts the story.

Most conspicuously, we assumed that employers can perfectly substitute the average immigrant worker for the average native worker (and visa versa). This is clearly unrealistic. Immigrants and natives differ along a number of dimensions that are likely of value to employers. Immigrants tend to have less formal education on average, with levels of educational attainment particularly low among Hispanic immigrants and many Southeast Asian immigrants. Immigrant and native-born workers are also likely to differ in terms of their ability to converse in

English. Immigrants also tend to be younger than natives, a fact suggesting that the average immigrant worker may have less labor market experience than the average native-born worker.[ii]

Given such difference in skills, it is more likely the case that immigrants and natives are what economists refer to as "imperfect substitutes" in production – i.e., substituting immigrant for native workers is possible, but limited by differences in skills. Moreover, the substitution possibilities are likely to vary across jobs according to the skill content of various occupations. In some instances, certain sub-groups of natives are likely to complement immigrant labor in production. That is to say, certain native workers are likely to be hired in conjunction with the hiring of immigrant workers. For example, Spanish speaking laborers on a construction site may increase the demand for native-born bilingual Hispanics with enough education to serve in supervisory positions. As another example, an increase in the supply of low-skilled construction labor may increase the demand for architects, structural and civil engineers, skilled craftsmen, and workers in other such occupations whose labor constitutes important inputs in the construction industry.

The imperfect substitutability between immigrant and native workers in the U.S. is most readily demonstrated by comparing their distributions of educational attainment. Table 1 presents the distributions of immigrants and native men and women, 18 to 64 years of age, across formal educational attainment levels for the year 2000. We tabulated these figures from the 1% Public Use Microdata Sample (PUMS) of the 2000 U.S. Census of Population and Housing. The share of immigrant workers with extremely low levels of educational attainment is quite high relative to all native groups. For example, roughly 22% of immigrant men left school before the ninth grade, compared with 2% of native-born White men, 4% of native-born Black men, 2% of native-born Asian men, and 8% of native-born Hispanic men. Similar patterns are observed

when comparing immigrant and native-born women. Immigrants are also more likely to hold advance degrees relative to most of the native-born groups.

Interestingly, the immigrant distribution across educational attainment categories is lightest in the intermediate educational attainment levels, such as high school graduate, or some college. For example, roughly 38% of immigrant men and 43% of immigrant women fall within these two educational attainment levels. By contrast, over 60% of non-Hispanic native-born white and black workers are in these two educational attainment categories as are nearly 60% of native born Hispanic men and women. Native-born Asian men and women are more highly concentrated among even higher levels of educational attainment.

One can also characterize the degree of overlap between the skill distributions of immigrant and native by incorporating the effects of age as well as education on skills and earnings. We do so in the following manner. We first defined 54 groups based on age and educational attainment.[iii] We then use the 2000 PUMS data from the census to rank these groups from lowest to highest in terms of average earnings among the employed within each group. This ranking serves as an indication of skill endowments as they are valued by the market.[iv] Next, we identified those age-education groups that account for the bottom 25%, or first quartile, of the skill distribution for natives, the next 25% of natives (the second quartile), the middle-upper 25% of natives (the third quartile), and the top 25% of the native skill distribution (quartile four). With this breakdown, we then calculated the percent of each immigrant and native groups that falls within each skill quartile. To the extent that the percent for a given group and quartile exceed 25%, the group is over-represented in this portion of the skill distribution. Conversely, to the extend that the percent falls below 25%, the group is under-represented.

Figure 2 presents these skill distributions for immigrant and native men. In addition to all immigrants, we also present the distribution for Hispanic immigrants. As can be seen, immigrants are heavily over-represented in the least-skilled quartile and under-represented in the remainder of the skill distribution. Fully 42% of all immigrant men and 62% of Hispanic immigrant men lie in the bottom quartile of the overall native skill distribution. For the native-born, by contrast, 23% of White men, 35% of Black men, 41% of Asian men, and 48% of Hispanic men fall in this low-skilled group. Furthermore, immigrants are under-represented in the middle of the skill distribution, with 37% of all immigrants and 31% of Hispanic immigrants in the second and third quartiles. For the native born, the comparable figures are 50% for White men, 53% for black men, 34% for Asian men, and 43% for Hispanic men. Figure 3 presents comparable distribution for women. The figure also reveals fairly large differences between the skill distributions of immigrants and natives.

These figures suggest that immigrants and native differ considerably in terms of their skills, a fact that complicates our analysis. Allowing for imperfect substitution between immigrant and native labor driven by differences in skills alters our theoretical predictions regarding the economic effects of immigrants on native labor market outcomes. Those natives whose skills are most like those of immigrants are most likely to be harmed. On the other hand, those natives groups with sufficiently different skill sets are likely to be least harmed or may even benefit in terms of their wages and employment by an increase in immigrant labor. The educational attainment figures presented in Table 1 and the skill distributions depicted in Figures 2 and 3 indicate that there are substantial differences in skills between immigrants and natives. Perhaps the greatest degree of similarity occurs between immigrants and native-born Hispanics. Nonetheless, one cannot predict a priori how immigration will impact each of these groups on

average, as immigrant skills distributions clearly differ in each case. The ultimate effect of immigrants on natives (both in terms of the sign of the effect as well as the magnitude) is an empirical rather than a theoretical question.

In the simple model in Figure 1, we also assumed that the stock of productive capital used in the production of goods and services was fixed, an unrealistic assumption that figures prominently in understanding some of the differing empirical results we will discuss below. To understand the importance of this assumption, we should briefly discuss the process by which capital accumulates in modern market economies. Changes in the capital stock from year to year reflect the difference between capital investment (which increases the capital stock) and capital depreciation (which diminishes the capital stock). Investment involves the deliberate allocation of resources towards activity that augments the future productive capacity of the economy –e.g., the production of a machine or factory. Capital depreciation occurs through the wear and tear of the existing capital stock. For the capital stock to increase, capital investments must exceed capital depreciation.

Whether the economy makes sufficient investments to, on net, increase the stock of productive capital will depend on the return to capital, with increasing returns to capital spurring net capital accumulation. If, for whatever reason, one can earn more with a lathe today than yesterday, the demand for investment capital for the purpose of producing lathes will increase. This will increase interest rates (the price of capital) which will induce people to save more domestically (supply their purchasing power to the capital market) and perhaps induce inflow of investment capital from abroad.

