ABSTRACT

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While the economic effects of immigration have recently become topics of debate in the public arena, the debate is a long-standing one in the economics literature. The labor market effects of immigration have long been of interest to economists. Whereas theory predicts large negative effects on the wages of competing native-born workers from influxes of immigrants in local markets, the bulk of papers in the literature find only small effects. In this dissertation, I examine the impact of immigration on wages in the U.S. labor market. In the first essay, I show that many forces in the labor market confound the identification of the effect of immigration on wages of native-born. Using U.S. Census data, I find that the negative correlation between wages and immigration over 1960-2000 is driven entirely by low educated workers, and many demand-side trends over this period can equally explain the result.

The conclusion of Chapter 2 resolves the conflict between the majority of studies and recent ones that use a skill-based methodology to estimate the impact on wages of natives. However, it does not resolve the divergence between theory's predictions and empirical evidence. In Chapter 3, I suggest how a reframing of the question of immigration's labor market effects. Namely, I present evidence that recent immigrants compete primarily with other immigrants, so that the strongest wage effects are found on immigrants rather than natives. Immigrant competition with other immigrants is likely substantial due to the imperfect substitutability of immigrants for native workers, segmentation of the labor market by ethnicity and language, and skyrocketing levels of immigration. In addition to estimating the effect of competition on the wages for all immigrants, I also analyze the effect on entry wages for new immigrants. Previous literature has established that entry wages of new immigrants declined over 1970-1990 and attributes this to declining unobserved "quality". I find that up to forty percent of the declining entry wage can be explained by increasing competition among immigrants. This provides is a powerful alternative story to that of declining immigrant quality.

IMMIGRATION AND WAGES IN THE U.S. LABOR MARKET

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Chapter 1: Immigration in the 20th century

By 1990 the number of immigrants in the U.S. reached an unprecedented 19.8 million, and continued increasing over the following decade, reaching 31.1 million by 2000.[1] Both on a national scale and in local communities, the economic, social, and cultural effects of immigration are fiercely debated. This debate, however, is not new in the public policy arena or among economists. It arises in response to large waves of immigration, and the current wave is the second wave of its size in the 20th Century.

Understanding the effects of immigration on the economy, and in particular the labor market, can help economists distinguish between alternative views of how U.S. markets function. Studies of immigration are thus of interest to economists for theoretical reasons. However, it is perhaps immigration's policy relevance that has attracted such a large number of studies. Over the 20th century, immigration policy has changed enormously, going through periods of relatively tight limits and periods of liberal admissions policies, as well as changing the qualifications by which one merits admission. Central to the policy debate is the effect of immigration on the wages of native-born Americans. Research on immigration's wage effects is vast and varied, and has the potential to inform many aspects of immigration policy. It may shed light not only on the efficient level of immigrant admissions but also on how the background and skill mix of immigrants affects U.S. labor markets. There are advocates on both sides arguing for and against liberalization of admission to the U.S., and evidence from economic research is adopted by each side to bolster their position. Conflicting

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[1] U.S. Decennial Census.

conclusions from research on the impacts on native-born workers continue to fuel the debate.

In this dissertation, I examine the impact of immigration on wages in the U.S. labor market. By offering ways in which we can refine the study of immigration's effect, I explain some of the conflicting evidence in the literature and refine estimation of the true effect of immigration on the U.S. labor market. This study is thus useful for framing the policy debate and also for informing theory. Many researchers have searched for an effect of immigration on the wages of native workers, but until recently, have found little. This is surprising given the simple model of supply and demand in competitive labor markets, where an influx of workers due to immigration is predicted to reduce the wages of competing workers. In Chapter 2, Seth Sanders and I show that many forces in the labor market may confound the identification of the national effect of immigration on wages of native-born. Our findings help resolve the conflict between the majority of studies and recent ones that use a different methodology to estimate the impact on wages of natives. It also suggests that the local area, rather than the nation as a whole, is the relevant unit of analysis in the study of immigration's impacts. However, the conclusions of Chapter 2 do not resolve the divergence between the model's predictions and empirical evidence. So in Chapter 3, I suggest how we might reframe the question of immigration's labor market effects. Namely, I present evidence that recent immigrants compete primarily with other immigrants, so that the strongest wage effects are found on immigrants rather than natives. In the present chapter, I describe the policy environment and characteristics of immigrants in the U.S. And in the final chapter, I discuss the potential and the limitations for economic research on immigration's effect to inform public policy.

1.1 Immigration Waves of the 20th Century

Historically, economic research on immigration has followed major waves of immigration, driven largely by policy changes that have generated two major immigration flows in the 20th century. Research on the economic effects of immigration date back at least to Paul Douglas' study, published in 1930, of immigrants' impact on wages in the manufacturing industry in the early 1900s. And economic research on similar topics has blossomed again during the late 1900s immigration wave. Although the absolute number of immigrants was lower in that early wave, the immigrant population relative to the native-born population was higher at that time than for the rest of the 20th century (Singer (2004)). At 11.1% in 2000, the ratio of immigrants to the population finally reached the 1930 mark. It is not surprising, then, that recent research on immigration in many ways mimics that of the very early 1900s.

The immigration wave of the late 19th and early 20th Century was driven largely by "pull" factors such as the rise of American industries that created new jobs and by "push" factors like economic and political crises in Europe. In addition, large-scale migration was made possible by the spread of railroads across Europe (easing access to ports) and the introduction of faster and larger steamships for crossing the Atlantic (Wills (2005)). By 1910, over 14% of the U.S. population was foreign-born. In response to the early wave of immigration, policymakers essentially closed the door to immigration in

1924 with the first permanent limitation on immigration levels.[2] The 1924 Act implemented national origin quotas that dramatically reduced the number of immigrants who could enter the country legally. Quotas for each source country were set based on the percentage of immigrants from the same county in the U.S. as of 1920. This system essentially excluded immigration from countries with no history of migration to the U.S. The policy also made a special exclusion for Japanese and other Asian immigrants. Not only was the policy discriminatory towards national origin, but it was also discriminatory by sex by giving preference to skilled males. The quota system dominated U.S. policy through the 1960s. The Immigration and Nationality Act of 1952 started to reverse the discriminatory aspects of the original system, while upholding quotas. It gave every country a minimum quota of 100, although set a ceiling of 2000 on most Asian countries.

The national origin quota system generated a significant dip in the stock and flow of immigrants in the U.S. between about 1924 and 1965. In 1965, the quota system was abolished by the Immigration and Nationality Act Amendments. This policy allocated visas on a first come, first served basis within a point system giving weight to relatives of U.S. citizens and permanent residents and to highly skilled persons. The number of visas was limited to 290,000 per year starting in 1968 but grew to 675,000 per year starting in 1990 through subsequent policy changes.[3]

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[2] The source of detailed information on U.S. immigration policy in this section is the *Immigration Legal History* documents from the U.S. Citizenship and Immigration Services department.

[3] In 1965, numerical limits were set at 170,000 per year from the Eastern Hemisphere, with a limit of 20,000 per country. For the Western Hemisphere, the limit was set at 120,000 per year with no country-specific limits. In 1978, the hemisphere limits were combined into a worldwide limit of 290,000. Then in 1990, a major overhaul of immigration policy increased the worldwide limit to 675,000 per year. Numerical limits on immigration have some effect, but do not deter some migrants from entering the U.S. unlawfully. This is evidenced in the amnesty and legalization granted to undocumented immigrants in the Immigration Reform and Control Act of 1986. Also, the numerical limits do not apply to immigrants admitted on a temporary basis, for example under the H-1 and H-2 visa programs, or the special categories O, P, Q, and R which were created in 1990 for temporary workers.

In the 20th Century, U.S. policy changed from liberal admittance to restrictive and back to liberal admittance. In addition, economic factors induced migration in some periods, namely the beginning and end of the century, and deterred migration during the Great Depression beginning in 1929. The political and economic factors thus created a U-shaped pattern for the proportion of immigrants in the U.S. over these 100 years. Figure 1-1 uses data from Singer (2004) to show both the stock and proportion of immigrants from 1900 to 2000. As is standard in the economic literature, I define an immigrant as foreign-born and either naturalized or non-citizen. The stock of immigrants in the U.S. tapers slowly for four decades after its peak in 1930 then rises dramatically in the last three decades. Even the unprecedented level of immigrants in 2000, however, does not rival the concentration of immigrant in the early part of the century when viewed as a proportion of the native-born population.

The current wave of immigration has rekindled many of the same debates that took place during the first wave of immigration to the U.S. What is the effect of this influx of immigrants on the labor market, the welfare system, the education system, and the culture of the U.S.? Should U.S. policy limit the number or type of immigrants who are granted admission? Unlike in the early wave of immigration, we now are better situated to answer some of these questions. The availability and accessibility of rich data and the advancement of the tools of empirical economics provide the opportunity to evaluate some of these questions in detail. When Paul Douglas was interested in understanding the effect of immigrants on wages in the early 1900s, he had to compile his own statistics and calculate correlations by hand, so he chose to examine only one industry. Now, it is easy to obtain a nationally representative sample of individuals in any given year with information on their family background, work information, and earnings. By 2000, we also have nearly a forty-year history of immigration growth in the U.S. This is a prime time to examine immigration's effects.

As described above, in this study I focus on the wage effects of immigration. Thus from here forward, I will concentrate on the immigrant sub-population most often studied for its effects on the U.S. labor market. The sub-population of focus is immigrant males between ages 18 and 55, who are in the labor force and are not self-employed or in the military. There are many interesting questions to ask about other immigrant sub-populations. For comparability with previous literature, however, working male immigrants are the focus of this analysis. In the descriptions that follow, "immigrant" will refer to this subpopulation rather than to all immigrants in the U.S. Following the previous figure, Figure 1-2 shows the growth in the male, working immigrant population from 1960 to 2000. The male immigrant population as defined here composes a slightly larger proportion of all working males than the immigration to native population overall. By 2000, 14% of the male, working population was immigrant, more than tripling the ratio from 1960. Not only is this rate of growth striking, but the compositional change of the immigrant population is also remarkable, which I describe in the next section.

1.2 Composition of Immigrants in the U.S.

One layer of the debate on the effects of recent immigration considers the fact that the bulk of recent immigrants are different from native-born persons in observable demographic and economic ways. The U.S. policy from 1924 to 1965 essentially maintained the composition of immigrants determined during the first wave of immigration. Hence, the immigrant pool until 1965 was primarily composed of Western Europeans. As detailed above, policy changes from 1965 forward rescinded the national origin quotas and opened the doors to immigrants from countries with little history of migrating to the U.S. Specifically, this opened the door to Asian and Eastern European immigrants.[4] At the same time, declining economies in many of these countries and in Latin America induced migration from within. Hence the composition of the immigrant stock in the U.S. began to change noticeably once the 1965 Amendments were enacted.

The large population of immigrants growing in the late 1900s was increasingly of Latin American and Asian origin, as shown in Table 1-1. By 2000, the majority of immigrants in the U.S. were from Central or South America, and nearly one-quarter were from Asia. This is in stark contrast to the stock of immigrants in 1960, before the policy change, which was over sixty percent of European origin. Also, Figure 1-2 shows that the flow of Latin American immigrants drives the increase in the overall stock of immigrants over the last two to three decades.

Because national origin is correlated with other demographic variables, such as education, age, and income, the changing composition of the immigrant stock adds another layer to the debate. The average education level of immigrants is decreasing relative to native-born. At the same time that wages of less-educated native-born workers are falling probably due to technological change and other factors, the number of immigrants arriving with low levels of education rises dramatically. The simultaneity of

[4] Although immigration from Latin America increased after the 1965 policy change, this was not entirely caused by the policy change itself. Under the quota system, Western Hemisphere countries were not subject to country-specific quotas, only a quota for the Hemisphere. So although the quota system restricted 1925-1965 immigration from the Eastern Hemisphere to the pre-1924 levels, it did not do so for Western Hemisphere countries.

these forces confounds identifying whether low-skilled immigration truly decreased the wage of competing workers. This issue is considered carefully in Chapter 2.

To establish the education disparity between immigrants and native-born, Figure 1-3 shows the percentage of immigrants relative to native-born in four major education categories: high school dropouts, high school graduates, those with some college, and college graduates. If immigrants and native-born were equally represented in a given education group, then the ratio would equal one. However, we observe that over the entire period 1970-2000, immigrants are more prevalent in the lowest educated group than are natives. And this disparity has increased markedly over the three decades. With such marked differences in human capital, the effects of immigration on labor market outcomes of native-born may not be as clear as expected from the predictions of a simple supply and demand theory.

1.3 Changing Settlement Patterns

The labor market impact of immigrants is, in the short run at least, a local phenomenon. There is debate about whether in the long run all native workers may be affected by immigrants who settle in one area of the country, and I will test this hypothesis in Chapter 2. However, since local areas certainly experience the immediate effects of immigration, it is important to understand the geographic settlement patterns of immigrants. There are many factors affecting where new immigrants decide to settle. Among the leading factors are: family ties or ties to ethnic groups, proximity to country of origin, job information and opportunity, and favorable local labor market conditions.[5] Historically, immigrants have located in only a few cities, such as New York, Boston, Chicago, and San Francisco. This was the case in the early 1900s and at the beginning of the second wave of immigration starting in 1968. What is remarkable about the new immigration of the late 20th century is that immigrants have increasingly settled in cities that have traditionally received very few immigrants (Singer (2004)). As the number of immigrants has grown, so has the dispersion of immigrants across the country. Whereas in 1970 the geographic distribution of immigrants looked quite similar to that of the early 1900s, by 2000 immigrants had fanned out to other cities that had never experienced a major influx of immigrants. Chapter 3 considers one potential driver of this increasing dispersion, namely that increasing competition of immigrants with immigrants may induce settlement in new areas.

Figures 1-4 through 1-6 display the increasing dispersion of immigrants over 1970-2000. In each figure, a dot represents a Metropolitan Statistical Area (MSA) in the U.S. An MSA is a county or group of counties with a major urban area at the center, as defined by the Census Bureau. All 119 major MSAs are used in this analysis and are listed in Appendix A. In Figures 1-4, 1-5, and 1-6, the fraction of the population that was immigrant in 1970 is plotted on the x-axis and the fraction in the given year (1980, 1990, or 2000) is plotted on the y-axis.[6] A 45-degree is given for reference. We see that in 1980 most of the MSAs are clustered around the 45-degree line, indicating that the proportion of immigrants by MSA was relatively similar in 1970 and 1980. Also, in

[5] Card and Lewis (2005) find that over 1990-2000, 75% of the variation immigrant inflows across cities is explained by settlement patterns of previous immigrants from the same source country and about 10% of the variation is explained by local labor market conditions.
[6] There is one outlier, Miami, which is not shown. The fraction immigrant in 1990 and 2000 is outside of the scale chosen to best display the changes in immigrant population in the other 118 MSAs.

Figure 1-4 we observe that most MSAs are clustered towards zero, or at least below 5 percent. This reflects the fact that the growth in immigration over the 1970s was not substantial and that the dispersion of immigrants in 1980 was not that dissimilar from the dispersion in 1970. Then in the next two figures, we find evidence of both increasing immigration and increasing dispersion. By 2000, the fraction of immigrants in almost every MSA exceeds what it was in 1970. As evidence of growing dispersion, we see that the MSAs are no longer clustered between zero and 5 percent. By 2000, the increase in immigration affected almost all of the major MSAs. Card and Lewis (2005) have documented that the diffusion of immigrants over the 1990s is due to the new location choice of recent immigrants rather than the relocation of older immigrants.

To analyze trends in immigrant location and growth more closely, I examine the ratio of immigrants to immigrants plus natives in each Metropolitan Statistical Area. The variation in fraction immigrant across MSA and across time is shown in Figures 1-7 and 1-8. Figure 1-7 plots the deciles of the distribution of fraction immigrant in each year. It shows not only that high immigrant receiving MSAs experienced growth in immigration over the period, but even MSAs at the bottom of the distribution saw growth in the fraction immigrant. In most MSAs the fraction immigrant increases monotonically over the period, so the deciles represent roughly the same set of MSAs in each year. For precision, in Figure 1-8 I plot the average fraction immigrant within deciles defined by the 1965 distribution. The same pattern is observed here. The bulk of MSAs had very low fractions of immigrants in 1965, as seen by the fact that the average in each of the nine lowest deciles fell below 7% immigrant. These low levels changed very little between 1965 and 1970, the period in which new immigration policy was enacted.