Immigration may increase the returns to capital by altering the composition of a nation's factors of productions. To appreciate this point, it is helpful to think about how the mix of a

country's endowment of productive inputs (referred to as factor proportions) impacts the marginal productivity of each input. The higher the amount of capital per worker, the more capital each employed person has to work with, which translates into higher labor productivity. Conversely, with a higher ratio of labor to capital, each unit of capital has more labor to work with, increasing the average productivity of capital. By increasing the ratio of labor to capital (or equivalently reducing the capital-labor ratio), immigration makes the existing capital stock more productive on a per-unit basis. This in turn increases the returns to capital in the receiving nation and should spur net capital formation.

To see how allowing capital to respond to an immigrant inflow alters our conclusion from the model in Figure 1, Figure 4 charts the effect of a net augmentation of capital in response to an increase in immigration. As before, we begin with our original labor demand curve, D_0, our native labor supply curve, S_0, and the labor supply curve incorporating a new wave of immigrants, S_1. As before, immigration leads to a decrease in wages, an increase in overall employment, and a reduction in native employment. An increase in the capital stock in response to the immigrant wave will add one additional adjustment to our original story. An increase in capital now makes labor more productive, increasing the value of the output of the marginal worker at each point. Since the height of the demand curve is indicative of this value, the increase in the capital stock shifts the labor demand curve upwards to D_1. This increase in labor demand will result in an excess demand for labor at the wage w_1 (in other words, there will be more employers seeking workers than workers seeking jobs at that wage level). Wages will increase, and as they do, more workers, native as well as immigrant, will be coaxed into the labor market. Thus, capital accumulation will partially offset the negative effects of immigration on native wages and employment. The degree of this offset will depend on the responsiveness of

capital supply to changes in return as well as underlying technological relationships governing production in the economy.

Thus, we began with a simple story where immigration unambiguously lowers the wages and reduces the employment of native workers, and then finished with a more nuanced description where the theoretical predictions are more ambiguous and varied. In our more complex yet more realistic theoretical discussion, the potential adverse labor market effects of immigration should be greatest for those native-born workers that are most similar in terms of skills to immigrants. Workers that are sufficiently different may even benefit from immigration insofar as immigrants complement such natives in the process of producing goods and services. In addition, capital accumulation in response to an immigrant inflow will, in isolation, benefit all workers by making them more productive. This will partially offset the wage declines for workers that are most similar to immigrants and accentuate the wage increases of complementary natives.

As the theoretical prediction regarding the effect of immigrants on natives is ambiguous, the question is ultimately empirical in nature. Thus, we now turn to a discussion of existing empirical research on the labor market effects of immigration.

3. A Review of the Empirical Findings

Over the past two to three decades, a large number of studies have characterized the degree of competition between immigrants and natives, and have estimated the overall effect of immigration to the United States on the nation's wage structure. Research on this question has, broadly speaking, pursued either of two methodological strategies. First, many studies compare cities or metropolitan areas in the U.S. with small immigrant populations to those with large

immigrant populations and estimate immigrant competition effects from corresponding differences in native labor market outcomes. Studies that pursue this strategy consistently find very modest effects of immigrants on native employment rates and wages.

An alternative strand in this literature estimates the effects of immigration on natives by analyzing at the level of the nation how immigration has altered the relative supply of labor of various skill levels. Given information pertaining to the degree of substitutability between labor skill groups, estimates of relative supply shifts can be used to simulate what relative wages would have been had we not experienced the recent historic levels of immigration, with the difference between this "counterfactual" wage structure and the actual providing estimates of overall effects. While not every study in this vein has found large impacts of immigration on native wages, the estimates from this national-level research tend to be larger than the comparable estimates from the cross-regional analyses.

In this section, we provide a selective review of empirical research on the labor market effects of immigration. While we do not discuss every paper written on this topic, we do present key publication employing each of these two approaches. Since much of the disagreement among economists pertains to the methodological particulars of this research, we expend considerable effort to clarify the strengths and weaknesses of particular studies.

A. Research that exploits inter-regional variation in immigrant concentration

Our theoretical discussion indicated that increases in immigration should negatively impact the employment and earnings of those who are most similar to immigrants in terms of the skills that they bring to the labor market. To empirically uncover such an impact, one needs to observe labor markets where immigrant competition with natives is relatively fierce and

otherwise similar labor markets where competitive pressures from immigrants are less severe. In other words, we need variation.

Within the United States, regional differences in the relative size of the immigrant population provide a natural starting point for such an inquiry. Coastal states, such as New York and California have been traditional entry points for immigrants as have important industrial states in the Midwest such as Illinois and Michigan. While recent immigrants have fanned out across with states, with notable increases in immigration in the south, it is still the case that the immigrant population is distributed unevenly across states and metropolitan areas in the U.S. relative to the comparable distributions of the native-born.

Thus, a number of studies have exploited this inter-regional variation in immigrant concentration to estimate the effect of immigration on local labor markets. The typical methodological approach in this research is to estimate a linear regression where the dependent variable is either the average wage of native born workers or the change in average wages measured at the city level and the key dependent variable is either the level or the change in the fraction of the local working age population that is immigrant. Theory suggests that wages should be lower (or should be more likely to decline) in areas with larger immigrant proportions (or larger increases in the proportion of residents immigrant).

While such comparisons are intuitively appealing, a number of methodological issues must be overcome if the results from such inter-regional strategies are to be interpreted as providing causal estimates.[v] First, where immigrants choose to locate within the United States is likely to depend on regional employment prospects. To the extent that immigrants choose areas with strong labor markets, or areas with strong growth prospects, inter-area differences in other determinants of labor market outcomes may mask any adverse effect of immigrants on natives.

In other words, simple regressions of native labor market outcomes on the proportion of residents that are immigrant are likely to be biased towards zero by unobserved difference in the strength of the regional economy.

Second, the residential location choices of native-born U.S. residents are quite sensitive to labor market conditions. Natives tend to mover from high-unemployment and low-wage areas to low-unemployment and high-wage areas, a fact that greatly facilitates the economy's adjustment to regional economic shocks. To the extent that immigrants suppress a region's wages, natives may simply pick up and leave. Such a mobility response by natives would dull the effect of an immigrant influx into a specific region and transmit part of the shock to other regions of the nation that are on the receiving end of out-migrating natives.

Finally, inter-regional trade in goods and services may further diffuse any immigrant-induced shock to labor supply through an adjustment of the industrial structure of the regional economy. One can conceive of regional economies as being small open economies that operate within a larger collection of small economies. The local economy will produce some goods and services for local consumption (which economists refer to as non-tradable goods) and produce other goods and services for trade with other regional economies (which we will call tradable commodities). Naturally, the local economy will specialize in producing those goods for which its resources are best suited and import those goods for which its resources are least suited. Thus, if a region's labor force is disproportionately high skilled, the region will produce and export tradable goods that use high-skilled labor intensively and import from other cities tradable goods that are produced in a manner that uses low-skilled labor intensively.

In such a world, an influx of immigrant labor that differs in composition from the incumbent native workforce may eventually alter the mix of what is produced locally and what is

imported from other regions. For example, an influx of low-skilled immigrants into a relatively high-skilled labor market may induce an expansion of production of goods that use low-skilled workers intensively, and a curtailing of the importation of such goods. Such an expansion would again dull the local labor market effects of immigrant competition, while transmitting the shock to other regions in the form of lower-import demand for their output.

Note, all three of these issues would tend to bias inter-regional correlations between immigrant penetration and native labor market outcomes towards the finding of no or small effects. Thus, in our discussion to follow, we assess how each study addresses these critiques.

One of the earliest examples of a cross-regional analysis is provided by Grossman (1982). The author uses data from the 1970 census for a small number of Standard Metropolitan Statistical Areas to estimate the degree to which native-born workers, second-generation native-born workers, and immigrant workers compete with one another in the labor market. While the actual estimation details of this study are complex, the basic strategy of this paper is to estimate the cross-sectional correlation between the relative supply of each group of workers and the fraction of regionally produced output paid out to each group in the form of wage and salary income. Grossman finds relatively small effects of immigrants on natives and second-generation natives, with a 10 percent increase in the immigrant population predicted to have no more than a one percent negative effect on wages in the long run. This early study by Grossman does not account for the non-random residential choices of immigrants, the potential effect of the out-migration of natives, or the potential adjustment of the regional economy through trade with the cities.

Altonji and Card (1991) provide one of the earliest examples in the cross-regional research literature that directly addresses some of these methodological challenges. Similar to

Grossman (1982), the authors analyze the cross-sectional relationship between the wages and employment of low-skilled native-born workers and the fraction of the local adult population that is immigrant. The authors go further, however, in that they uses a much large number of SMSAs in their analysis (over 150), present results for 1970 and 1980, and estimate models where they regress the change over the decade of the 1970s in average native wages and employment on the change in immigrant penetration. The principal benefit of modeling the change in native labor market outcomes rather than conducting a cross-sectional comparison is that a within-city change analyses effectively controls for any inter-city differences that are constant through time. Thus, if Los Angeles and New York happen to be high wage cities throughout U.S. history, this will not bias a change analysis, as the study is effectively comparing how the change in immigrant concentration in Los Angeles and New York correspond with a change in native wags and employment.

An additional innovation in this study is that Altonji and Card isolate variation in growth in the immigrant population that is likely to be independent of regional economic factors that may be unobservable to the researcher but that influence the residential choices of immigrants. In particular, the authors isolate variation in growth in regional immigrant population associated with historical immigration patterns in 1970. The authors show that cities with larger immigrant populations in 1970 had greater proportional growth in immigrant populations between 1970 and 1980.

Using cross-city variation in the growth in the immigrant population caused by difference in historical location choices of immigrants, Altonji and Card find little consistent evidence of a negative impact of immigration on native employment rates. The authors do, however, find modest negative effects of immigrant competition on wages. Interestingly, their correction for

the non-random location choice of immigrants increases the size of these estimates, suggesting that cross-sectional comparison that make no such adjustment are indeed biased towards zero.

Pischke and Velling (1997) present a comparable analysis using data from 1985 and 1989 for Germany. One of the benefits of applying this methodological framework to Germany is that Germans are considerably less mobile inter-regionally within the nation than are Americans, thus native mobility is likely to pose less of a confounding problem. The authors divide Germany into 167 local labor markets, using geographic boundaries that minimize the degree of cross-area commuting. The authors test for effects of regional increases in the overall immigration share on overall employment and unemployment rates using change regressions and adjustment for non-random immigrant location comparable to those presented in Altonji and Card (1991). The study finds little evidence of a displacement effect and little evidence that native-born Germans migrate out of areas in response to increases in the immigrant population.

Card (2001) uses cross metropolitan area data from the 1990 census to (1) estimate the effects of regional differences in immigration flows on the occupational supply structure of cities across the country, and (2) estimate the effects of immigration-induced supply shocks to specific occupations on local wages. This study also presents an analysis of the migration responses of natives to net increases in immigration and tests for the effects of recent growth in immigration on wages, with an eye on a isolating a response period that is too short for the economy to adjust it's industrial structure in a manner discussed above. This is the only regional study that addresses all three of the critiques of the inter-regional research in one form or another.

Card finds little evidence that native migration responds to the influx of immigrants. The study shows that a one person increase in the supply of immigrant labor of a given skill level generally results in a one-person increase in the city's supply of labor of that skill level,

suggesting very little offsetting effect due to native out migration. The study also finds that immigration-induced increases in the relative supply of specific occupational groups within cities do indeed reduce overall employment rates as well as wages. These effects, however, are modest. In terms of wage effects, an immigrant inflow that increases the supply of labor to one occupation by 10% is estimated to lower wages in this occupation by 1.5%. Moreover, since the study looks at the effects of recent immigrants, this estimates is unlikely to be dulled by shifts in the industrial composition of the local economy.

There have been a number of studies that have explored the three critiques of the regional research using alternative data sources and estimation strategies. Card and DiNardo (2000) analyze the migratory responses of natives to the influx of immigrants in greater detail and find little evidence of a substantial response. Lewis (2003) explores how the industrial composition of regional economies responds to an influx of immigrants, and finds little evidence of an expansion in employment in industries whose labor needs match those of the immigrant inflow – i.e., much of the regional adjustment to immigration occurs within industries. Finally, Card (2005) updates the analysis in his 2001 study on native migratory responses and immigrant wage and employment effects using data from the 2000 census. The results remain quite similar.