However, over the 1970s, immigrant populations grew, particularly in the top decile. Then over the 1980s and 1990s, more and more of the deciles are affected by the growth and dispersion of the immigrant population. These new immigrants continued to flock to the original high-immigrant areas, but they also began settling in high numbers in places that traditionally received very few immigrants. Appendix B further details which MSAs were affected by influxes of immigrants and in which year.

Most of the growth in immigrant population across and within MSAs is from the influx of immigrants from Latin America. In Figure 1-9, as in the two preceding figures, I show the growth in fraction Latin American immigrant by MSA. Using the 1965 distribution of immigrants across MSAs, I calculate the average fraction within decile and show how that average changes over time. In the traditionally and consistently high immigrant receiving MSAs, continued growth in immigrant population comes from growth in the number of Latin American immigrants. For example in both Miami and Jersey City in 1970, only 6-7% of immigrants were from Latin America but by 2000, 38% were. Immigrants in Los Angeles are consistently of Latin American descent, but even more so over the period: from 43% in 1970 to 67% in 2000. In Santa Barbara, an MSA which experienced high relative growth in immigrant population beginning in the 1980s, the fraction of immigrants of Latin American stock went from 48% in 1980 at 75% in 1990. In Las Vegas, that fraction rose from 21% in 1980 to 65% in 2000.

1.4 Economic Analysis of Immigration

As stated earlier, this dissertation focuses on the wage effects of immigration in the U.S. To establish the trends in wages for workers in the U.S. labor market, Figures 1-

10 and 1-11 presents the wage for employed native-born and immigrant men in metropolitan areas.[7] Except for college graduates, the weekly wages of working men have been falling over 1970-2000. The wages of immigrants are always lower than the wages of native-born except for high school dropouts in 2000. The downward trend in wages of native-born workers has many sources, including perhaps the increase in immigration. Parsing the immigration effect from other downwards trends over this period is one of the goals of Chapter 2. In Chapter 3, I offer one explanation for the falling immigrant wage, namely increasing competition. In addition, I show that increasing competition can partially explain the falling entry wage for new immigrants.

The decreasing wage upon arrival for immigrants is shown in Figure 1-12. The line for immigrants in the U.S. 1-5 years, for example, plots the 1970 wage of immigrants who arrived between 1965-1969 and in 1980 plots the wage of immigrants who arrived between 1975-1979. First note that by comparison to Figure 1-11, we see that immigrant wages upon entry to the U.S. are much lower than even the lowest educated immigrant (or native-born) wages. These entry wage trends are unadjusted for education, age, and U.S. labor market conditions. As I document further in Chapter 3, even after controlling for observable human capital changes in immigrants across this period, the entry wage of immigrants declines as shown here. I show that part of the decline in entry wage can be attributed to increasing competition in the labor market within immigrant groups.

Many economic studies exploit the growth in immigration during the last three decades of the 20th Century to answer interesting theoretical and policy questions about the labor market. As previously noted, many of these studies make conflicting conclusions, and one goal of the present study is to offer explanation for some of this

[7] Weekly wages are measured in 1999 dollars, deflated by the CPI-U index.

conflict. I focus in particular on why studies that estimate the effect of immigration on wages of native-born workers find different results depending on the methodology. In addition, I exploit the increasing dispersion of immigrants across the U.S., most notably over the 1990s. This variation has not been harnessed for identification purposes in previous studies. I also offer one explanation for immigrants locating in "new places", namely the evidence of adverse wage effects for immigrant competition with other immigrants.

Chapter 2: Refining the Estimation of Immigration's Labor Market Effects[8]

2.1 Introduction

Reviewing a large set of papers that analyzed the effect of immigration on the wages of native workers in the U.S., the National Academy of Science Panel on Immigration (1997) concluded "there is only a small adverse impact of immigration on the wage and employment opportunities of competing native groups." Most of the papers correlate the immigrant share of a local labor market against the wages of native-born workers in that market. The weak correlation between native-born wages and immigrant share of the labor market serves as evidence that immigrants have only a small adverse impact on native-born workers' wages.

This spatial variation estimation technique, however, is fraught with biases from a number of sources, including internal migration of workers. Most authors acknowledge that migration within the U.S. arbitrages local wage differentials and can nullify the effects of immigration on wages as measured in spatial difference models. If wages equilibrate across markets then regardless of the geographic distribution of immigrants, all areas of the country would have the same wages after workers migrate to exploit opportunities for higher earnings. Borjas (2003) uses a novel approach to lessen the bias induced by internal migration; instead of geographic labor markets, he focuses on labor markets defined by skill. Variation in wages and immigration within skill groups over time then identifies the effect of immigration on wages. In contradiction to the NAS conclusion, Borjas finds a *very large* effect of immigration on native wages; his estimate

[8] This chapter is coauthored with Seth Sanders.

is at least three- to four-times the size of the leading estimates. For theoretical and policy reasons, it is important to understand whether, in fact, the impact of immigration has been vastly understated in previous studies as Borjas' compelling result suggests.

After carefully examining the evidence, we find that the Borjas (2003) results are driven largely by the earnings of one skill group during a 20-year period – high school dropouts between 1980 and 2000. While we do not rule out immigration, any factor correlated with decreasing earnings of high school dropouts during these years could equally explain his results. Many alternative reasons abound, including de-industrialization, skill-biased technological change, and increasing negative selectivity of dropouts. We look at time series evidence to distinguish immigration effects from these alternatives and find the pattern of shocks is largely inconsistent with the story that immigration drastically drives down native wages. Rather, we find evidence that the measure of immigration used in Borjas (2003) may be a proxy for labor demand rather than labor supply. Further, we isolate the role of immigration on the wages of native-born by using data from the 1971-2001 Canadian Censuses. Canada stands as an ideal comparison as immigration to Canada was considerably more skilled than immigration to the U.S., so trends in wages of the low skilled in Canada have less effect on the correlation between immigration and wages. We find that the Canadian experience again suggests that the effect of immigration on the wages of the native-born is small.

2.2 Literature Review

"Demand curves slope down." This is perhaps the best-understood principle in all of economics. Economists believe this principle applies in a wide variety of contexts and the demand for labor is no exception. Just as with any other good, an increase in the supply of labor should, all other things equal, reduce labor's equilibrium price. Immigration, which is an increase in the supply of labor to a country, should reduce the wages of all workers in the market.[9] The magnitude of the wage effect is dependent upon the size of the supply shock, the elasticities of supply and demand, and upon simultaneous changes in labor demand. To accurately measure the effect of immigration then, we must be able to isolate supply shocks from demand shocks.

One set of complications to this textbook model rest on firm responses to immigration. In a Hecksher-Ohlin (HO) model, where local areas are open rather than closed economies, firms face the choice of the amount of labor to employ relative to capital. Local areas that receive large immigrant flows may substitute towards the production of labor-intensive goods. In the extreme version of the model there is enough specialization in labor-intensive production (and enough trade across local markets) that there is no effect on wages either in the local labor market or the national labor market. Lewis (2003, 2005) and Hansen and Slaughter (2002) find some empirical support for this theory.

Even when we can abstract from these complications, gathering evidence to support the simple "demand curves slope down" theory proves difficult. If a country were made up of many small and closed economies then exogenous influxes of immigrants would allow us to test the basic textbook model using cross-sectional data. The relationship between changes in the number of immigrants and changes in wage across these small economies (e.g. cities) could identify the effect of immigration. Indeed, immigrants tend to cluster in a few cities, giving variation across cities in

[9] Assuming perfect substitutability of workers, perfect mobility, and no shift in labor demand.

immigrant share of the local labor market. Studies that use this variation to estimate the wage effects of immigration find both positive and negative effects, with most estimates close to zero (Goldin (1994), LaLonde and Topel (1991), Altonji and Card (1991)).

A basic concern with these studies is that immigration to the U.S. and to particular U.S. cities is not exogenous but rather is related to local labor market conditions.[10] If immigration decisions are indeed endogenous in this way, then estimates of the effect on wages using variation across cities are biased upward since immigrants choose to locate in markets with higher wages. LaLonde and Topel use individual data in their analysis so that they can control for characteristics that may lead people to live in certain areas, potentially reducing the bias from simultaneity. Goldin uses time series data and estimates the effect of a *change* in immigration density on the *change* in wage, which mitigates the endogeneity problem assuming that immigrants choose their location based on wages at the time of arrival, not projected wages. Both of these analyses, however, still find relatively small effects: a 1 percentage point increase in the fraction foreign-born reduces wages by 1-1.6% in Goldin's study and a 10% increase reduces wages by 0.3% in LaLonde and Topel's analysis. Further, Altonji and Card (1991) use an instrumental variable strategy to correct for the endogeneity of immigrants' locational decision. Since immigrants tended to locate in areas where other immigrants already were living, Altonji and Card use the stock of immigrants in a local market as an instrument for the change in immigrants. They find larger negative effects of immigration (consistent with the belief that previous estimates were biased toward zero). In their

[10] Card (1990) uses the rare event of an exogenous immigration shock and finds no discernable effect on the labor market. Similarly, Kugler and Yuksel (2006) use the exogenous shock of immigrants due to Hurricane Mitch and find positive wage effects for higher educated native men and women and some negative employment effects on less-educated natives.

study, a 1 percentage point increase in the stock of immigrants reduces the wage of less-skilled natives (that is, the most highly affected group) by an estimated 1.2%, which is in the range of Goldin's result. These studies, and many others, have used different techniques, data sources, time periods, and subgroups of the population, but still find results in the same range.

A concern with these and many other immigration studies is that they must make the assumption that local labor markets are closed and native workers do not relocate in the face of worsening labor market conditions. Ignoring this shortcoming biases estimates towards zero if migration of natives equalizes wages across cities. However, the evidence on whether migration of natives is a major issue is mixed. Kugler and Yuksel (2006) find no evidence of native outmigration in response to the influx of Central American immigrants caused by Hurricane Mitch in 1988. Card (2001) models the local labor market outcomes and migration decisions jointly and finds that outflows of the native born are not sensitive to immigrant inflows, and that wages of low-skilled natives in immigrant "gateway" cities were reduced by only 1-3 percentage points in the 1980s due to immigration. Borjas, Freeman, and Katz (1997) use a factor-proportions approach to investigate the effect of immigration and find the opposite results: natives migrate in the face of immigrant shocks, immigrant shocks do not have a clear effect on local area economies, and low-skilled natives are greatly harmed by immigration.[11]

In addition to this inconsistent evidence on the outflow of natives from immigrant-receiving cities, one must recognize that outflows from cities are only half of the migration issue – immigration may slow population inflows to cities. Studying this is

[11] Note that the reliability of these conclusions is hampered by the fact that their estimates of immigration's effect on proportion of labor by skill group are very sensitive to specification.

complicated by the fact that native-born workers tend to be attracted to the same robust labor markets as attract immigrants. There is no consensus on the degree to which immigration effects labor flows or on the bias in results that rely on local labor market variation in the immigrant share.

Borjas (2003) circumvents these problems by using a novel kind of "closed market." He uses skill (education-experience) groups in the national labor market, rather than local areas, as his "closed market." This approach assumes that workers in different education-experience groups are highly imperfect substitutes, and thus compete in essentially independent labor markets and also that they do not "migrate" between groups. Borjas cites the importance of experience found in the literature on human capital as evidence that workers are less than perfectly substitutable, even when they have the same level of education. In addition, he compares the occupational distributions across skill groups and finds they are different enough to suggest that skill groups are not substitutable. For the purposes of this study, we take his assumptions to hold. Borjas' idea of closed skill markets, then, allows him to exploit the differences between education-experience groups and the variation in immigrant shares within these groups nationally over time. Using this strategy, Borjas estimates quite a large effect: a 10% increase in supply of workers causes a 3-4% decrease in the wage, more than double the largest effects estimated in previous literature. In related work, Borjas (2004) estimates the effect of immigration by education level. He finds that among high school dropouts immigration over the 1980s and 1990s lowered the wages of high school dropouts by 7.4%. He concludes "It is clear that Mexican immigration, which is predominantly low-skill, accounts for virtually the *entire* adverse impact of immigration on low-skill native workers."

The result in Borjas (2003) rests on the correlation between changes in immigrant share and changes in wage within education-experience groups over a 40-year period. Interpretation of his findings is complicated by the many factors theorized to effect within-group changes in wages over the period of his study, which have been documented in a wide body of literature. Juhn, Murphy, and Pierce (1993), for example, document the within skill group increases in wage inequality, driven primarily by increasing returns to skill. Many other papers have posited demand-side explanations for the trends in wages, citing skill-biased technological change and rapid de-industrialization as driving forces.[12] Alternative explanations for increasing wage inequality given in the literature include shifts in labor supply due to increased international trade, changes in the minimum wage, decreasing unionization rates, and, of course, immigration. While the jury is still out on the relative importance of these factors, it is likely that many of these skill-based explanations have power in explaining the increasing wage inequality in the U.S.

If changes in immigrant share within a skill group are correlated with changes in *other* factors that affect within-group wages, then the identification strategy in Borjas (2003) is problematic. For example, if the immigrant share in low-skilled groups is increasing at the same time that the hypothesized skill-biased technological change has been driving down the wages of low-skilled groups, then using within skill group variation in wage to identify the effect of immigration is misleading. On the other hand,

[12] For example, Autor, Katz and Krueger (1998), Berman, Bound and Griliches (1994), Beaudry and Green (2003), Card and DiNardo (2002), Card and Lemieux (2001), and Katz and Murphy (1992).

if the immigrant share for a skill group is correlated with the wages of native-born workers prior to 1980, which is prior to the major onset of suspected skill-biased technological change and prior to the large reduction in industrial and unionized jobs, this is strong evidence that immigration, not other factors, is responsible. Similarly, if after 1980 variation in wages of the middle and upper skilled groups is correlated with changes in the immigrant share this would also be strong evidence that immigration is important. The first method to more fully understand the relationship between immigrant share and wages is to identify whether specific skill groups are disproportionately responsible for the negative correlation. A second method is to evaluate a complete trend in immigration and wages, so that we can look specifically at the timing of immigration shocks and various labor demand and supply shocks.

A final method to verify the immigrant share hypothesis is to test the model in a country where changes in the immigrant share by skill group were less correlated with other trends in wages. Canada serves as a good point of comparison due to the many similarities it shares with the U.S. and also the differential trends in immigration and wages. On a broad level, trends in immigration and wages have been much the same in the U.S. and Canada; both countries have experienced increasing wage inequality and changes in the national-origin composition of immigrants due largely to policy changes that reverse the preferential treatment of immigrants from Western and Northern Europe. However, looking more closely, there are important differences in these trends that are of great use to our study. We will lay out these differences, first with regard to immigration and then with regard to wages.

Canadian immigration policy generally yields a more highly skilled immigrant pool than the U.S. Though both nations adopted non-exclusionary policies toward Asian immigrants in the 1960s, other aims of the policies diverged from there. The U.S. policy since the late 1960s has been generally aimed at family reunification, whereas the Canadian policy has been aimed at immigrant assimilation according to socioeconomic characteristics and responds to domestic economic conditions. The Canadian policy of 1967 constructs four classes of immigrants: (1) refugees, (2) close relatives or the "family class", (3) independents, and (4) assisted, distant relatives. Priority is given in this class order, and within the third and fourth classes, priority is given based on skill characteristics such as fluency in the language, age, education, and intended occupation. Because of the narrow definition of the family class, the policy in effect gave priority to those entering as independents, which was supposed to allow the country to fill gaps in the labor market. In 1973, 70 percent of immigrants to Canada were part of the independent class and were thus assessed on skill. Policies have gradually broadened the definition of the family class, so that in 1992 only 20 percent of the immigrants were of the independent class (Green (1999)). Despite the slight weakening of the skill-based conditions for immigration to Canada, researchers do still find that Canadian policy has a significant effect on the skill composition of immigrants. Borjas (1993) also shows that the policy in Canada attracts more skilled workers there than to the U.S. Specifically, Canadian policy attracts immigrants from countries with higher mean skill rather than the more highly skilled immigrants from all countries, thus creating a different national-origin composition in the two countries. This is evident in a simple tabulation of the source country of the immigrant stock in each country over the period of this study, presented in Table 2-1 for Canada and Table 1-1 for the U.S. Both countries have experienced a decrease in the percentage of immigrants from Europe and an increase from Asia. But the fraction of European immigrants in Canada is more than twice as large as that in the U.S. even at the end of the period. And the fraction of South and Central American immigrants in the U.S. is over four times that in Canada in 1991. In addition, Figure 2-1 shows the education of immigrants to Canada relative to Canadian-born workers. Comparing this figure to that for the U.S. (Figure 1-3) displays clearly that the relative education level of immigrants to Canada is much higher than for immigrants to the U.S. Overall, the composition of immigrants in Canada is decreasingly skilled, though still more skilled than in the U.S.