B. Natural Experiments

In addition to the research based on cross-regional comparisons, there is a small number of studies that exploit concentrated, and arguably accidental immigration flows into specific regional labor markets. Given that one of the main critiques of the regional research concerns the likelihood that migrants were choosing locations within the U.S. with strong regional market conditions, several researchers have looked for examples where politics, war, or some other factor has led to massive immigration shocks to a small region.

The earliest study to pursue such a strategy is Card's (1990) analysis of the effect of the Mariel boatlift on the Miami labor market. Between May and September of 1980, approximately 125,000 Cuban immigrants migrated to the United States, many of them settling in the Miami metropolitan area. This concentrated immigration influx increased the supply of workers to the Miami labor market by roughly 7% in a very short time period. The migration flow and ultimate location of these immigrants had very little to do with differences in economic conditions between Cuba and the United States. The boatlift followed an abrupt decision on the part of Fidel Castro on April 20, 1980 to allow anyone who wanted to leave Cuba to go. Moreover, the location choices of immigrants were driven largely by the facts that Miami was the closest American port and that Miami already had a large Cuban population.

Card analyzes the path of wages and unemployment for native-born workers as well as for previous Cuban immigrants in the Miami labor market relative to a chosen group of other southern cities that did not experience a Mariel-induced population increase over the period 1979 to 1985. The study tests for effects on natives of various skills levels and from various racial and ethnic groups. There is no evidence of an impact of this large influx on the wages or unemployment rates. Most interestingly, Card finds little evidence of an effect on the wages of previous Cuban immigrants.

Hunt (1992) presents a similar analysis using the 1962 independence of Algeria from France as an exogenous shock to the French population. Upon independence, nearly all French nationals residing in Algeria returned to France, a migratory flow that amounted to over 900,000 immigrants (roughly 1.6% of the total French labor force in 1962). Moreover, these migrants tended to settle in the south of France were the climate was most similar to the Algerian climate, thus providing variation in the location of these migrants. While Hunt finds relatively high

unemployment rates among repatriates, she does not find large effects of these inflows on the unemployment rates of non-repatriates. Her estimates suggest that at most, the flow of repatriates increased the 1968 unemployment rate of non-repatriates by 0.3 percentage points. The study finds similarly modest effects on annual salaries, with an upper-bound estimate of the effect of the influx nationwide of -1.3%.[vi]

As a final example, Friedberg analyzes the effect of Russian immigrants on the Israeli labor market during the 1990s. Again, the immigration inflow in this instance was driven largely by the lifting of travel restriction in the former Soviet Union, while the destination choice was driven largely by the fact that Israel imposed no waiting period nor numerical limitations on Jewish migrants from abroad. Friedberg analyzes how the massive increase in Russian migrants impacted the relative supply of workers in various occupational groups in Israel, and exploits the fact that the occupation of employment of immigrants before migrating to Israel provides a good prediction of their occupational attachment in their new home country. Friedberg finds no evidence of an adverse effect of Russian immigrants on the wages and unemployment of Israeli natives.

C. National level studies of the effect of immigration

The results from the regional level estimates consistently find modest effects of immigration on the employment and earnings of native workers. In fact, the finding of no or little effect is so pervasive in this research that two prominent literature reviews on this topic written in during the mid 1990s concluded that there is little evidence of an adverse effect of immigration on native labor market outcomes in the U.S. (Friedberg and Hunt 1995, Smith and Edmonston 1997). Nonetheless, there are scholars who contend that it is impossible to simultaneously address the three critiques of inter-regional comparisons (the problems of non-

random immigrant choice, native mobility responses, and adjustments through inter-regional trade) within this methodological framework. While many of the studies that we have reviewed have identified clear exogenous immigration shocks, it is difficult to argue that any of these studies have ruled out the possibility that portions of the labor market impacts are being diffused to other regions of the nation through the various adjustment valves that we have discussed.

Based on these contentions, several scholars argue for an analysis of immigration on native labor market outcomes using data at the national level. Borjas, Freeman, and Katz (1997) provide such an analysis of the contribution of immigration and international trade to growth in U.S. wage inequality between 1980 and 1996. This study first presents a lengthy and detailed critique of the large body of cross-regional research, whose substantive outline is similar to the three critiques that we have already discussed. The authors then go on to characterize how international immigration to the United States has altered the relative supply of low and high skilled labor (in the language of economists, the impact of immigration on relative factor proportions).

The authors present simulation estimates of these changes on the wage structure based on existing estimates of the degree of substitutability between low and high skilled workers. One of the key conclusions in this analysis is that immigration increased the supply of low-skilled labor in the United States to such an extent that, given existing estimates of the responsiveness of wages to shifts in supply, it explains a substantial portion of the increase in wage inequality occurring during the 1980s and early 1990s. In particular, the authors conclude that immigration to the U.S. between 1980 and 1996 explains roughly half of the relative decline in earnings of high school dropouts that occurred over this period.

Notably, Borjas, Freeman and Katz do not directly estimate the effect of the immigrant-induced supply shifts on national level wages, but rely on existing estimates of substitutability among workers of differing skills to carry out their simulation. Borjas (2003), however, does use national level data to directly estimate the overall correlation between immigrant penetration and native wages and employment, as well as the structural parameters that are needed to perform the factor proportions simulations comparable to those in his earlier work with Freeman and Katz.

In this later study, Borjas first divides the national level labor market into a set of groups defined by four alternative levels of education attainment (high school dropouts, high school graduates, some college, and college graduates) and eight work experience groups (1 to 5 years, 6 to 10 years, 11 to 15 years, 16 to 20 years, 21 to 25 years, 26 to 30 years, 31 to 35 years, and 36 to 40 years).[vii] When interacted with one another, these two dimensions split the labor force into 32 separate skills groups. Borjas then estimates the average annual earnings, weekly earnings, and fraction of year employed for natives in each of these groups and the fraction of the total population in these groups that are immigrant for each of the years 1960, 1970, 1980, 1990 and 2000. Adjusting for time trends and group-specific factors that do not vary over time, Borjas finds strong negative associations between the labor market outcomes of natives and the proportion of one's skill group that is immigrant. To summarize the magnitude of these relationships, Borjas estimates that a 10% increase in labor supply caused by immigration results in a 4% decreases in average native weekly wages. With regards to annual earnings, a 10% immigrant-induced supply shock is estimated to decrease annual earnings by 6.4%. These estimates are considerably larger than those from the inter-regional literature, which at most predicts a 1.5% decline in wages associated with a 10% immigration-induced supply shock.

Borjas then goes on to estimate a structural model of the national labor market, the parameters of which can then be used to estimate how the impact of immigrant competition differs for workers of different skill levels. Specifically, using the education-skill groups described above, Borjas estimates the degree to which employers are able to substitute workers of different experience levels within groups defined by educational attainment as well as the degree to which employer can substitute employees of different levels of educational attainment for one another. The analysis assumes that immigrant and natives in the same education/experience group are perfect substitutes for one another. With these "elasticity of substitution" parameter estimates, Borjas is then able to simulate the effect of the net change in the immigrant population between 1980 and 2000 on the wages of native workers from different skill groups. This structural analysis yields the conclusion that net migration to the U.S. between 1980 and 2000 induced an average reduction in the real wages of natives of approximately 3%, with a much larger reduction for natives who haven't graduate from high school (a predicted real decline of 9%).

The results of this study represent a sharp departure from the pre-existing literature to date. Moreover, unlike the early national level study that we summarized, this latter provides actual estimates of the competition effects of immigration, and thus it is much more than a complex back-of-the-envelop calculation. However, the research design in Borjas (2003) does fail to account for many other factors that have changed over time and differentially within these skill groups that may also impact the wages and employment of natives. For example, in Raphael and Ronconi (2005), we should that changes in the measure of immigrant competition employed by Borjas correlate quite strongly with changes in the fraction of natives within each skilled group that are involved with the criminal justice system.

Clearly the increasingly common experience of serving or having served time in prison represents a barrier to stable employment that is more prevalent today among low-skilled men than in past years (Raphael 2005). Having served time is likely to negatively impact one's earnings through a host of channels. To begin, former inmates are likely to have fewer years of non-institutionalized work experience relative to those who have not been incarcerated. Furthermore, serving time may negatively affect one's stock of human capital through the depreciation of skills while idol or the erosion of soft skills among those who develop anti-social attitudes while incarcerated. Finally, employers consistently voice strong aversion to hiring workers with criminal history records, a factor that is likely to impact average employment and wages for certain native skill groups.

Figure 5 presents a scatter plot of adjusted inter-decade changes in the proportion of one's skill group that is immigrant against the change in the proportion of natives in one's skill group that is currently institutionalized for men.[viii] As can be seen, the change in the fraction immigrant is strongly positively correlated with the change in the proportion of native men that are currently in prison or jail. To the extent that these correctional trends negatively affect wages and employment of men in these groups, omitting this factor from the regression analysis of the effects of immigration will lead to an over-estimate of the effect of immigrants and native labor market outcomes.

Indeed, we find that adding this single factor to the regression models in Borjas (2003) substantially reduces the estimated impacts of immigrant competition. To be precise in our preferred model specifications, we found that omitting correctional trends leads one to infer that a 10 percent increase in labor supply caused by immigration would results in a 5.3% decline in annual earnings and a 3.1% decline in weekly earnings. When correctional trends are accounted

for, the comparable immigration competition effect estimates decline to -1.4% for annual earnings and 0 for weekly earnings. Thus, accounting for one additional factor provides estimated effects using national level variation that are comparable to the results from the cross-regional research.

Moreover, the structural model in Borjas (2003) used to simulate the effect of net migration between 1980 and 2000 on native wages of different skill levels has been shown to be quite sensitive to small changes in model specification. For example, Ottaviano and Peri recalibrate the model in Borjas (2003) with two key extensions. First, they build into their model the possibility that immigrants and natives within the skill groups defined in Borjas are not perfect substitutes for one another. This seems to be a reasonable assumption, given that immigrants and native often differ on average in terms of English fluency and other sorts of factors that may be of value to U.S. employers. Moreover, the data appear to support this more flexible specification of substitution possibilities over a model that assumes immigrants and natives to be equals as far as production is concerned within these skill groups.

Second, Ottaviano and Peri incorporate capital accumulation in their model, while the simulations in Borjas (2003) assumes that stock of capital is fixed.[ix] As we discussed in our theoretical discussion, an increase in immigration is likely to increase the returns to capital, and thus creates and incentive for natives to save more and for foreign capital to flow into the U.S. Such capital flows will dampen the adverse effects of immigration on native wages.

Ottaviano and Peri find first that immigrant and natives are not perfect substitutes within these groups, a fact that is likely to limit the effect of immigrant competition on native wages and employment while augmenting the effects of competition from newly-arriving immigrants on the employment and wages of immigrants arriving in years previous. The authors also find that re-

simulating the effect of immigration on wages allowing capital to accumulate in response to the immigrant labor flows yields much smaller estimated effects on natives. On net, these additions to Borjas original analysis yield estimates of the effect of immigration on native labor market outcomes that are not far from the modest results emanating from the cross-regional research.

4. Concluding Thoughts

Our review of the literature on the economic effects of immigrant competition on native-born Americans suggests the following. Results from inter-regional comparisons as well as from concentrated immigrant shocks find modest effect of immigrants on native wages and employment, with the greatest impact on those workers who are most like immigrants in terms of their skills. The body of cross-regional studies is fairly uniform in these findings and led many to conclude during the mid 1990s that immigration was not a major cause of increasing earnings inequality in the United States.

Results based no national-level analyses, however, are far from uniform. The early theoretical simulations as well as the more recent work by Borjas suggest potentially large impacts of immigration on the nation's wage structure. However, the findings from this research appear to be sensitive to the inclusion of omitted factors and small changes in the specification of the underlying model used to simulate the impact of immigration. Thus, while some of the national level research indicates substantial adverse impacts of immigrant competition, the evidence here is far from uniform and there is reason to believe that the largest estimates from this line of research are perhaps too large.

To those unfamiliar with this scholarly debate, the summary of this research in the last two paragraphs are likely to come as a surprise. Given that male immigrants account for roughly

15% of prime age males in the U.S. in 2000, and a much larger percentage of low-skilled males, one may wonder why economists have not been able to find more consistent evidence of severe adverse effects. That is to say, the review begs the question of why immigration does not have a larger effect on native wages and employment.