In summary, though Canada is similar to the U.S. in many ways, the more skilled immigrant flow to Canada stands in stark contrast to that of the U.S. If the correlation between changes in immigration and wages in Canada is similar to that in the U.S., then we have evidence that the Borjas (2003) result is driven by immigration rather than other trends in wages.

2.3 Data

The two primary data sources for this study are the 1960 – 2000 U.S. Census of Population and the 1971 – 2001 Canadian Census of Population. We use the U.S. Census data available from the Integrated Public Use Micro Sample (IPUMS). In 1960 the Census Bureau released only a 1% sample of the U.S. population. However, beginning in 1970, the Census Bureau released various 1% and 5% samples. These samples are all independent samples from the Decennial long form data. The samples vary on the geographic detail released and in 1970 in a sub-set of the questions asked. But by combining samples within years it is possible to construct a 6% sample of the U.S. population for each census year between 1970 and 2000.

The Canadian Census of Population has been fielded every 5 years since 1956, although public use micro samples were first released in 1971. We use all of the available Canadian microdata files that have the information needed for this study.[13] The 1996 file is a 2.8% sample, 1991 is a 3% sample, 1986 and 1981 are 2% samples, and 1971 is a 1% sample of the Canadian population.

The key variables of interest are weekly wages (constructed from wage and salary income and weeks worked), education, and labor market experience (constructed from age). To the degree possible, we analyze the U.S. and Canadian data in a parallel fashion. Appendix C details the data issues with making the data sets comparable. In following Borjas, our sample is subset in the following ways. We use only males of age 18-64 who do not reside in group quarters and participate in the labor force. All of our calculations of wages further subset this group to include the wage and salary income of those who are native (non-immigrant), not in school, who are not self-employed, and have worked greater than zero hours, greater than zero weeks, and made greater than zero earnings in the year prior to the survey. An immigrant is defined as a person foreign-born and either a non-citizen or a naturalized citizen (that is, foreign-born but not of American parents).

[13] The 1976 Canadian Census microdata files do not collect earnings of individuals.

2.4 Methods

We first replicate the Borjas (2003) results using 1960-2000 Census IPUMS data. Using a fixed-effects model we estimate the effect of the immigrant share on a labor market outcome (weekly wage, annual earnings, fraction working) by year-experience-education group, accounting for the fixed effects from his 4 education groups, 8 experience groups and 5 years of data:

$$Y_{ijt} = \theta X_{ijt} + s_i + x_j + \pi_t + s_i x_j + s_i \pi_t + x_j \pi_t + \varphi_{ijt} \tag{1.1}$$

where *i* indicates schooling group, *j* indicates experience group, and *t* indicates decade. *Y* is the logarithm of weekly wage, *X* is the immigrant share (ratio of immigrants to all persons in skill group), and *s, x,* and *π* are vectors of fixed effects for schooling group, experience group, and time, respectively. *θ* is the main parameter of interest. The model accounts for the across education-experience group variation and time trends, so the within group variation over time is what identifies *θ*, that is, identifies a correlation in immigrant proportion and the average log weekly wage over time.

There are several ways of judging the importance of an observation on the regression coefficient. In their important book, *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*, Belsley, Kuh & Welsch (1980) [hereafter BKW] suggest several methods for measuring the influence on parameter estimates of observations in multiple regression models. The "DFBETAS" statistics are a scaled measure of the change in each of the *l* parameter estimates and are calculated by deleting the *k*th observation:

$$DFBETAS_l = \frac{\hat{\beta}_l - \hat{\beta}_l^{(k)}}{s^{(k)}\sqrt{(X'X)_{ll}^{-1}}} \tag{1.2}$$

where the error variance is estimated by $\left(s^{(k)}\right)^2$ without the k_{th} observation, $\left(X'X\right)_{ll}^{-1}$ is the $(l,l)_{th}$ element of the standard regressor matrix $\left(X'X\right)^{-1}$. In general, large values of DFBETAS indicate observations that are influential in estimating a given parameter. BKW recommend a size-adjusted cutoff of $2/\sqrt{n}$ to indicate an influential observation. Using the BKW suggested cutoff, we can then isolate observations having the largest influence on the initial regression.

2.5 Replication and Analysis of Competing Explanations

2.5.1 Replication and Examination of Influential Observations

We now reconstruct the Borjas (2003) analysis using the 1960-2000 IPUMS. Table 2-2 shows that we are able to replicate the results quite closely.[14] We estimate that for a 10 percentage point increase in the fraction immigrant, there is a corresponding 5.38% decrease in wage of native workers in the same education-experience cell. Borjas (2003) estimated this relationship at 5.46%. When the cells are weighted by the number of immigrants and natives in a cell, the estimates are less similar, but not strikingly. Before examining what drives the relationship given in Table 2-2, we simply present a scatter plot of the demeaned decadal changes in wage and percentage foreign born in the unweighted model.[15] Figure 2-2 also labels the 10 observations with the largest values of

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[14] There are three potential sources of differences in our estimates. First, we use the full 6% samples for 1970-2000. Because of the large size of the IPUMS we suspect this is not a major cause of the divergent results. Second, we are unclear on some of the subsetting rules Borjas used. For example, it is unclear how Borjas deals with the fact that no citizenship status (to define immigrant) is available in 1960, and how he identifies persons in school in the March 2000 CPS data. Finally, Borjas uses CPS data for 2000 and we use Census 2000 since it is now available.

[15] This plot essentially maps the first-difference version of the fixed effects model we use. First difference models are equivalent to fixed effects, in the absence of measurement (and specification) error. Since the

DFBETA. Almost without exception, these are high school dropouts from either 1990 or 2000, and these experienced a decrease in log weekly wages. This is our first source of evidence that this group will be important in understanding the results in Table 2-2.

To more formally test this we rank the year-education-experience cells according to the DFBETA statistic and present those that exceed the BKW suggested cutoff.[16] Table 2-3 lists the nineteen observations that exceed this level, twelve of which are high school dropouts. Also, twelve of the top influential observations are from the 1980-2000 period.

We next examine the influence of cells by education and year groups, to give a fuller picture than simply looking at the individual year-education-experience cells that exceed the DFBETA cutoff. We calculate the fraction that each year-education group of cells contributes to the total weight on the regression estimate coming from the right-hand side variable of interest. In a simple linear two-variable regression, the weight of each observation on the regression line can be decomposed as w_{ijt} in the following way:

$$\hat{\beta} = \frac{\sum_{i=1}^{4}\sum_{j=1}^{8}\sum_{t=1960}^{2000}\left[Y_{ijt}-\overline{Y}\right]\left[X_{ijt}-\overline{X}\right]}{\sum_{i=1}^{4}\sum_{j=1}^{8}\sum_{t=1960}^{2000}\left[X_{ijt}-\overline{X}\right]^{2}} = \sum_{i=1}^{4}\sum_{j=1}^{8}\sum_{t=1960}^{2000} w_{ijt}\left[Y_{ijt}-\overline{Y}\right] \qquad (1.2)$$

where $w_{ijt} = {X_{ijt}-\overline{X}}\Big/{\sum_{i=1}^{4}\sum_{j=1}^{8}\sum_{t=1960}^{2000}\left[X_{ijt}-\overline{X}\right]^{2}}$ and *i* indexes education, *j* indexes experience, and *t* indexes year. The measure we will use, w'_{ijt}, is not a direct

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fixed effects model is identified off of changes *within* education-experience cells *across* time, we can see why the two versions of the model must be essentially equivalent.

[16] The BKW suggested cutoff is 0.158. And Table 3 reports results for the unweighted regression, as our analysis matches Borjas (2003) most closely for the unweighted specification.

decomposition from the coefficient estimate, since we are using a fixed effects model, but w'_{ijt} does give a rough idea of the influence coming from the immigrant supply share:

$$w'_{ijt} = \frac{X_{ijt} - \bar{X}}{\sum_{i=1}^{4}\sum_{j=1}^{8}\sum_{t=1960}^{2000}\left(X_{ijt} - \bar{X}\right)^2} \tag{1.3}$$

This influence weight is calculated for every year-education-experience cell and then summarized across year-education groups.

Table 2-4 summarizes these approximate regression weights w'_{ijt} by year and education. When we look at which year and education cells influence the regression the most, we find that high school dropouts account for approximately 51% of the influence on the regression from the right-hand side variable, shown in Table 2-4. Specifically, high school dropouts in 1990 and 2000 account for over 40% of the influence.

Just as the influence of an observation can be analyzed by dropping it and re-estimating the regression, we look at the effect of dropping each group of the education-year cells (that is, across experience) on the estimated impact of the immigrant share on the wages of the native born. Table 2-5 shows that eliminating any education-year group *except* for high school dropouts had little effect on the estimated coefficients; for example, eliminating the high school graduate-1960 cell reduces the estimated coefficient from –0.434 to –0.457. When all high school dropouts are eliminated the estimated regression coefficient becomes positive and is no longer statistically significantly different than zero. Likewise, when high school dropouts in 1990 and 2000 are eliminated from the regression, the coefficient is negative but statistically insignificant (the estimated coefficient is -0.378 with standard error of 0.377). Put simply, the falling wages of high school dropouts over the period is entirely responsible for the measured negative correlation between the immigrant share and the wages of the native-born.

The results in Tables 2-4 and 2-5 lead us to the conclusion that high school dropouts between 1980 and 2000 are driving the entire result. Many hypotheses including the hypothesis of skill biased technological change would predict that exactly these cells would experience the largest downward trend in wages.

2.5.2 Time Trend Results

We believe that factors *other* than immigration may be behind the correlation between immigrant share and native wages based on the fact that low-skilled groups in 1980-2000 are entirely responsible for the measured negative correlation. That is, immigration of other skill groups between 1980 and 2000 do not seem to be correlated with native-born wages and immigration of any skill group is uncorrelated with native-born wages prior to 1980. This analysis relied on data from five points in time (the decennial censuses). We now look more closely at what happened *between* these points. Consistent with the differences between wages and immigrant share across decade, we find that in general the wages of high school dropouts fell while the fraction of immigrants rose. However, there is little evidence that year-to-year variation in immigrant share is correlated with year-to-year changes in wages and there are several periods over the 1980s and 1990s where immigrant share and wages are positively correlated.

We use data from the Current Population Survey and the Survey of Program Participation (SIPP) to analyze the inter-census periods. Questions regarding immigration were asked in the March supplements in 1994-2001 and in the June supplements in 1986, 1988, 1991, and 1994-2001. Not only is current citizenship and nativity available, but also the year of immigration. To measure immigration share in the years not listed above, we use the year of immigration variable from the nearest survey. For example, our CPS measure of the immigrant stock in 1984 is estimated as the stock of immigrants in 1986 *less* those who in the June 1986 supplement indicated they immigrated between 1984 and 1986. We believe this is a more reliable technique than to, for instance, use the year of immigration variable from the 1991 or 1994 survey, since fewer immigrants will have emigrated or died as of 1986. The year of immigration variable is coded in intervals of varying length, so we cannot construct the immigrant stock for every year between 1974 and 2001. The SIPP data, however, recorded information on immigrant status since its inception in 1984. While we are unable to construct the immigrant stock for every year, we believe we have enough information to give a clear picture of the trend in immigration. To construct the trend of wages, we use men of age 18-64 who are employed, not in school, not self-employed, with positive earnings, hours, and weeks worked, just as we did in the previous section. Unlike before, we use the wages of all workers, not just native workers because we cannot distinguish natives from immigrants in *all* years. Where we can distinguish the two, we find that including or excluding immigrants does not affect the trend.

The sharpest downward trends in real wages experienced by low-skilled groups occurred in the early 1980s and then again in the early 1990s. Figure 2-3 shows this by focusing on wages of high school dropouts. The timing of these drops in wages is consistent with evidence offered on the hypotheses of de-industrialization and skill-biased technological change. When we then compare the trend in wages to the trend in immigrant share, we first note how the changes between 1980, 1990, and 2000 would predict the negative relationship between immigration and wages estimated in Table 2-2. Between 1980 and 1990, Figure 2-3 shows a large decrease in wages and a modest increase in immigration. Then between 1990 and 2000, we see a more modest decrease in wage and a large increase in immigration. So estimation off of these three points would clearly give a negative correlation in wages and immigration. However, Figure 2-3 shows that there is much more going on than the three points would suggest. Between 1979 and 1983 as wages dropped precipitously, immigration was almost flat. Then as immigration began to rise from about 1983 to 1988, wages were almost flat. Finally, beginning around 1994, the immigrant share rose as the wages of high school dropouts rose. This pattern is the opposite of what the simple supply and demand theory, and indeed the Borjas (2003) result, would suggest. During the critical post-1980 period it is only the period between 1989 and 1994 where immigration rose while wages fell.

To summarize, we find that year-to-year changes in the share of immigrants are not especially strongly correlated with the change in the wages of high school dropouts for much of the time period between 1980 and 2000. The largest decline in wages occurs *prior* to the largest increases in the immigrant stock, occurring during the period where the effects of skill-biased technological change, negative selectivity in education, and de-industrialization are hypothesized to be important. However, for one period of time, between 1989 and 1994 there appears to be large increases in the immigrant share coincident with large declines in the wages of high school dropouts.

2.5.3 Testing for Compositional Changes in Immigrant Share

The model in this paper correlates the immigrant share with the average log wage of an experience-education group, imposing a restriction on how changes in the native born workers affect wages relative to the affect of foreign-born workers. The observed negative correlation between wages and the immigrant share variable could be the result of changes in the number of natives rather than the number of immigrants. This distinction is important, given the marked changes in education attainment in the U.S. over this period of study, which likely proxies for changes in labor demand. Between 1960 and 2000 the fraction of native-born workers that were high-school dropouts decreased enormously, as shown in Table 2-6. If high-school dropouts were more negatively selected, as their numbers dwindled the remainder may have had lower unobserved human capital and lower wages. If this is true then changes in the number of native born in a cell could affect wages directly through educational selection. It would increase confidence in the Borjas (2003) result if at least part of the negative correlation between wages and the immigrant share was driven by the stock of immigrants.

To test this we estimate the model

$$Y_{ijt} = \theta_1 I_{ijt} + \theta_2 N_{ijt} + s_i + x_j + \pi_t + s_i x_j + s_i \pi_t + x_j \pi_t + \varphi_{ijt} \quad . \qquad (1.4)$$

Equation 1.4 decomposes the immigrant share, $X_{ijt} = I_{ijt} \big/ I_{ijt} + N_{ijt}$, into the number of immigrants and natives, *I* and *N*, respectively. It allows us to test whether rises in the number of immigrants or declines in the number of native-born are correlated with a fall in the wages of the native born. It also allows us to test the model restriction that $\varepsilon_{yI} = (\partial y/\partial I)(I/y) = -(\partial y/\partial N)(N/y) = -\varepsilon_{yN}$ in equation (1.1).

Using the full Census dataset, we find that an increase in the number of immigrants in a cell has a negative but small and statistically insignificant effect on native wages whereas an increase in the number of natives has a positive effect on wages (Table 2-7). This casts some doubt on making a strong negative interpretation of the correlation between the immigrant share and wages as estimated in Section 2.5.1.

To test the restriction implicit in equation 1.1, the null hypothesis is $\varepsilon_{yI} = -\varepsilon_{yN}$ which in our notation simplifies to $\theta_2 = \theta_1 * \frac{I}{N}$ where I and N are evaluated at the mean. This test gives an F-statistic of 13.66, leading to a rejection of the null. These results indicate that changes in the native population may actually be more responsible for the negative correlation than influxes of immigrants. Because high school dropouts have so much influence on the regression line, the timing of the native-born workforce being decreasingly likely to be high school dropouts during the period in which wages for this group were deteriorating appears to be a large part of the underlying measured correlation between immigrant share and native-born wages. The fact that number of natives in skill cells is positively correlated with wages is consistent with the idea that immigrant share proxies for labor demand.