One potential explanation is provided by capital accumulation. Certainly, international capital mobility is sufficient to respond to international differences in returns. To the extent that immigration induces greater capital accumulation, the impact on native wages and employment will be moderated.

In a similar vein, international migration is likely to partially displace international trade between the sending and receiving countries. In other words, rather than import goods and services from the origin nations of immigrants, we may produce a greater portion of these goods at home (effectively shifting our consumption demand from foreign producers to domestic producers). This trade diversionary effect of immigration will also partially offset the negative effects of immigration on wages relative to what one might observe in an economy closed to international trade.

A further possible explanation offered by Ottaviano and Peri (2005) concerns the imperfect substitutability between otherwise similar natives and immigrants. To the extent that the elasticity of substitution between observationally similar (in terms of educational and experience) immigrants and natives is less than infinite, the negative effects of immigration on U.S. wages will be concentrated on the wages of prior immigrants. Indeed, the authors find a degree of substitutability between immigrants and natives that are on the order of previous estimates of the degree of substitution between workers with different levels of education.

A final potential explanation may be found in relaxing the implicit assumption in most structural analyses that national income is generated by a constant returns to scale production function. To the extent that there are agglomeration economies in the U.S., perhaps in part augmented by the diversity of experiences and aptitudes associated with having a large and internationally diverse immigrant population, immigration may on net increase output per worker.

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Figure 1: The Effect of Immigration on Labor Supply and Native Wages and Employment

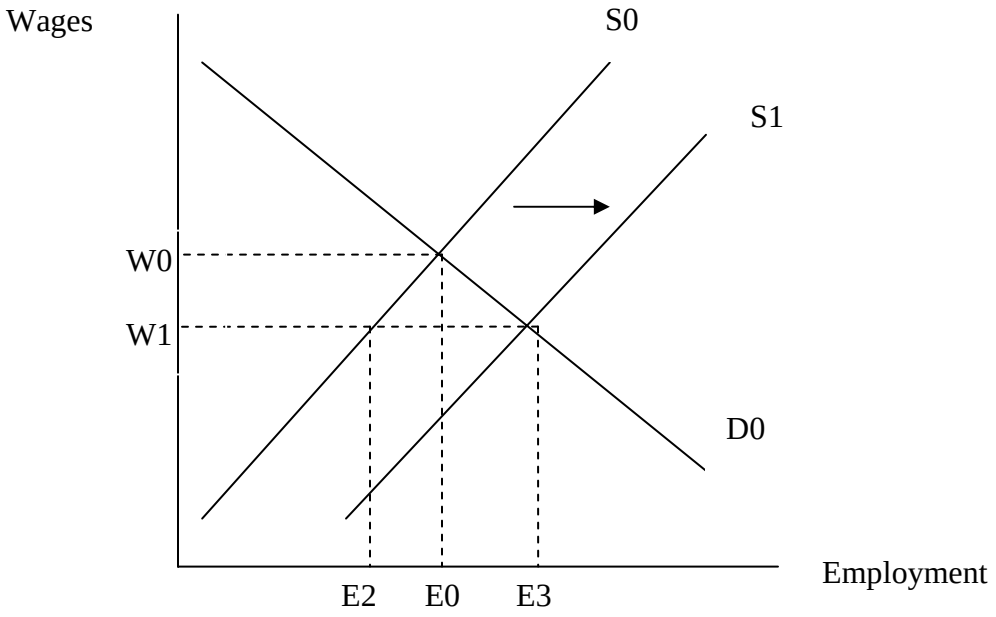

Figure 2

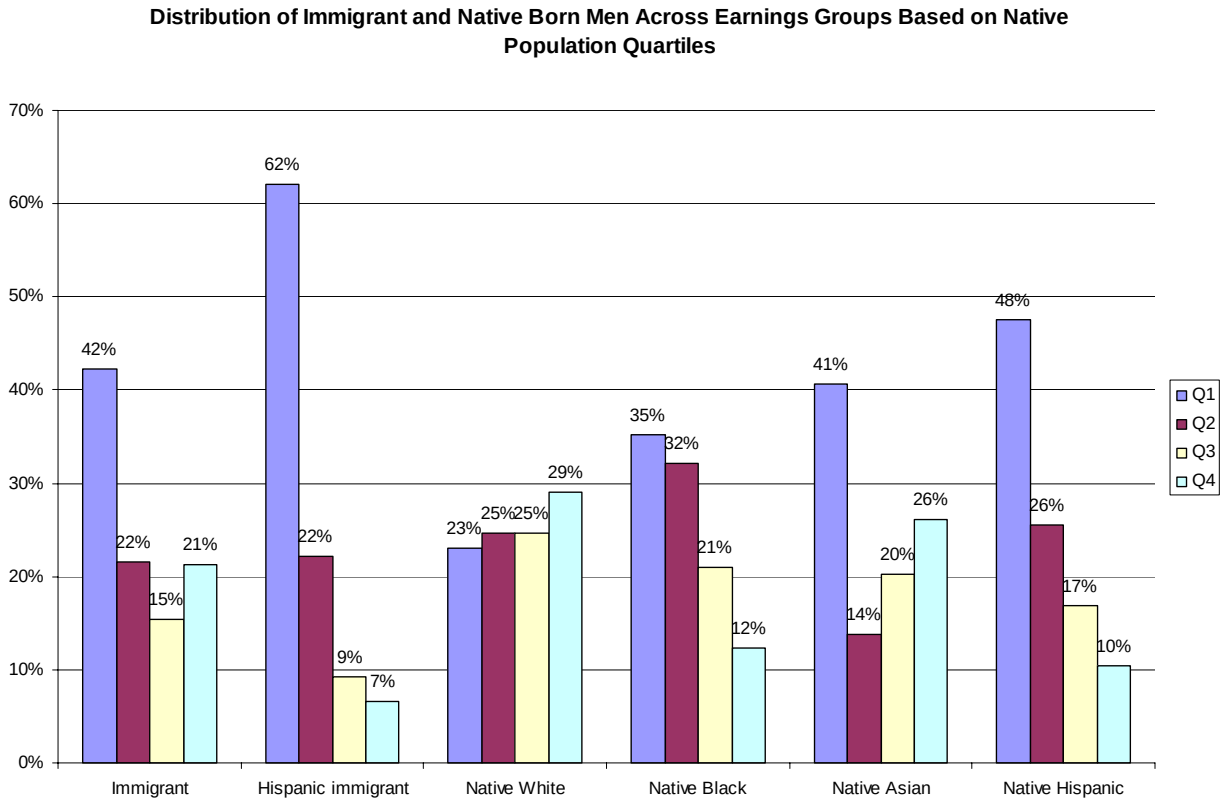
Distribution of Immigrant and Native Born Men Across Earnings Groups Based on Native Population Quartiles
70%
60%
50%
40%
30%
20%
10%
0%
42%
22%
15%
21%
62%
22%
9%
7%
23%
25%
25%
29%
35%
32%
21%
12%
41%
14%
20%
26%
48%
26%
17%
10%
Immigrant
Hispanic immigrant
Native White
Native Black
Native Asian
Native Hispanic
Q1
Q2
Q3
Q4