2.6 Results from Analysis of Canadian Data

Given the evidence to this point that many factors are behind the correlation between immigrant share and native wages within skill groups, we now turn to Canadian data for a further test. Low-skilled Canadians in the 1980s and 1990s experienced much smaller increases in wage inequality, so this is a natural point of comparison to the U.S. experience, where our evidence shows that skill-related trends in wages in the U.S. drive the correlation between immigrant share and wages. Also, immigrant flows to Canada tend to be more highly skilled, so the negative selectivity of low-skilled workers that may drive part of the story in the U.S. should be less of a factor in Canada. If the Borjas (2003) result is robust, that is, if increases in immigration truly drive the observed decreases in wages within skill group, then it should be the case that immigration to Canada has a negative effect on the wages of native Canadians even though the immigrant skill composition and the trends in wages are quite different.

First we run the standard fixed effects regression using the Canadian Census data:

$$Y_{ijt}^{c} = \alpha X_{ijt}^{c} + s_i + x_j + \pi_t + s_i x_j + s_i \pi_t + x_j \pi_t + \varphi_{ijt} \qquad (1.5)$$

We find that the correlation between immigrant share and native wages by cell in Canada is much less strong than in the U.S. Though negative, the correlation is statistically insignificant, as given in Table 2-8. We find very dissimilar results compared to the U.S. regressions, suggesting that in the absence of the U.S. trends in immigration and wages, the correlation between immigrant share and native wages virtually disappears.

Skill-based explanations for this correlation would suggest low-skilled workers in the 1980s and 1990s are the most influential, though we would expect the explanation to have less power in the Canadian data than in the U.S. Indeed, this explanation seems to have no power; the skill groups affected by skill-biased technological change and other demand-side trends in wages have no more influence on the regression line than any other groups. Table 2-9 shows the percentage of the weights, w'_{ijt} , that each education-year group contributes. With the exception of high school graduates in 1971, all year-education cells have approximately equal weight on the regression line.

Since changes in wage and immigration within skill groups in Canada have been less pronounced than in the United States, perhaps the variation identifying the relationship between changes in wage and immigration are inadequate. Canada has not experienced the same level of growth in immigration as the U.S. In the 1970s, immigration to the U.S. neared the high levels of the early 1900s but immigration to Canada remained virtually the same (Greenwood and McDowell (1991)). This concerns us to the extent that variation in immigrant share is very low in Canada and very high in the U.S. However, Figure 2-4 shows that because the model takes account of time trends (by demeaning), the variation in both variables is much the same in Canada as in the U.S. This evidence suggests that the statistically insignificant results here are not caused by a lack of sufficient variation.

Although we see a lot of variation in wages and immigrant share by year-education-experience cell in Canada, a concern remains. Because the Canadian Census samples are smaller than the U.S. samples in all years, in some year-education-experience cells in Canada there are a markedly low number of observations relative to the U.S. cell size. This raises the concern that measurement error could be biasing the results in Tables 2-8 and 2-9. In particular, high education, high experience cells in 1971 have fewer than 100 observations per cell.[17] We take two strategies to account for this potential measurement error. First, we look only at high school dropouts, a group that has an ample number of observations in all years and both in the U.S. and Canada. This is also the group we expect to be most affected by influxes of immigrants. Table 2-10 shows that while the negative correlation between wages and immigration is amplified

[17] The full table of cell sizes in Canada and the U.S. can be found in Appendix D.

for high school dropouts in the U.S., the zero correlation in Canada remains. Our results stand up within the group of high school dropouts, where measurement error is highly unlikely to be a problem.

As a second method to address measurement error concerns, we collapse small year-education-experience cells together and re-run the model. Because only cells with high experience have fewer than 100 observations, we group the three highest experience cells together into a fifteen-year experience cell. This gives us five five-year experience cells (from one year to twenty-five) and a sixth cell covering twenty-six to forty years of experience. Comparing the results using the eight original experience categories and our six categories shows very little change. The results in Table 2-11 suggest that either there is no measurement error or if there is measurement error, it occurs in cells with even more than 100 immigrants, which is highly unlikely.

We should consider further problems with using Canada as a point of comparison. Institutional differences between the countries may play a role. DiNardo and Lemieux (1997) concluded that two-thirds of the differential increase in wage inequality between the U.S. and Canada is explained by differences in unionization and the minimum wage. Gottschalk (1993) also claims that the differential growth in public transfers accounts for the differential increase in wage inequality. Similarly, employment patterns may play a role since young low-skilled Canadians were more likely to be out of work than their U.S. counterparts in the 1980s (Bowlus (1998)) and when researchers include part-time workers in the analysis of Canadian wage inequality, that inequality increases (Gottschalk and Joyce (1992)). These factors make the comparison of U.S. and Canadian labor market affects an imperfect natural experiment when looking specifically at trends in wages. In addition, broader differences exist such as the progressivity of the tax rate and availability of public health insurance. However, Canada is more similar to the U.S. than almost any other country and many others have used the two as points of comparison.

The negative correlation between wages and immigrant share does not exist in the Canadian data. Unlike the U.S., skill groups that have the most influence on the regression do not coincide with those most affected by skill-based explanations for trends in wages. This is further evidence that the strong negative result in the U.S. is not measuring the pure effect of immigration.

2.7 Discussion

We have shown that the U.S. results on the correlation between wages and immigration are driven by low skilled cells and are subject to demand side factors. In particular, as section 2.5.3 shows, the native component of the key variable “immigrant share” is the driving force. We expect that the number of natives in skill cells is correlated with wages thru many factors other than labor supply. For example, increasing demand for skilled labor drives up the wage and drives workers toward higher levels of educational attainment. The number of natives in high skilled groups is positively correlated with wages. This trend works in the other way as well, with workers “left behind” in low skilled groups being negatively selected, at the same time that wages for low skilled workers decrease due to falling demand. We chose a simple model for education selection and found that it could explain the entire downward trend in wages of high school dropouts. Under the model that those remaining in the lowest educated category are negatively selected, and assuming that translates into lower wages, the fixed effects regression presented earlier would tend to overestimate the negative effect of immigration on wages of natives. We construct a counterfactual wage for high school dropouts in 1960-1990 representing what the wage *would have been* if the most successful dropouts *would have* gotten a high school degree had they been of the same age in 2000. We find that under the counterfactual model, wages of dropouts would have been rising rather than falling were it not for education selection.[18] Thus negative selectivity of high school dropouts is a potential competing explanation for the observed negative correlation between immigration and wages within skill groups. A simple model for the negative selectivity of low educated, native workers reveals that were it not for trends towards more education, the wages of this group may have actually increased over the period of study.

Behind the national labor market hypothesis is the idea that markets are integrated. From this we can make two predictions. First, no matter where an immigrant arrives in the U.S., the effect on native-born wages should be the same across all regions of the U.S. Second, in any given area of the country, the wage in each region is a function of immigration shocks in all other regions. Using a variety of divisions of the U.S. into regions and decomposing the national shock into regional shocks, we test these two predictions and strongly reject both. We find that the immigrant shares across regions have very different correlations (or none) with national wages. And we find that only the immigrant share in the West has a statistically significant impact on wages in all other regions, even though other areas of the country have experienced increasing shares of immigrants.[19] This casts doubt on an analysis which starts by assuming that the U.S.

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[18] See Appendix E.
[19] See Appendix F.

labor market is truly national. As low skilled workers are generally found to be less mobile, it may be more likely that the national labor market hypothesis is valid for only more skilled or other segments of the labor force.

2.8 Conclusion

Sorting out why the share of immigrants in a skill group is negatively correlated with the wages of native born in that group is difficult. While we have no single piece of evidence, we believe that the preponderance of the evidence presented here suggests that this negative correlation is not reflecting the national impact of immigration on the wages of native-born workers. We find that high school dropouts between 1980 and 2000 entirely drive the negative correlation. While it may be that immigration depressed the wages of this group, it would be premature, at best, to conclude this. First, this group during this time period was likely negatively affected by several other factors including skill-biased technological change, negative selectivity in education, and de-industrialization. Second, the year-to-year changes in the immigrant share for this group are not especially correlated with the year-to-year changes in wages and during some time periods they are actually positively correlated. This is some evidence that trends in native low skilled workers other than immigration are very important. Further, our analysis of compositional changes in the immigrant share statistic showed that indeed across *all* skill groups, the number of natives rather than the number of immigrants appears to be largely responsible for the correlation between immigrant share and wages.

When we look at Canada, where immigration was more skilled, we find no evidence of a negative correlation between immigrant share and wages at the national level.

One possible resolution is that the immigrant share does not effect wages of more skilled groups but does effect the wages of high school dropouts. This would explain why in Canada the immigrant share is uncorrelated with the wages of native Canadians and why in the U.S. it is also uncorrelated among skill groups with a high school level education or greater. But if this is true, one wonders why the estimates here are so much larger than estimates in the literature that rely on geographic variation in the immigrant share as high school dropouts are the ***least*** geographically mobile group in the U.S. It is perhaps for this group where the estimates in the literature are most likely to hold.

The evidence presented in this chapter suggests that the identification of immigration's wage effects at a national level within skill groups is confounded by the skill bias in both immigration and wage trends over 1960-2000. Although the national-level identification strategy may minimize bias from native migration in studies using local-level variation, recent evidence suggests this bias is negligible.[20] Hence, compared to the spatial variation methodology, the drawbacks from the national-level identification strategy likely outweigh the gains. In addition, other evidence on immigration's effects suggests that the local area is the relevant unit of study. Cortes (2006) finds that prices of non-tradeable goods (which are produced overwhelmingly by immigrant labor) are statistically significantly lower in cities with more immigrants. Lewis (2006) finds local industries respond to immigration influxes by altering the choice of production technique. These studies indicate that large local differences can persist and that the local area is the relevant unit of analysis in the study of immigration's impacts.

[20] Kugler and Yuksel (2006) and Card (2001).

Chapter 3: The Quantity and Quality of New Immigrants to the U.S.

3.1 Introduction

Chapter 2 finds that immigrants have little effect on the wages of native-born, leaving unanswered the question of where are the labor market effects of immigration. In this chapter I hypothesize that the primary labor market effects of immigration should be on immigrants, given labor market segmentation and the fact that immigrants and natives are not perfectly substitutable for each other. I find that the concentration of immigrants in a local area has a large, negative effect on the wages of immigrants. Within ethnic or language groups, this correlation is even stronger. In addition to examining how the growing number of immigrants affects the wages of immigrants, the methodology in this chapter can also shed light on previous results in the literature indicating that the quality of immigrants has been declining over the past few decades. I find that the increasing concentration of immigrants can explain up to forty percent of the declining entry wage of new immigrants between 1970 and 1990, which has otherwise been attributed to declining unobserved "cohort quality".

As detailed in Chapter 2, the vast immigration literature in general identifies very small negative effects, if any, of immigration on the wages of native workers. This is in contrast to basic supply and demand theory, which predicts a wage response to such large shifts in the supply of workers in geographically-defined labor markets. However, there are many reasons why this simple theory may not capture the true functioning of labor markets. First, if immigrants and native-born workers are not perfectly substitutable for each other, or if they are actually complements for each other, then the effect of new immigrants entering the labor market may decrease the wage of native-workers by a smaller than expected amount, or may even increase it. Indeed, there is growing evidence that even within a skill group, immigrants are not closely substitutable with natives for many reasons, including language and U.S.-specific human capital (LaLonde and Topel (1991), Ottaviano and Peri (2006)). Second, segregation may preclude immigrants from competing with natives in the labor market. Recent studies show that the labor market and even individual firms are segregated by language and ethnicity (Hellerstein and Neumark (2003)). Last, immigrants are highly concentrated in a relatively few local labor markets, though less and less so in the most recent decades. For example, it is highly unlikely that immigrants arriving in New York City have a direct, strong effect on the wages of a native-born worker in Pittsburgh. Given these three pieces of information, upon which I expand further below, I hypothesize that immigrants suffer the main adverse wage effects from increased immigration. This is the "quantity" side of the analysis.

The second focus of this chapter is to analyze the "quality" results in the literature. Research finds the starting wage of new immigrants decreased with successive arrival cohorts between 1970 and 1990 (Borjas (1985, 1995)). Despite controlling for observable skill differences and labor market conditions, the declining entry wage persists. Thus the wage differential between cohorts is attributed to declining unobserved immigrant "quality". However, if successive immigrant cohorts face ever-increasing levels of competition, then the declining entry wage may result from increasing competition rather than declining quality. I test this hypothesis by examining whether immigrant concentration in local labor markets has power in explaining the difference in entry wages for new immigrant cohorts between 1970 and 2000.

I test the quantity and quality hypotheses using Census Public Use Microdata from 1970-2000. The empirical strategy correlates immigrant wages, either individually or as an arrival cohort, with the concentration of immigrants in the local area. The identifying variation comes from the growth of immigration over 1970-2000 and the increasing geographic dispersion of immigrants. To interpret the correlation as causal, the assumption is that immigrant concentration is not endogenous with immigrant wages. Two factors, working in opposite directions, may violate this assumption and bias the estimated effect of immigrant concentration on the wages of immigrants. I will discuss these in detail in section 3.3. Generally, the first is the problem of endogenous location decision which I handle by estimating the effects off of *changes* in wages rather than levels. Second, although the geographic dispersion of immigrants provides identifying variation, it may also bias the estimated effects since immigrants are increasingly likely to living in local areas with lower average wages. Thus, the average wage of new immigrants over time may appear to decrease with immigrant concentration, not because of a causal relationship but because over time immigrants are more likely to live in cities with lower wages. I use native wages to control for this potential source of bias, so that all estimated effects on immigrant wages are measured *relative* to native-born in the locality.

I find that immigrant concentration has a statistically significant, negative effect on the wages of immigrants relative to natives. For a ten percentage point increase in the fraction of immigrants in a metropolitan area, I estimate a 2.7 percent decrease in wages of immigrants. This effect is large relative to previous studies. I find these effects to be stronger within sub-populations predicted to be particularly subject to labor market segmentation. In particular, I find that for the same increase in fraction of immigrants, there is 5.9 percent decrease in the wages of immigrants not fluent in English. Similarly, for a ten percentage point increase in the fraction of immigrants from Latin America in a local area, I estimate a 3.2 percent decrease in wages of immigrants from Latin America. These estimates are consistent with evidence of labor market segmentation by language and ethnicity.

I also find that immigrant concentration can explain a relatively large portion of the decline in entry wage of new immigrants relative to natives between 1970 and 1990. Up to forty percent of the decline is explained by immigrant concentration. Thus I conclude that immigrant competition with immigrants is a powerful factor in understanding not just the level of immigrant wages, but also the changes in wages of new immigrants over time.

3.2 Literature Review

As reviewed in the previous chapter, the bulk of the literature on wage effects of immigration finds little adverse effect of immigration on wages of natives, despite strong theoretical predictions to the contrary. Using a different source of variation than most papers in the literature, Borjas (2003) finds a much larger negative impact. Borjas (2003) attempts to circumvent some of the problems in the spatial variation identification method by analyzing immigration within skill markets rather than geographic markets. However, as the previous chapter shows, the Borjas (2003) methodology confounds the impact of immigration with other downward pressures on wages within skill groups over the period of study. Thus the empirical evidence to-date fails to confirm the predictions from a simple supply and demand model where natives and immigrants substitute for each other in the labor market. In addition, the evidence from Chapter 2, Cortes (2006) and Lewis (2006) indicate that the local area is the relevant unit of study, as explained in the previous chapter.

There is growing evidence on the imperfect substitutability of immigrants and natives in production. Chapter 1 describes the education and age differences between immigrants and natives. The imperfect substitutability of workers across skill groups is commonly accepted (and is exploited in Borjas (2003)). However, even *within* a skill group immigrants and natives may be poor substitutes. Differences in language, culture-specific human capital, institutional knowledge, and perhaps even preferences are a few examples. Some of these differences diminish as immigrants assimilate into the U.S. labor market. Imperfect transferability of human capital acquired abroad predicts that starting wages of immigrants will be lower than wages of natives with similar skill but that the growth rate is higher than for natives. These predictions have been confirmed empirically in numerous studies, beginning with Chiswick (1978). This need for assimilation is one source of imperfect substitutability of immigrants for natives, and LaLonde and Topel (1991) estimate the elasticities of substitution. They find that new immigrants are less substitutable for natives and for immigrants who have been in the U.S. a longer time. They also find that these elasticities diminish with older and older arrival cohorts.

Even after assimilating, there remain differences between immigrants and natives that can generate less then perfect substitutability. Two recent studies, Ottaviano and Peri (2006) and Cortes (2006), find empirical evidence of the imperfect substitutability of immigrants and natives. Ottaviano and Peri (2006) estimate elasticities of substitution within education-experience groups and Cortes (2006) estimates the elasticity for high school dropouts only. Difference in language ability, for example, can generate this imperfect substitutability.[21] The more language ability matters in a particular industry or occupation, the less substitutable are immigrants for natives. Thus the expected effect of immigration on wages of natives is lower when language ability matters, even for workers with otherwise similar skill. Indeed, some recent work suggests that immigrants and natives may be *complementary* in the labor market (Peri and Sparber (2007) and Kugler and Yuksel (2006)), in which case immigrant arrivals may increase the wage of native-born, exactly the opposite prediction from that of the simple supply and demand model.[22]

The imperfect substitutability of immigrants for natives in production yields not just different predictions on the effect of immigration on wages but also observable labor market segmentation along certain dimensions. For example, employers may find it optimal or preferable to group workers of the same language ability together.[23] In the extreme case this sorting would lead to roughly two types of firms: those with workers

[21] It can also generate differences in earnings. McManus, Gould and Welch (1983) find that differences in language proficiency explain all statistically significant differences in earnings between immigrant and native Hispanics. However, this study only uses a single cross-section of data and thus cannot control for the earnings effects of assimilation.

[22] Lewis (2006) suggests another model in which immigration increases result in no change in relative wages for native-born in local markets. In particular, if immigrant labor is a substitute for automation technology then the change in skill ratio due to immigration has no effect on the wages of native-born.

[23] Whether this segregation is caused by profit-maximizing behavior of firms, taste or discrimination is out the scope of this paper.

fluent in English and those with non-English speakers. This sorting may not be just across firms, but also within firms. To the extent that ethnicity is correlated with language ability, sorting based on language ability may also yield ethnic segregation. Recent work exploiting rich data in employee-employer linked data sets sheds light on the segmentation of workers at the establishment level. Andersson, Haltiwanger and Sanders (2006) find evidence of segregation based on citizenship status and based on the ethnicity of immigrants. They find that recent, young immigrants in 1995 are sorted into construction and service industries, small firms, and into firms with other immigrants from the same source country. For example, seventy-three percent of new immigrants in 1995 worked in firms with less than ten workers compared to ten percent of native-born. Looking within a firm, Andersson et. al. compare the percent of workers who are immigrants from a given country with the percent we would expect if workers were distributed randomly. Overwhelmingly, immigrants are more likely to work with other immigrants from their home country than we would expect if they were distributed randomly across firms. For example, Chinese immigrants are 150 times as likely to work with other Chinese immigrants than we would predict based on their share of the population. And Cuban immigrants are about 45 times as likely to work with other Cuban immigrants. Overall, this work by Andersson et al. suggests that there is a high level of segmentation across firms by both citizenship status and ethnicity.

Hellerstein and Neumark (2003) find evidence of segregation of workers by language ability and ethnicity. Hellerstein and Neumark find that Hispanics work in establishments where 26.8% of the employees are Hispanic, on average. That comparable statistic for Whites is only 5.5%. Also, they find that language ability explains approximately one-third of the Hispanic-White segregation in workplaces. Hispanics who speak English poorly work in establishments where 48.1% of the workforce also speaks English poorly, nearly twice what we would expect if workers were randomly assigned to workplaces. These results are particularly important given that new U.S. immigration is increasingly Hispanic and Spanish-speaking, as described in Chapter 1. Given this evidence on segmentation of the labor market, it is unrealistic to expect, in general, that immigrants compete directly with native-born workers.

Lastly, as established in the first chapter, immigrants tend to be concentrated geographically. An immigrant arriving in New York City, in the short run, is obviously not substitutable for a native worker in Omaha. So wage effects across geographic areas would have to go through other channels, such as migration of natives or firm capital or labor adjustments, which are also unlikely in the short run.[24] Thus immigrants feasibly substitute for only the natives in their local area, and given the evidence above, even this substitution is likely very imperfect.

This existence of immigrant labor markets that are distinct from native labor markets has many potential explanations, including job and social networks, optimal behavior of firms, and employee preference or skill differences. The goal of this paper is not to explain why segmentation occurs but to use it as background for why we should expect the effect of immigration on wages to be stronger for immigrants than for natives.

Despite this evidence of segmentation, only a few papers have analyzed the labor market effects of immigrants on other immigrants. Card (1990) looks at competition

[24] Card (2001) and Kugler and Yuksel (2006) show that there is little migration of natives across areas in response to immigrant inflows. Lewis (2005) and Ottaviano and Peri (2006) show that *within* geographic areas, firm capital adjustments in response to labor supply increases such as immigration do occur in the short run.

among immigrants in Miami following the Mariel boatlift in the 1980s. Card finds no evidence of an effect of the new Cuban immigrants on previous Cuban immigrants or on non-Cubans. LaLonde and Topel (1991) use the 1970 and 1980 Censuses and find remarkably small negative effects considering they examine the groups most likely to be affected by influxes of immigrants. They estimate that a doubling the stock of *new* immigrants decreases the wage of *new* immigrants by 3%. However, when the authors consider the effect on older immigrants, the negative wage effects go to zero. There are two reasons why LaLonde and Topel might have found only small effects. First, although immigration increased markedly in the 1970s, these immigrants were entering a labor market with few recent immigrants to compete with. Conversely, immigration in the 1980s and 1990s more than doubled the number of immigrants in the U.S. and thus offers a better opportunity to analyze the effect of immigrants on immigrants. Second, the Immigration and Nationality Act Amendments of 1965 (implemented in 1968) changed policy on admittance and hence characteristics of immigrants. Post-1968 immigrant cohorts are likely not directly comparable to those before 1968, though the results in LaLonde and Topel are largely based on these two groups. Immigrants of the 1970s-1990s are probably more comparable, and these are the immigrants upon which my results are based.

In addition to estimating elasticities of substitution, Ottaviano and Peri (2006) estimate general equilibrium wage effects from immigration. Surprisingly, they find that due to quick capital adjustments, native workers actually gain from immigration.[25] For example, on average (across education groups), native workers gained 1.8% in wages due

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[25] Lewis (2006) provides further evidence of how the availability of low-skilled labor may affect capital adjustments in manufacturing plants, specifically, and how this may explain why immigration has little effect on the wages in U.S. local labor markets.

to immigration over 1990-2004. On the other hand, they find that immigrant workers lost on average 19% of real wages due to immigration over the period. Working concurrently, I have used a partial equilibrium approach over a longer time period and find results with the same order of magnitude to those of Ottaviano and Peri. I believe my study and the recent work by Ottaviano and Peri are the two most recent papers on the effect of immigration on wages of immigrants. However, I also find an effect for the period preceding the Ottaviano and Peri (2006) study.

Beyond adding to the literature on the wage effects of immigration, another goal of this paper is to ascertain the effects of increasing immigrant competition on wage assimilation of immigrants. Many papers examine the assimilation of immigrants in the U.S. economy (Chiswick (1978), Borjas (1985, 1991, 1995), and Duleep and Regets (1996)). These find immigrant characteristics (non-U.S. experience, legal status, country of origin) lead to lower initial wages but the importance of such characteristics declines over time. Immigrants are found to catch up to natives or other relevant comparison groups. Borjas (1985 and 1995) finds that the assimilation results are different for different arrival cohorts of immigrants. In particular, new immigrants in the 1970s and 1980s start with lower initial wages. Their wage growth over time in the U.S. is not any faster than for earlier cohorts, so the initial wage disadvantage has significant implications for their assimilation. Since these estimates control for observable skill and labor market conditions, the remaining disparity in initial wages is attributed to declining cohort quality. Interestingly, Borjas and Friedberg (2006) find that cohort quality increases for new arrivals over the 1990s.[26] I will add to this part of the immigration

[26] Their study finds that the increase in entry wage over the 1990s is driven by changes at the top and bottom of the skill distribution. At the top, it is driven by changes in immigration policy favoring high-

literature by analyzing whether immigrant concentration affects immigrant wage differentials across cohorts. An alternative explanation to declining cohort quality over the 1970s and 1980s is increasing immigrant competition.

3.3 Hypothesis and Implementation

The two main hypotheses in this chapter are (1) that increasing concentration of immigrants within a local area drives down the wages of other immigrants and (2) that this increasing concentration can partially explain why unobserved immigrant arrival cohort quality declines. I will test these quantity and quality hypotheses using Census Public Use Microdata from 1970-2000. The general empirical strategy of correlating immigrant wages with the concentration of immigrants in a local area is made possible by the growth and dispersion of immigrants in the U.S. over the period, providing identifying variation. However, there are two major sources of bias that may confound the analysis.

First, there may be attenuation bias if immigrants make their location choice based on local wages. Suppose immigrants choose a city because it offers higher average wages. Then we would observe high immigrant wages in cities with high levels of immigrant concentration and vice versa. This positive correlation is generated by location choice rather than by causal effects of immigrant concentration on wages. So in my empirical strategy, I must parse out the wage effect due to immigrant concentration from the effect of endogenous location choice. In the literature, one popular method for dealing with this endogeneity is to instrument using the 1970 settlement patterns of

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skilled immigrants (H-1B program). And at the bottom it is driven by the decline in wages of native high school dropouts and the increase in earnings of Mexican immigrants. However, even after accounting for these changes, the majority of the increase in entry wage is still unexplained.

immigrants. However, as described in Chapter 1, immigrants are increasingly likely to locate in "new places". So the strength of the instrument declines over the period of my study. Evidence for this was given in Chapter 1, where I compare the geographic distribution and concentration of immigrants in 1980, 1990, and 2000 to that in 1970 (Figures 1-4 through 1-6). I find that another method proposed in the literature is more powerful. I handle the endogeneity problem by using multiple years of data and year fixed effects.[27] Thus identification comes from *changes* in immigrant concentration and *changes* in wage. The identification assumption is that immigrant location choice may be endogenously affected by wages but, because immigrants cannot predict perfectly, changes in immigrant concentration are not affected by changes in wages.

Second, over the period new immigrants are increasingly likely to go to "new places", metropolitan areas that traditionally received few immigrants (Singer (2004)). This is helpful variation in the concentration of immigrants. However, many of the "new places" immigrants settle in have lower average wages than the traditional immigrant gateway cities.[28] Why would immigrants choose to settle in places with lower wages and fewer similar individuals? My hypotheses provide one possible explanation: although wages are lower on average, so is competition. Failing to account for this movement to new places with lower average wages could generate a downward bias in the correlation between immigrant concentration and wages of new immigrants over time. For example, average wages are lower in Atlanta than in Chicago. Chicago has always received a large number of new immigrants. Immigrants were not likely to live in Atlanta in 1970-1990, but were much more likely to live there in 2000. Thus, the average wage of new

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[27] In the absence of specification error, this is equivalent to using first differences.
[28] Appendix A lists the major metropolitan areas used in this study, along with the average wage and fraction immigrant over 1970-2000.

immigrants over time may appear to decrease with immigrant concentration, not because of a causal relationship but because over time immigrants are more likely to live in cities with lower wages. To reduce the bias from this artificial correlation, all of the wage effects of immigration on immigrants will be measured relative to natives within local areas. This controls for wage effects due to local labor market conditions *unrelated* to immigration. I assume that local market conditions, other than the concentration of immigrants, affect natives and immigrants in the same way.[29]

I will expand upon the standard immigrant wage model found in much of the literature by incorporating a measure of immigrant concentration and the bias corrections described above. This implementation in some ways bridges the literature on the effects of immigration on native wages and the literature on immigrant wage assimilation. Like the former, I correlate wages with immigrant concentration. And like the latter, I show that conclusions about immigrant wage assimilation are misleading without including the effects of immigrant concentration.

A typical wage model for immigrants begins with a basic human capital model and adds immigrant status and time in the U.S. (Borjas (1985, 1995), Bratsberg et al (2006)). Since assimilation affects the wages of immigrants, it is important to control for their time in the U.S. when modeling wages. I chose to model immigrant wages using the following specification:

$$Log(wage)_{it} = X_{it}^{'}\beta + \sum_{c}\sum_{t}\theta_{tc}Cohort_{c} + \sum_{t}\gamma_{t} + \varepsilon_{it} \qquad (1.a)$$

where $Log(wage)_{it}$ gives the log weekly wage of immigrant i in period t, and X contains education, age, and education-age interactions. Indicator γ_t captures time effects.

[29] Recent evidence in Bratsberg et al (2006) suggests that this assumption may need to be relaxed. They find that unemployment rates affect immigrants differently than natives.

Cohort$_c$ are dummy variables indicating the year of arrival in the U.S. The cohort effects θ_{tc} capture differences in wages of immigrants attributable the date of their arrival and the Census year. The year-cohort effects θ_{tc} allow estimation of immigrant wage growth both across and within cohorts, which is the key decomposition used for analyzing cohort quality changes.[30] The combination of cohort and year allows one to estimate the effect of years since migration on immigrant wages. For example, in 1970 the immigrants who arrived between 1960 and 1964 were in the U.S. for 6-10 years and in 1980 the immigrants who arrived between 1970 and 1974 were also in the country for 6-10 years. The coefficients on these variables estimate the effect of 6-10 years of U.S. experience, allowing it to vary by decade. Previous literature on immigrant wages suggests that the cohort-year effects should be negative and increasing with time in the U.S. For instance, in 1980, the 1970-1974 cohort is expected to have a smaller wage penalty than the 1975-79 arrival cohort. And by 1990, each of these cohorts is expected to have a smaller wage penalty than they did in 1980.

Because model (1.a) includes age, cohort, and year effects, it is under-identified. The common solution is to use natives to identify the period effects. The assumption is that β and γ_t are identical for immigrants and natives.[31] The model of native wages is just as above but excluding arrival cohort effects. Then immigrants and natives are pooled

[30] This is the key decomposition in Borjas (1985). But this specification does not exactly replicate his methodology. His model is estimated on immigrants only and includes dummy variables for marital status, work disability, and urban/rural and is estimated separately by year and race (an alternative is to is fully interact Model (2) with year and race). He also uses years of schooling instead of dummy variables for educational attainment and uses years of experience instead of dummies for age, as I do. In calculating within- and across-cohort effects, Borjas allows the mean personal characteristics, X, to vary with race, year, and cohort. I will assume that they do not vary. I find that the changes I have made make little difference in the results. My methodology is a parsimonious way to both establish the stylized facts about cohort wage growth and also to identify the effects of immigrant competition and location choice (Section VI) in the same formulation of the model. This allows me to compare my results more easily.

[31] It is not necessary to assume β is identical for immigrants and natives, but I find only small differences, so I make the restriction for simplicity.

and estimated jointly. Natives identify the period effects, which allows identification of the immigrant arrival cohort effects off of immigrant wages. I call this pooled approach model (1), which can be represented as:

$$Log(wage)_{it} = X_{it}^{'}\beta + \sum_{c}\sum_{t}\theta_{tc}Cohort_{c}I_{i} + \sum_{t}\gamma_{t} + \varepsilon_{it} \qquad (1)$$

where I_i is an indicator variable for immigrants. Note that in this pooled model the fact that the identification of the period effects is made from native wages means that the year-cohort effects on the wages of immigrants are interpreted as wage effects *relative* to the wages of natives in the same year. This is the basic model I will use for establishing continuity with the previous literature on cohort quality (Borjas (1985, 1995) and Borjas and Friedberg (2006)).