Figure 3

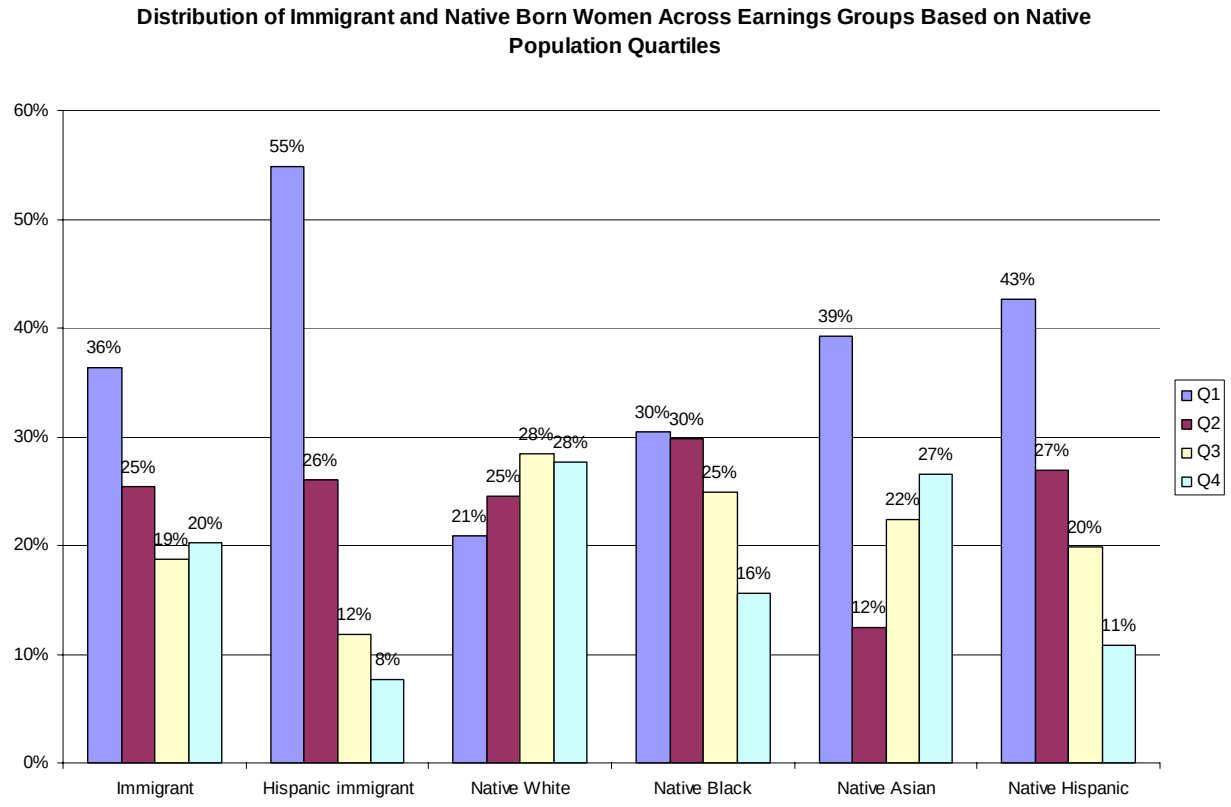
Distribution of Immigrant and Native Born Women Across Earnings Groups Based on Native Population Quartiles
60%
50%
40%
30%
20%
10%
0%
36%
25%
19%
20%
55%
26%
12%
8%
21%
25%
28%
28%
30%
30%
25%
16%
39%
12%
22%
27%
43%
27%
20%
11%
Immigrant
Hispanic immigrant
Native White
Native Black
Native Asian
Native Hispanic
Q1
Q2
Q3
Q4

Figure 4: Allowing Capital to Accumulate in Response to Immigration Inflow

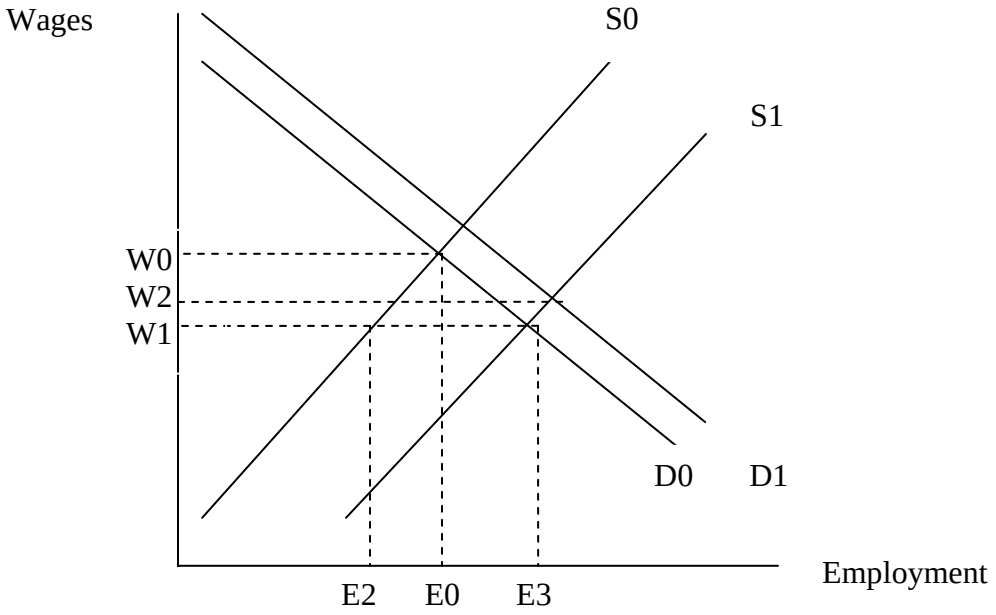

Figure 5: Scatter Plot of Adjusted Changes in Proportion Immigrant Against Adjusted Changes in the Proportion Institutionalized for Education-Experience Year Cells