In order to bridge from the literature on immigrant wage assimilation to the effect of immigration on wages, I add a measure of immigrant concentration to the model. As described in Chapter 1, the measure I use is the fraction of immigrants by MSA and year. Under the first hypothesis, the fraction of immigrants has a negative effect on the wages of immigrants. This is directly testable in the following model, which is an extension of model (1):

$$Log(wage)_{it} = X_{it}^{'}\beta + \sum_{c}\sum_{t}\theta_{tc}Cohort_{c}I_{i} + \sum_{t}\gamma_{t} + \lambda Frac(I)_{mt}I_{i} + \varepsilon_{it} \qquad (2)$$

where *m* indexes MSA. Under my first hypothesis, $\lambda<0$, that is, as the fraction immigrant in an MSA rises, wages of immigrants fall. Continuity with the literature is established by interacting the last term with a dummy variable for native workers instead of immigrant workers. In this case, λ is expected to be positive.

As established in Chapter 1, not only are many new immigrants arriving in the U.S., but they are also going to new locations, some of which have typically lower wages than the traditional immigrant-receiving areas. So there are two effects which may make

λ negative: increasing competition among immigrants and lower wages in new immigrant-receiving areas. The first is the effect I would like to isolate, so I use the variation in the number and location of new immigrants to distinguish the two. Instead of estimating immigrant wage penalties relative to all natives in a given year, I estimate immigrant wages relative to all natives in the same MSA and year. This is a valid strategy for distinguishing the two effects provided that local labor market conditions affect immigrants and natives identically conditional on the other covariates in the model (age, education, and cohort). To implement this, I change the simple year effects to year-MSA fixed effects:

$$Log(wage)_{it} = X_{it}^{'}\beta + \sum_{c}\sum_{t}\theta_{tc}Cohort_{c}I_{i} + \sum_{t}\sum_{m}\delta_{mt} + \lambda Frac(I)_{mt}I_{i} + \varepsilon_{it} \qquad (3)$$

where δ_{mt} is a fixed effect that varies by year and metropolitan area. In this model, identification of the immigrant concentration measure comes from the variation in immigrant wages relative to native wages across year and within metropolitan area. This regulates the difference in local labor market conditions across different areas, which could otherwise lead to spurious conclusions.

Within model (3) I can test some of the implications from the evidence on labor market segmentation. For instance, if immigrant labor markets are indeed segregated by ethnicity, then the effect of $Frac(I)_{mt}$ should be stronger for Hispanic workers, since most new immigrants are Hispanic. Similarly, the effect is expected to be stronger for poor English speakers. Across all specifications I will test whether the measures of immigrant concentration have an independent effect on wages of immigrants. This is a simple F test of the null hypothesis that including immigrant concentration in the model has no statistically significant effect.[32]

The second part of the analysis has two goals: establish cohort quality results for the 1990s and test the hypothesis that immigrant concentration can explain a portion of them. Starting from the basic model (1), I extend the well-known findings of Borjas (1985, 1995) on cohort quality to the 1990s. I follow Borjas in decomposing cross-sectional wage growth from 1990 to 2000 into two pieces: differences in cohort wages across time (within cohort wage growth) and differences in cohort wages holding time in U.S. constant (across cohort wage growth). This latter measure is the one relevant to cohort quality conclusions. Let θ_{tc} estimate the wage effect in year *t* of being an immigrant of cohort *c*. Then the cross-sectional wage growth relative to cohort *c+10* is $\theta_{tc} - \theta_{t,c+10}$. This measures how the extra ten years of U.S. labor market experience benefited immigrants in year *t*. It can be decomposed as follows:

$$\theta_{tc} - \theta_{t,c+10} = [\theta_{tc} - \theta_{t-10,c}] + [\theta_{t-10,c} - \theta_{t,c+10}]$$

$$= [\textit{within-cohort growth}] + [\textit{across-cohort growth}]$$

Within-cohort growth measures how an extra ten years of experience in the U.S. benefited cohort *c*, and is calculated as $\theta_{tc} - \theta_{t-10,c}$. Last, we can examine how immigrants with the same years since migration but different year of arrival (i.e. different cohort) fared in different years. This is the across-cohort growth in wages. As I explained previously, the across-cohort growth in wages is the difference in wages across decades holding years in U.S. constant. Across-cohort growth is calculated as: $\theta_{t-10,c} - \theta_{t,c+10}$. If

[32] Thus, Model (1) is taken as the restricted model and Model (3) as the unrestricted. The test statistic is $\{(RSS_{restricted} - RSS_{rnrestricted})/(\text{number of restricted coefficients})\}/\{RSS_{rnrestricted}/(\text{number of observations} - \text{number of unrestricted coefficients})\}$.

across-cohort growth is positive then we conclude that unobserved cohort quality has declined.

Borjas (1985, 1995) shows that across-cohort growth makes up a substantial portion of cross-sectional wage growth of certain groups of immigrants. For instance in the 1985 paper, he finds that new Mexican immigrants in 1970 did much better than new Mexican immigrants in 1980, as measured by the across-cohort growth of 1965-1969 immigrants in 1970 compared to 1975-79 immigrants in 1980. The same pattern is established for immigrant wages over the 1980s in Borjas (1995). As human capital differences were controlled for, he interprets the findings as evidence of declining unobserved quality of immigrants.

Given the growth and dispersion of immigrants described in Chapter 1, it is not clear that the story of declining immigrant quality over the 1970s and 1980s will hold for the most recent decade. Using the cohort-year effects estimated model (1), I analyze the wage growth patterns of immigrants over the 1990s, focusing on the across-cohort growth measure.

After analyzing the wage growth in the basic model, I will examine how the cohort-year effects change upon adding MSA controls and then immigrant concentration. I will focus on whether or not the entry wage differential of new immigrants across decades (across-cohort wage growth) changes considerably first between models (1) and (2) and then between models (2) and (3).

3.4 Data

I use 1970-2000 Census Integrated Public Use Microdata[33] to estimate the models outlined in Section 3.3. Since the goals of this paper involve estimating cohort effects, I must be able to determine year of immigration. For this reason, 1960 is omitted from the analysis, as this information is not available (metropolitan area is also not identifiable). The immigrant arrival cohorts that can be defined from the Census are: before 1950, 1950-1959, 1960-1964, 1965-1969, 1970-1974, 1975-1979, 1980-1984, 1985-1989, 1990-1994, 1995-1999. Immigrants are defined as born outside the U.S. and its territories and either naturalized or non-citizen.[34] Latin American immigrants are defined as those born in Mexico, Central and South America.[35]

I use the 1% metro samples for 1970-1990, and both the 5% and 1% weighted samples for 2000.[36] I will restrict my analysis to MSAs that have at least one immigrant and one native in each year. As a result I will be using the 119 major MSAs; these are listed in Appendix A. Further sample restriction criteria are as follows. The analysis is

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[33] Ruggles et al (2004).

[34] Thus, for example, persons born abroad to American parents are not considered immigrants.

[35] Undocumented immigrants comprise a significant portion of the immigrant population in the U.S., especially of the Mexican and Central American immigrant population. The difficulty in obtaining a reliable count of these unauthorized immigrants is a challenge to almost any research in this area. Evidence suggests that over time the Census has improved data collection on undocumented immigrants, from a 40% undercount of undocumented Mexican immigrants in 1980 to a 30% undercount in 1990 and a 10% undercount in 2000 (Card and Lewis (2005)). Hence the potential for undercounting of the undocumented immigrant population is likely to decrease over the period of my study. However, Census data captures more of the undocumented population than any other nationally representative survey. An undercount would bias the MSA-level immigrant concentration measure downwards and likely bias average immigrant wages upwards. Thus I may understate the negative correlation between immigrant concentration and immigrant wages. Since undercounting declines over time, this understating declines over time (assuming undocumented immigrant wages are consistently lower than documented immigrant wages). Any bias in the present study due to undercounting of undocumented immigrants is similar to the bias introduced in virtually any other study of immigration on a national level.

[36] The reason I do not use larger samples for 1980-1990 is that the geography of the 5% samples does not allow complete identification of MSA. The restrictions in both geography and variables defining immigrants and cohorts do not allow me to use other 1% samples available for 1970.

restricted to men ages 18-55, who are in the labor force, not self-employed or in the military, and not in group quarters. Data is weighted by person-level weights.

To control for education, I construct four categorical dummies for high school dropout, high school graduate, some college, and college graduate or higher.[37] I will use log weekly wages, calculated as income from wages divided by weeks worked, both measured in the year before survey. Weekly wage is measured in 1999 dollars, adjusted by the CPI. Weeks worked is taken as the midpoint of the values defined as intervals. Also, topcoded values of income are adjusted by multiplying by a factor of 1.5, as typical to the literature. Observations with zero income from wages or zero weeks worked are excluded.

3.5 The Effect of Immigrant Concentration

3.5.1 Results from the Basic Model

This section examines the hypothesis that immigrants have a negative effect on wages of immigrants by implementing models (1) through (3) above. Table 3-1 Column 1 shows the year-cohort effects estimated in Model (1). Appendix G provides the estimates on the other covariates, which are all consistent with the standard human capital results in the literature. The year-cohort effects are also as expected from previous literature. In each year, new immigrants have the largest wage penalty. For instance in 1980, immigrants in the U.S. only 0-5 years (the 1975-79 cohort) have 27% lower wages than natives. This penalty decreases with time in the U.S. (following the estimates down the column within the same year). For example, in 1980 immigrant in the U.S 6-10 years

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[37] The IPUMS variable "educrec" defines these dummies, which is in accord with the algorithm suggested by Jaeger (1997).

have about 19% lower wages than natives, compared to the 27% of the next newest cohort.

Column 2 of Table 3-1 implements model (2), which adds MSA-year fixed effects in order to control for wage differentials across local markets. This changes the identification of the model from variation across all individuals within year to variation across individuals within MSA across time. I would not expect this difference to change the estimated effects of personal characteristics, *X*. Indeed, those coefficients do not change much (see Appendix G Column 2). Also the cohort-year effects for 1970 and 1980 also change very little. This is consistent with the fact that as of 1970, most MSAs had few immigrants, and the majority of MSAs did not experience large increases in the number of immigrants until the 1980s and 1990s. The cohort-year effects for 1990 and 2000 are consistently more negative than those in Column 1. Accounting for local wages makes the level of immigrant wages look slightly worse. In the next section I will analyze whether these fixed effects have an impact on across-cohort wage growth.

Next I directly measure the effect of concentration of immigrants on wages as proposed in model (3). In Column 3, we see that the effect is negative and statistically significant, as expected given the hypothesis. Because the immigrant cohort effects jointly give the penalty to being an immigrant in the labor market, the *Frac(I)* variable measures the additional affect to being an immigrant in an MSA with a higher or lower concentration of immigrants. This shows the simple result that a higher ratio of immigrants in a local area is correlated with lower wages of immigrants. The F-test comparing Column 3 to Column 2 (the restricted model) leads to a rejection of the null that *Frac(I)* has no effect. The estimate suggests that for a 10 percentage point increase in the fraction of immigrants in an MSA, there is a corresponding 2.7% decrease in the wages of immigrants relative to natives in the MSA. This estimate is larger than previous estimates on immigrants and much larger than most wage effects estimated on natives. Table 3-2 gives the mean *Frac(I)* across MSAs and for a variety of subgroups that will be tested further. The mean fraction immigrant across MSAs over the entire study period was 7.6%. A 10 percentage point increase in this average fraction immigrant would imply between a doubling and tripling of the immigrant population, assuming no growth in native population.[38] It is worth noting that many MSAs experienced at least a 10 percentage point increase in the fraction of immigrants over the study period, and many experienced that change within multiple single years.

All estimates presented thus far regard immigrant wages relative to natives. So it is natural to ask what is the effect of immigrant concentration on native wages? To do so, we want to replace $Frac(I)_{mt} I_i$ with $Frac(I)_{mt} N_i$ where N_i is an indicator variable for native-born. However, this change makes model (3) under-identified since both the fraction immigrant and the MSA-year effects vary only by MSA and year. The closest specification which is fully identified is to separate MSA-year effects into MSA and year effects. This specification is less flexible than model (3), since MSA effects are not allowed to vary over time. First I estimate such a model first with $Frac(I)_{mt} I_i$ to ensure that the change in specification does not change the conclusion that immigrants affect the wages of immigrants (relative to natives in MSA). Then I re-estimate model (4) using $Frac(I)_{mt} N_i$ to uncover the effect of fraction immigration on the wages of natives.

[38] Note that LaLonde and Topel (1991) estimate a 3% decrease in the wage of new immigrants from a doubling of the number of immigrants over the 1970s. This is in similar range to my estimate except that I find the effect across *all* immigrants, which is much stronger than finding an effect on the subpopulation most likely to be affected by competition.

$$Log(wage)_{it} = X_{it}^{'}\beta + \sum_{c}\sum_{t}\theta_{tc}Cohort_{c}I_{i} + \sum_{t}\gamma_{t} + \sum_{m}\eta_{m} + \lambda Frac(I)_{mt}I_{i} + \varepsilon_{it} \qquad (4)$$

where once again γ_t are period effects and η_m are MSA fixed effects. Estimation of λ is given in Table 3-3 Panel 2. Altering the fixed effects in this way only slightly changes the estimate of the effect on immigrants, suggesting that for a 10 percentage point increase in the fraction immigrant, there is a corresponding 2% decrease in the wages of immigrants. The effect on natives is strong and positive. For a 10 percentage point increase in the fraction immigrant within an MSA, there is a 4.3% increase in the wage of natives relative to immigrants. Since native wages are positively correlated with immigrant concentration, increasing immigrant concentration may actually exacerbate the native-immigrant wage disparity.

If the adverse effect of immigrant concentration is coming from segmentation of the labor market into native and immigrant workers, then we also expect evidence of further segmentation by ethnicity and language. Table 3-3 Panels 3-5 tests this prediction using a number of different measures. The basic idea in this section is to break down the explanatory variable $Frac(I)_{mt}\,I_i$ in Model (3) into components according to language, race, and other measures. In all cases, the decomposition will sum to this same explanatory variable. For example, suppose immigrants are classified into two groups, those who are fluent in English and those who are not. Let I_i^{f} indicate that immigrant i is fluent and I_i^{nf} indicate that immigrant i is not. Then $I_i = I_i^{f} + I_i^{nf}$ and $Frac(I)_{mt} = Frac(I^{f})_{mt} + Frac(I^{nf})_{mt}$ where I^{f} and I^{nf} are the sum of all immigrants in MSA m and year t who are fluent or not fluent, respectively. So decomposing one or both of the variables could yield the following three specifications:

$$Frac(I)_{mt}\, I_i = Frac(I)_{mt}\, I_i^{\,f} + Frac(I)_{mt}\, I_i^{\,nf}$$

$$= Frac(I^{f})_{mt}\, I_i + Frac(I^{nf})_{mt}\, I_i$$

$$= Frac(I^{f})_{mt}\, I_i^{\,f} + Frac(I^{f})_{mt}\, I_i^{\,nf} + Frac(I^{nf})_{mt}\, I_i^{\,f} + Frac(I^{nf})_{mt}\, I_i^{\,nf}$$

I will use one or more of these decompositions to test whether the model is consistent with the predictions from the labor market segmentation hypothesis.

First, I examine whether the effects are differential by language. Starting in 1980, the Census asked respondents if they spoke English at home and, if so, how well. From this question I define two groups of immigrants: non-fluent in English and fluent in English. I define non-fluency as the response "does not speak English" or "speaks English but not well". And I define fluency in English as the responses "speaks only English", "speaks very well", and "speaks well". These variables are available for 1980-2000 only, so I drop 1970 for this part of the analysis. The coarseness of this variable will bias against finding any differential effects of immigrant concentration by language ability.[39] In model (3), I replace the immigrant dummy variable I_i with its two component dummy variables defining the mutually-exclusive language groups and identify two separate λ's, one for each language. Panel 3 gives these estimates. As expected, the effects of immigrant concentration are stronger for immigrants who are not fluent in English. Immigrants who speak English are less likely to be affected by segmentation of the labor market by language, and indeed, the effect of fraction

[39] Alternative definitions for language ability yield the same conclusions in the analysis that follows. For example, if I define three levels of fluency (speaks only English, speaks English very well, or well vs. speaks English but poorly vs. does not speak English) or using the language spoken at home (English, Spanish or other language) the interpretation of the results is the same.

immigrant has a much smaller negative effect on their wages.[40] These results are consistent with the evidence in the literature on labor market segmentation by language.

Next, I separate immigrants into two groups based on country of origin: immigrants from Latin America and all other immigrants.[41] I expect the fraction of own-ethnicity immigrants to have a stronger effect on wages than cross-ethnicity effects. Panel 4 shows first that the fraction of all immigrants by MSA and year has a stronger effect on immigrants from Latin America. For a ten percentage point increase in the fraction of immigrants, Latin American immigrants wages are 3.7% lower, whereas immigrants from other source countries only experience a 1.8% decrease in their wage. To probe these correlations further, I decompose the fraction immigrant into fraction of immigrants from Latin America and fraction from other countries. Panel 5 shows that the fraction of Latin American immigrants has a four-times larger effect on the wages of Latin American immigrants than on that of non-Latin American immigrants. Interestingly, the effect of the fraction immigrants from non-Latin American countries also has a larger effect on the wages of Latin American immigrants than non-Latin American immigrants. Since this latter group is very heterogeneous, I will next explore a finer classification of immigrants by ethnicity.

Separating fraction immigrant into more than two ethnic categories further reveals which groups are most affected by immigrant concentration. I classify immigrants into the following racial groups: Mexican, Cuban, other Hispanic, Asian, Black (non-Hispanic) and White (non-Hispanic), and other.[42] Panel 6 shows the effects of fraction

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[40] The within- and across- language group results are less clearly interpretable. See Appendix H.
[41] Latin America is defined as Mexico, Central America, and South America.
[42] Finer classification becomes difficult, as there are not enough immigrants of each type in each MSA. Also, this is the same classification used in previous immigration literature (for example, Borjas (1985)).

immigrant on the wages of immigrants by race. As expected, white immigrant wages are not negatively affected by concentration of immigrants, indeed they appear to be positively affected. The only other ethnic group whose wage effects are smaller than the effects estimated on immigrant overall (Panel 1) are Cuban immigrants. The other wage effects range from about a 3% decrease to a 5% decrease. For Blacks, the estimates are the largest, though considering the average fraction of Black immigrants across MSAs is so small, this large wage effect is less striking. These results reveal that the negative correlation between immigrant wages and concentration is not driven entirely by one ethnic group. Note that if race fixed effects are added to the model, the estimates in Panel 6 do not change drastically, except that the white estimate is small and negative.[43] Thus the differential effect of immigrant concentration by ethnicity is not driven solely by differential earnings across ethnic groups.

Model (3) accounts for education, but I also show that the effects are not coming from immigrants of a certain education level, which was the major finding in Chapter 2. Similar to the above analysis within ethnicity, I parse immigrants into four education groups: high school dropouts, high school graduates, those with some college, and college graduates. First I estimate whether the effect of immigrant concentration differs across these groups, shown in Table 3-4 Panel 1. Although the effect is largest on the high school graduate group of immigrants, all four estimates are not strikingly dissimilar. The adverse wage effects are not restricted to the lowest education group.[44]

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[43] See Appendix I.

[44] The results are roughly the same if the entire regression is estimated on one or more education group alone. When estimated on high school dropouts and high school graduates only, the estimate on *Frac(I)* is -0.178 (0.017). On high school dropouts only, the estimate is -0.255 (0.032). On those with some college and college graduates, the estimate is -0.286 (0.014).

3.5.2 Specification Checks

I find that the effect of *Frac(I)* increases by year. This is shown in Table 3-5 Panel 2. The differences in the 1970 and 1980 coefficients on fraction immigrant are not statistically different, but there are statistically significant differences in the other years. The level of the fraction varies markedly by year, as shown in Table 3-2. However, there are few strong *a priori* reasons to expect its effect to vary by year. Increasing labor market segmentation is a potential explanation, although evidence on this is hard to find.[45] Alternatively, the increasing effect over time may indicate that the relationship between fraction immigrant and wages of immigrants is not best captured linearly. Given that the fraction immigrant increases across time, non-linearities in the relationship between concentration and wages could easily show up as increasing effects over time in the linear model.[46] Hence I test alternative functional forms on the immigrant concentration measure to uncover the true underlying relationship between concentration and wages. First, I estimate the effect of the natural logarithm of *Frac(I).* These results are in Panel 3. It suggests that a 10 percent increase in fraction immigrant in an MSA is correlated with 4 percent lower wages of immigrants. This is roughly on par with the estimate from the linear model around the mean of *Frac(I).* Hence the logarithmic specification does not add much beyond the linear specification. Indeed, it cannot explain the growth in the effect of fraction immigrant by year (see Panel 3b). A quadratic

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[45] Hellerstein, Neumark and McInerney (2006) find no decline in workplace segregation by ethnicity and race between 1990 and 2000. Black-white segregation and segregation by education increase, while Hispanic-white workplace segregation is virtually unchanged. In addition, Census improvements of measuring the undocumented immigrant population over time may also explain some of the increasingly negative estimates by year, but this hypothesis is extremely difficult, if not impossible, to test.

[46] Consider, for example, a quadratic relationship. In 1970, since the fraction is low, the coefficient is estimated off of the flat portion of the curve. In 2000 since the fraction is very high, the coefficient is estimated off of the steep portion of the curve.

specification does fit the data well, as shown in Panel 4. However, including a quadratic term does not change the difference in the linear terms by year (see Panel 4b).[47]

The logarithmic and quadratic specifications do not appear to approximate the true relationship any better than the linear, so last I turn to non-parametric specifications. These are presented in Panel 5**.** Using the deciles of the distribution of the fraction immigrant over the entire period, I assign indicator variables to each MSA and year according to which decile it falls into. Then, in model (3) I replace *Frac(I)* with nine *Frac(I)* decile dummy variables (dropping the lowest decile). Except for the 60-70th and 70-80th percentiles, the effects of fraction immigrant decrease monotonically. Since MSAs at the beginning of the period are more likely to fall in the bottom of the distribution and the opposite for MSAs at the end of the period, this specification reveals why the negative effect of fraction immigrant worsens with time.

The previous specification also suggests that the effects of immigrant concentration are not homogeneous across MSAs with different size immigrant populations. To address this concern I identify a more homogeneous set of MSAs over which I re-estimate model (3). I start by estimating the range of fraction immigrant that is consistent over the entire period. This is essentially the common support. I calculate the 5th and 95th percentiles of the fraction immigrant for *each year*. Then I define the common support from the maximum of the 5th percentile across the years to the minimum of the 95th percentile across the years. There are twenty-three MSAs that fall in the common support in every year. In 1970 there are 61 MSAs in the common support, 60 in 1980, 57 in 1990, and 73 in 2000. These MSAs are listed in Table 3-6.

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[47] Even when calculating the total effect at the mean of the fraction immigrant from the linear and quadratic terms by year, the differences do not disappear.

Using the sample of MSAs that always fall into the common support of fraction immigrant, I find that the effect of fraction immigrant is still negative but much smaller. Results are given in Table 3-5 Panel 6-7. The differences in this effect are not as striking across years. The 1970 and 1980 effects are not statistically different, nor are the 1990 and 2000 effects. If instead I include an MSA in any year that it fell into the common support, the results are qualitatively similar. Only the 1970 effect of fraction immigrant is statistically different from the others. Quantitatively, the effects are much closer to the basic model (3) estimates in Panel 1. This analysis over the common support of the fraction immigrant variable also minimizes concerns about minimum wage workers biasing the results, as the common support is defined as the 5^{th} to 95^{th} percentile of the wage distribution.

3.5.3 Robustness

The identification of immigrant concentration's effects on immigrant wages above may be impeded by the argument that there is a negative correlation between immigrant concentration and immigrant skill. MSAs with large concentrations of immigrants may offer immigrant-preferred goods or services as well as job information or opportunities. A large ethnic enclave may lower the return to certain skills, for example the return to learning English (as suggested in McManus (1990)). Living outside of an immigrant enclave, then, may be an indicator of or an incentive to obtain greater skill. If immigrants who live in less immigrant-concentrated areas are more skilled, then their wages may be higher not because they face less competition but because they have higher marginal productivity.

I find little evidence of correlation between immigrant concentration and skill, based on observable measures. I compare MSAs in roughly the 80th and 20th percentiles of the fraction immigrant and find no marked difference in education, English fluency, industry or occupation. Table 3-7 compares two groups of MSAs: those between the 70th and 80th percentiles and those in the 10-20th percentiles. I calculate the average of each skill measure and present the ratio of that measure for the 70-80th percentiles relative to the 10-20th percentiles. For example, I find that in 1970 the proportion of immigrants from Latin America was 1.85 times higher in the more concentrated MSAs (the 70-80th percentiles) than in the less concentrated MSAs. Overall there is striking similarity between the more or less concentrated MSAs along these measures. The education distribution is slightly more skewed towards low educated groups in the more concentrated MSAs, but that skewness virtually disappears by 2000. I present industries and occupations that are common for many immigrant workers, but find no persistent differences in the immigrant distribution according to MSA concentration. In the second panel of Table 3-7, I present the same ratios for the 80th to 90th percentile relative to the 0-10th percentiles. As expected, the observable immigrant skill differences between these groups of MSAs is larger. Apart from the high school dropout and laborer occupation outliers, however, the skill differentials are not extremely large.

Occupation may be the strongest proxy for skill in this dataset, so to test the skill-concentration argument further, I add occupation controls to Model (3). Indeed there is a history in the literature to analyzing immigration's effects by occupation. Orrenius and Zavodny (2006) find immigration has a negative, statistically significant effect on wages of natives in blue collar occupations over the late 1990s. Card (2001) also examines immigration's effects on occupation-specific wages and employment of natives and finds some small, negative effects although they are not stable under instrumental-variables specifications. Using the occupation groupings given in the Census, I define ten indicator variables (1-digit 1950 occupation codes). These are: professional and technical, farmers, managers and officials, clerical, sales, craftsmen, operatives, service workers, farm laborers, and other laborers. With these indicators added as fixed effects (dropping the indicator for professional and technical), I find that the effect of immigrant concentration on wages of immigrants changes only slightly, to -0.288 with a standard error of 0.011.[48] In addition, I estimate the effect of immigrant concentration on the wages of immigrants in each of the ten occupations separately. These estimates are presented in Table 3-4 Panel 2. The largest statistically significant negative effects are found on the wages of operatives, craftsmen, sales occupations, and clerical occupations. There is no statistically significant effect on the wages of professionals or technical workers as well as farmers. Since this study focuses on wages in metropolitan areas, the failure to find statistically significant negative effects on the wages of farmers and farm laborers is most likely due to the limited scope of the data rather than to the lack of a true effect.

Industry composition of MSAs may bias the results of the basic model in a similar way that the skill-concentration argument works. For example, if immigrants are pulled to less concentrated MSAs by well-paying jobs in thriving industries, it could generate the same negative relationship between concentration and wages that has so far been argued as causal. As above, I first add industry fixed effects, using the 1950 industry

[48] I find nearly identical results for other occupation definitions, for example using the trivariate grouping: professional, technical and manual based on the 1970-2000 occupational codes (Orrenius and Zavodny (2006)). Or using six occupational groups also based on the 1970-2000 codes as in Kugler and Yuksel (2006).

classification in the Census: agriculture, mining, construction, manufacturing, transportation and communication, wholesale and retail trade, FIRE, business and repair services, personal services, entertainment and recreation, professional and related services, and public administration. The estimated effect of immigrant concentration on immigrant wages is increased only slightly to -0.308 with a standard error of 0.01. The results for concentration by industry are also not surprising. Statistical significance for the agriculture and mining industries is not found due to the urban geographic focus of this study. Otherwise, the negative effects of immigrant concentration are distributed somewhat evenly across the other industries.

As a final robustness check, I test whether this model accurately captures the full labor market by adding unemployed and self-employed immigrants. These individuals were excluded from the analysis, in keeping with previous literature, since $Log\ wage_{it}$ does not exist for the unemployed and because since self-employment income is hard to compare to wage and salary earnings. However, these are important segments of the labor market. First, it is important to note that the unemployed make up a relatively small portion of workers in my sample, from 3.44% in 1970 to 5% in 2000. Also, immigrants and natives are roughly equally represented among the unemployed in this population. For example, in 1970 3.42% of immigrants in this sample were unemployed whereas 3.44% of native-born were. The self-employed make up 9-10% of the population. Once again, immigrants and natives are approximately equally likely to be self-employed; for example, in 2000 9.95% of natives were self-employed and 10.03% of immigrants were. Given these facts, I do not expect that adding unemployed and self-employed to the model will change the estimated effects substantially.

An important distinction is that unemployment and self-employment variables in the Census pertain to the current year, whereas the earnings variables apply to the previous year. So not only do I include currently unemployed or self-employed individuals, but also those who reported zero earnings for the previous year. I find that between 6 and 8.6% of the population reported zero earnings from wages and salary in the previous year. Immigrants appear to be slightly more likely to report zero earnings, for example in 2000, 7.9% of native-born reported zero wage and salary earnings in 1999 whereas 10.91% of immigrants did so.

For zero earnings in the preceding year, I add them to the regression by arbitrarily entering a log weekly wage of -10, which corresponds roughly to a weekly wage value of 0.00005. I find that including these "zeros", the currently unemployed and the self-employed does not change the estimated effect of immigrant concentration much. The results are presented in Table 3-8. In addition, I change the dependent variable to estimate the effect of immigrant concentration on the employment of immigrants. Using a linear probability model, I find that immigrant concentration has a statistically significant, but economically unimportant effect on the employment of immigrants. Likewise, I find a statistically insignificant effect of immigrant concentration on the propensity to have zero earnings in the prior year (a measure of employment in the previous year).

In summary, the main results show that immigrants compete with other immigrants, and this is correlated with strong adverse wage effects. Probing further on this correlation, I have shown that the results are consistent with evidence of labor market segmentation by language and ethnicity. The negative correlation is not driven by a particular education or ethnic group. It is also not driven by employment outcomes of immigrants, industry or occupation choice.

3.6 Cohort Quality Results

In this section I will do two things: establish facts about cohort quality over the 1990s and show that immigrant concentration can explain a substantial portion of the wage differential among immigrant cohorts otherwise attributed to declining quality.

First I confirm the Borjas (1985, 1995) results for wage growth by cohort over the 1970s and 1980s and the Borjas and Friedberg (2006) results extending the analysis over the 1990s. As described in Section 3.3, the strategy is to compare year-cohort effects in Model (2). The year-cohort effects from Model (2) were presented earlier in Table 3-1 Column 2. Twenty-eight cohort effects, θ_{tc}, are estimated, where t=1970, 1980, 1990, 2000. Four cohorts, c, can be identified for 1970, six for 1980, eight for 1990, and ten for 2000. Recall that cross-sectional wage growth is decomposed into within-cohort wage growth and across-cohort growth. As an example, consider immigrants in 1980 who arrived between 1965 and 1969. The wage penalty for this group (relative to natives) is -0.1282. This says that in 1980 immigrants who had been in the U.S. 10-15 years earned 12.8% less than natives. The coefficient on the 1975-79 cohort says that immigrants in the U.S. 1-5 years as of 1980 earned 26.77% less than natives. Comparing these two year-cohort effects, then, estimates the wage growth attributed to being in the U.S. ten extra years. This is exactly the cross-sectional wage growth, θ_{tc} - $\theta_{t,c+10}$. The estimated difference, -0.1282 – (-0.2677), suggests that immigrants arriving in 1965-1969 earned 13.95% more in 1980 than immigrants arriving in 1975-79. This cross-sectional growth can be decomposed into within-cohort and across-cohort growth as described in Section 3.3. In this particular example, the decomposition is as follows:

$$Cross\text{-}sectional = Within + Across$$

$$(-0.1282 - -0.2677) = [-0.1282 - -0.2203] + [-0.2203 - -0.2677]$$

$$0.1395 = 0.0921 + 0.0474$$

In this case, across-cohort growth in wage explains about one-third of the 1980 cross-sectional wage growth between cohorts 1965-69 and 1975-79. Borjas (1985) suggests this is attributable to declining cohort quality.

Table 3-9 Panel 1 summarizes the decomposition calculated from the coefficients estimated in Table 3-1 Column 2. The 1970-1980 and 1980-1990 panels establish the declining cohort quality pattern over these periods. In general, across-cohort wage growth is positive and a substantial portion of cross-sectional wage growth. Interestingly, the 1990-2000 panel shows evidence of new trend for the 1990s. In 2000, the difference between wages of older and newer immigrants (the cross-sectional wage growth) is much smaller than in previous periods. Also, cohort quality appears to explain less of the difference between cohort wages. In fact, unobserved cohort quality appears to *increase* for the newest cohorts of immigrants over the 1990s. The reason behind this increase in entry wage of new immigrants over the 1990s remains a puzzle in the literature. Borjas and Friedberg (2006) find part of the increase in unobserved quality is due to the H1-B visa program that favored high-skill immigrants and the rise in high school dropout wages of immigrants relative to natives.