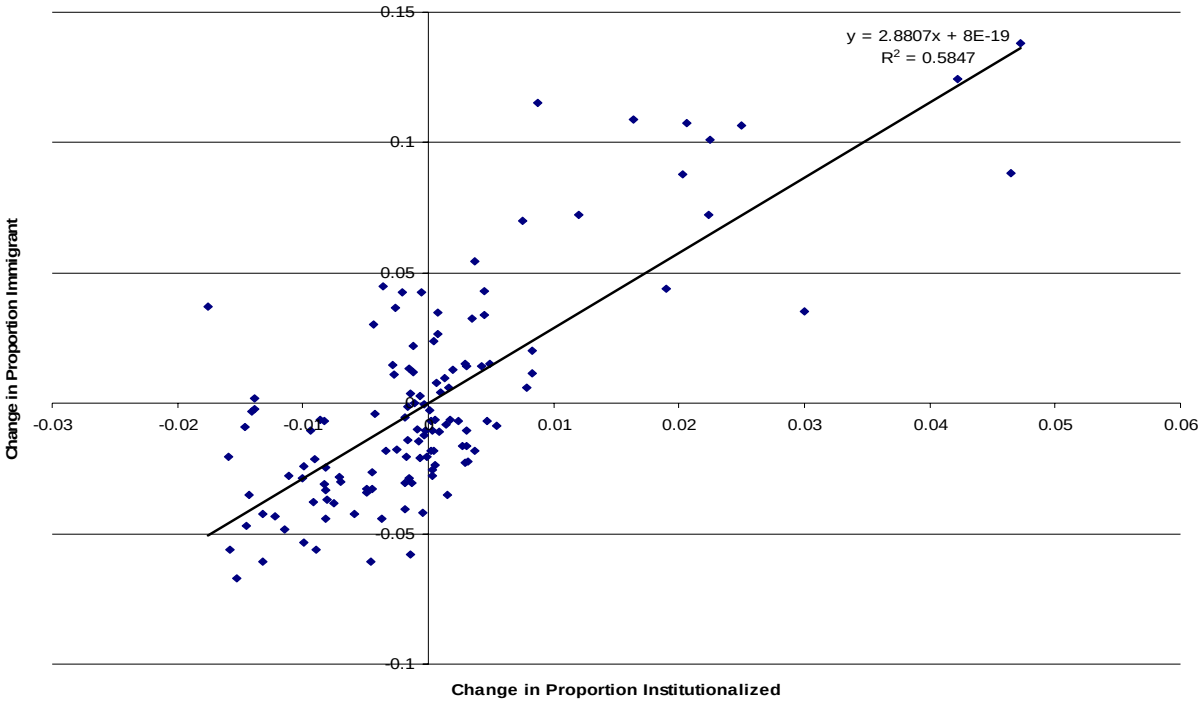

Table 1
Distribution of Educational Attainment by Immigration States and by Race/Ethnicity for Adults, 18 to 64 Years of Age, 2000

	Foreign-Born		Native-Born American Citizens							
			Non-Hispanic White		Non-Hispanic Black		Non-Hispanic Asian		Hispanic	
Educational Attainment	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
< 9 year	21.61%	19.57%	2.315	1.63%	4.18%	2.93%	2.09%	1.63%	8.15%	7.22%
9 to 12, no diploma	17.48	15.70	10.02	8.47	23.14	18.73	7.72	6.00	23.29	19.56
High school grad	19.02	20.76	29.04	28.99	33.90	30.18	18.67	17.43	29.80	28.70
Some college	18.43	22.05	31.37	34.66	28.16	33.81	36.60	36.94	28.10	32.37
Bachelors degree	12.62	14.09	17.80	17.81	7.60	9.89	24.18	27.04	7.45	8.78
Masters or higher	10.84	7.83	9.45	8.43	3.02	4.47	10.74	10.96	3.21	3.37

Author tabulations from the 1% Public Use Microdata Sample of the 2000 U.S. Census of Population and Housing. The numbers in each column sum to 100 (or near to 100 due to some rounding error).

[i] The downward slope of the demand curve follows from assuming that the stock of productive capital is fixed, and thus the marginal output of each additional hire will decline as we stretch available capital more thinly across the pool of employed residents.

[ii] Of course, if immigrants enter the labor market earlier in life due to leaving school at a younger age, the relative youth of immigrant workers may not translate into lower average years of work experience relative to natives.

[iii] We use the six educational attainment groups defined in Table 1 and the nine age groups, 18 to 25, 26 to 30, 31 to 35, 36 to 40, 41 to 45, 46 to 50, 51 to 55, 56 to 60, and 61 to 64. The interaction of these six educational groups and nine age grouping define 54 age-education cells.

[iv] We use average earnings among native-born, non-Hispanic White men to do these rankings. We use this group to rank age-education groupings into apparent skills groups since White men are the largest sub-groups in the labor market. We exclude other groups and women to abstract from the effects of race, ethnicity, and gender on wages. In other words, we wish to identify a ranking that is more likely to purely reflect average difference in skills.

[v] We draw the framing for the following critiques from the discussion presented in Card (2001).

[vi] Carrington and deLima (1996) present a similar analysis of the effect of the repatriation of Portuguese from African during the 1970s.

[vii] Since one cannot observe actual work experience in the census, economists tend to infer potential work experience by subtracting the number of years of completed education and 6 from age.

[viii] The figure covers all census years between 1960 and 2000. The scatter plots are adjusted for decade specific fixed effects.

[ix] Borjas (2005) extends his original analysis to incorporate capital accumulation as well and finds that doing so leads to substantially smaller estimates of the effect of immigration on native wages than was presented in his earlier study.