I find that the increase in cohort quality over the 1990s is actually understated when local labor market differences are not accounted for. The across-cohort figures in

Table 3-9 are slightly less negative when MSA-year fixed effects are not included in the model.[49] Over the period 1990-2000 new immigrants increasingly went to "new places", where average wages are lower than in historic immigrant-receiving cities. Failing to account for this using native wages in a locality as the comparison group slightly understates the increase in unobserved cohort quality.

The main objective in this section is to see whether the negative effects of immigration on wages of immigrants can explain changes in entry wages of immigrants. That is, does implementing model (3) over model (2) have an effect on the across-cohort wage growth estimates? To do so, first I compare the cohort-year effects in Table 3-1 Column 2 to those in Column 3. Including *Fraction Immigrant* in the model explains a large portion of the wage penalty attributed to cohort effects in Column 2. This is increasingly the case for more recent years; the difference in estimated cohort effects is larger for 1990 and 2000 than for 1970 and 1980. Next, I decompose the cohort effect from Column 3 into cross-section, within-cohort, and across-cohort growth. This decomposition is presented in Table 3-9 Panel 2. We see that, compared to Panel 1, cross-sectional wage growth changes little for most cohorts and years. This suggests that immigrant competition does not affect the wage growth of immigrants with time in the U.S. However, the across-cohort wage growth decreases markedly for most cohorts. For instance, over 1980-1990 the across-cohort wage growth for the newest immigrants decreased from 5.1% to 2.9%. The decrease in across-cohort wage growth can also be interpreted as a decrease in the differential entry wage of new immigrants between 1980 and 1990. The exception to this pattern is the two newest cohorts over 1990-2000 where

[49] In a model including year effects only, and no MSA effect, for the 0-5 year cohort, the across-cohort wage growth is -0.0771. For the 6-10 year cohort, the across-cohort wage growth is -0.0262. Both differences are statistically significant at the 1% level.

immigrant concentration does not appear to have an impact on cohort quality estimates. This exception is consistent with the idea that the dispersion of immigrants over the 1990s to new places was in part driven by movement away from cities with high levels of immigrant competition.

Immigrant competition in local labor markets explains up to 40% of the differential in wages between immigrants of different cohorts but the same length of stay in the U.S. Thus, failing to account for immigrant competition in the local labor market overstates the degree to which declining cohort quality affects the wages of immigrants.

3.7 Conclusion

Immigration to the U.S. grew rapidly over the end of the 20th century. At the same time, immigrant location choice has changed and brought immigrants to new places across the country. In the policy world, this raises important questions about what effect immigrants have on local areas. Many are concerned about the effect of immigrants on the wages of native workers. This question has been much studied, and only small negative effects, if any, are found. Unlike most of the literature, I estimate the effect of immigrants on the wages of immigrants.

Given the facts about labor market segmentation and non-substitutability of immigrant for native labor, I hypothesize that the main effects of immigrant competition are on wages of immigrants. Extending typical models from the literature, I find evidence in support of this hypothesis. For a ten percentage point increase in the fraction of immigrants in a local area, immigrants experience a 2.7% decrease in their wages. This result is robust to alternative specifications of the model. And the result is stronger within subgroups where competition is predicted to be even more intense because of labor market segmentation. For a ten percentage point increase in the fraction of immigrants from Latin America in a local area, Latin American immigrants see a 4.8% decrease in their wage. The fact that the concentration of immigrants has an adverse effect on wages of immigrants does not preclude immigrants from also negatively affecting the wages of natives. This paper simply suggests that the main effects are on wages of immigrants.

In addition I show that immigrant competition has power in explaining the well-known result suggesting that immigrant cohorts are of declining quality over 1970-1990. Up to 40% of the wage differential between immigrants of different cohorts at the same point in time of their assimilation experience can be explained by increasing competition. This suggests that successive cohorts may still be of lower quality over the 1970s and 1980s but not to the degree that was previously estimated.

Chapter 4: Conclusions and Policy Implications

The remarkable growth in immigration to the U.S. in the end of the 20th century provides an opportunity to test economic theories of the labor market. Recent immigrants are on average younger, less educated, and possess lower English language ability than native workers. Understanding how this population affects the labor market has the potential to explain not just how immigrants affect the market but how the rise in any differently situated population might interact with existing workers.

4.1 Findings

Much immigration research begins with the hypothesis of a simple model of labor supply and demand where an increase in supply reduces wages of all competing workers, including native-born. At the local level, there is little evidence in the literature that any sizeable wage effect exists. That is, under the assumption that labor markets are defined by local geographic borders, there are only small negative effects of the number of immigrants on the wages of native workers. These studies implicitly assume that immigrants and natives compete within local areas but not across them. Relaxing this assumption and examining the national wage effects of immigration yields strikingly different results. If we assume that immigrants and natives compete within skill groups rather than within geographic areas, the correlation between the number of immigrants and the wages of native-born in skill groups is large and negative. This result, as presented in Borjas (2003), suggests that a simple supply and demand theory does have power in explaining real world situations.

In Chapter 2, Seth Sanders and I showed that although the skill group correlation method is appealing, it confounds the identification of the true effect of immigration on the wages of native-born. The first piece of evidence is that young, high school dropouts drive the entire negative correlation between immigration and wages of native-born. Higher skilled immigrants appear to have no effect on the wages of higher skilled native-born. Even though immigration shocks in higher skill groups are small relative to those in lower skill groups, if the national market assumptions and the supply and demand model describe reality, the size of the shocks should not change the underlying correlation with wages. We use Canadian immigration patterns as a point of comparison, since immigrants to Canada tend to be of higher skill. We find that even though Canadian supply shocks due to immigration are in higher skill groups, there is no negative correlation between immigration and wages of native-born Canadians.

In addition we provide evidence that labor market trends *other* than immigration may be picked up in wage trends within skill groups. For example, the wages of high school dropouts fell over the period of study, and many possible explanations abound, including skill-biased technological change, increasing negative selectivity in education, de-industrialization, and international trade. The skill group methodology cannot dissociate these wage trends from those due to immigration. We construct an annual series of wages and immigration for high school dropouts between 1974 and 2002. Looking only at decennial Census years, there is a negative relationship between wages and immigration. This is the relationship identified in the Borjas (2003) methodology. However, examining inter-Census years, we find the trends are not consistent with the story that high school dropout immigrants have driven down the wages of high school dropout native-born. For example, in the early 1980s when wages of high school dropouts in the U.S. plummeted, immigration in this skill group was stagnant. Also, in the late 1990s immigration and wages increase at nearly the same rate.

Overall, Chapter 2 concludes that the model where immigrants compete with natives within skill group on a national level yields spurious correlations between immigration and the wages of native-born workers. This leaves open the question regarding immigration's wage effects. Most economists believe that an infusion of 30 million new workers to a relatively few local areas must have an effect on wages in the U.S. That is one reason the Borjas (2003) result is so appealing. In Chapter 3 I suggest a view of immigration and the labor market that makes progress toward explaining the absence of wage effects thus far. Namely, I provide evidence that immigrants compete primarily with other immigrants and thus the wage effects of immigration are observed first on other immigrants. In addition to anecdotal evidence, there is growing evidence in the economics literature that labor markets are segregated along many dimensions that impact immigrants directly. Hispanics tend to work with other Hispanics, and workers of similar English language ability tend to be grouped together as well. Immigrants are overwhelmingly likely to work in small firms and in service and construction industries. They also tend to work with other immigrants from the same source country.

In light of the evidence on segregation of the labor market by language and ethnicity, it is not surprising that I find large effects of immigration on wages of competing immigrants. These effects are estimated relative the wages of native-born workers in the same local area over time. I find that it is important to control for trends in immigration settlement that affect different areas of the U.S. at different times. After identifying the effect of immigration on the wages of immigrants, I show that this competition result can help explain the declining entry wage of immigrants over 1970-1990. Namely, increasing competition can explain up to forty percent of the declining entry wage. The entry wage decline has previously been attributed wholly to declining "quality" of new immigrants.

Chapter 3 explains in part why it is hard to find an effect of immigration on the wages of native-born workers. Simply, the primary effect is on the wages of competing immigrants. This is not to say that there is no effect of immigration on natives – either on their wages or other labor market outcomes – rather the findings of Chapter 3 suggest that the wage effects are likely smaller than was previously anticipated.

4.2 Policy Implications

How can the above findings inform government policy on immigration? It is first important to state that there are no direct policy implications from the research conducted here or in much of the research on the labor market effects of immigration. No public policy was tested directly. Rather, this study and others aim to further our understanding of how labor markets in the U.S. respond to large immigration shocks. This understanding can help identify the agents in the labor market that are most affected by increasing immigration, the long term gains and losses to competing workers. Without unbiased identification of the agents who "win" and those who "lose" due to increased immigration, it is nearly impossible to formulate policy to support the U.S. labor market in light of high levels of low-skilled immigration. Economic research on immigration, however, cannot inform the debate over the equity of immigration policy.

If we focus only on the labor market effects of immigration, we find that formulating policy quickly becomes complicated. As with many economic situations, there are winners and losers in the labor market from increased immigration to the U.S. To fully identify winners and losers, we must consider all agents in the labor market. The conclusions of Chapters 2 and 3 suggest that native-born workers are not the big losers in terms of wage competition due to immigration. Indeed, they may actually be better off, as I note in Chapter 3 (Ottaviano and Peri (2006)), due to the complementarity of immigrant and native labor. The competing group that experiences wage decline is, instead, other immigrants. Having identified the winners and losers in terms of wage competition, it may be tempting to suggest that immigration policy limit future immigration in order to maintain current immigrants' wages, or to only admit more immigrants as long as the wage increases for the winners (natives) outweigh the wage losses for the losers (current immigrants).

However, determining the optimal inflow of immigrants is not so simple. Even if immigrants are the "losers" because their wages have declined[50], firms employing immigrant labor are "winners" because their costs have declined. So the net effect of immigration on the labor market must also take account of the gains and losses to firms due to changing labor costs. Changing labor costs for firms in turn affect the price of products. Hence we must also consider the gains and losses to consumers who purchase these products. Both natives and immigrants benefit from the declining price of goods produced by relatively cheaper immigrant labor (Cortes (2006)). We have already

[50] Of course, even if previous immigrants in the U.S. experience wage declines due to increased immigration, they may not be "losers" in the labor market compared to what their labor market opportunities would have been if they had remained in their home country.

established many layers of gains and losses due to immigration, and have only considered the labor market effects of immigration.

There are many other dimensions along which existing immigrants may gain from increased immigration. Having more immigrants from one's own source country can increase political influence and cultural capital. For example, immigrant-owned businesses offering culture-specific products may benefit from increased demand. And immigrant consumers may benefit from an expanding market for culture-specific products. These effects are obviously difficult or impossible to measure.

One commonly debated effect is that on the welfare and education systems. In this arena we will see that it is not only difficult to identify all the interconnected winners and losers due to immigration, but it is also crucial to clarify the time dimension of its effects. Recent immigrants are relatively young and low-educated, making many of them prime candidates for welfare benefit receipt. Despite the fact that many immigrants who qualify do not actually take up welfare benefits, there is major concern about their current and potential impact on the welfare rolls. In addition, along with the growth in immigrant working adults, there is growth in the population of immigrant children. Whether they are born in or out of the U.S., once in the country they are entitled to an education. In some local areas, the ethnic, cultural, and language mix of students is drastically changing. This imposes real costs in terms of the services schools need to provide. There are also intangible costs of cultural change and the benefits of increased diversity.

Whether immigrants as a whole pay in more in tax than they take out in the form of education and welfare is difficult to answer. First, the estimates of tax paid by immigrants vary widely, largely due to the difficulty in identifying payments by undocumented immigrants. Also, the question as framed often in public debate is not framed appropriately in terms of the long versus short run effects. For example, investment in the education of immigrant children, provided they stay in the U.S., may have great benefits to the economy but only in the long run. In that sense, current taxpayers may be "losers" from immigration but future generations may reap the economic benefits of this investment in a significant portion of tomorrow's workforce.

A simple economic way of approaching policy on immigration is to identify the gains and losses along some time horizon, as discussed here, and allow future immigrants only as long as the gains outweigh the losses. This method may neglect some of the psychic or cultural costs and benefits because they may simply be impossible to measure. But it can be one way to frame a policy debate that is extremely complex.

Where such economic analysis of the policy problem offers no insight is in the equity side of the debate. Policymakers and the public may not be willing to accept an immigration policy which has a net benefit but only natives experience gains and current immigrants experience all the losses, for example. Research can inform public policy by explaining who are the winners and losers and how large are the effects. But this analysis has nothing to say about the concern that young, low-skilled immigrants are the ones experiencing wage loss and higher-skilled native-born workers are the beneficiaries. Ultimately even a complete understanding of the economic effects of immigration in the U.S. is incapable of assessing the equity concerns of any immigration policy.

Tables

Table 1-1: National-Origin Composition of the Stock of Immigrants to the U.S.

	U.S.				
	1960	**1970**	**1980**	**1990**	**2000**
North America	11.69	9.43	4.87	2.70	2.26
Central and South America	13.06	25.05	38.50	48.71	54.45
Europe	67.22	50.41	29.68	16.83	13.14
Asia	6.88	10.83	19.35	24.97	26.10
Africa	0.32	1.03	1.82	2.57	3.49
Other	0.81	3.26	5.81	4.22	0.56

Source: U.S. Census PUMS, 1% sample for 1960, 6% samples for 1970-2000
Note: Central and South America includes the Caribbean.

Table 2-1: National-Origin Composition of the Stock of Immigrants in Canada

	Canada			
	1971	**1981**	**1991**	**1996**
North America	6.04	5.62	4.89	4.65
Central and South America	3.30	7.26	11.22	12.11
Europe	81.77	67.91	51.30	43.58
Asia	6.10	14.92	26.43	32.06
Africa	1.50	3.14	5.17	5.72
Other	1.27	1.15	0.98	1.88

Source: Canadian Census PUMF, 1% sample for 1971, 2% samples for 1981 and 1986, 3% sample for 1991, and 2.8% sample for 1996.

Table 2-2: Regression Results using 1960-2000 Census Data

Dependent Variable: Log Weekly Wage of Native-born	
	Effect of Fraction Immigrant, θ
Unweighted	-0.538 (0.187)
Weighted by Number in Cell	-0.434 (0.219)

Source: U.S. Census PUMS
Note: Standard errors are in parentheses and are clustered on education-experience. Both regressions include fixed effects for education, experience, year, and all two-way interactions.

Table 2-3: Top Influential Year-Education-Experience Cells

Year	Education	Years of Experience	DFBETA	Rank of DFBETA
2000	HS Dropout	1-5	-0.8225	1
1970	HS Dropout	1-5	-0.6382	2
2000	HS Dropout	6-10	0.5949	3
1960	HS Dropout	1-5	-0.5496	4
2000	College Grad	36-40	-0.4157	5
1980	College Grad	1-5	0.3550	6
1970	HS Dropout	6-10	0.3430	7
2000	HS Dropout	36-40	0.3133	8
1960	College Grad	36-40	-0.2952	9
1980	HS Dropout	1-5	0.2820	10
1990	HS Dropout	26-30	0.2662	11
1960	HS Dropout	6-10	0.2588	12
1980	College Grad	16-20	0.2371	13
1960	HS Dropout	16-20	-0.2212	14
1980	HS Dropout	16-20	0.2202	15
2000	Some College	6-10	0.2158	16
1990	HS Dropout	21-25	-0.1946	17
1970	College Grad	1-5	-0.1908	18
2000	College Grad	11-15	0.1560	19

Source: U.S. Census PUMS

Table 2-4: Percentage of Total Weight on the Regression, by Year and Education

	1960	1970	1980	1990	2000	Total
HS Dropout	4.34	3.92	3.13	14.73	25.59	51.70
HS Grad	5.63	6.06	5.05	2.47	1.78	20.99
Some College	4.07	4.28	3.23	2.08	1.40	15.06
College Grad	3.61	3.04	2.04	0.45	3.10	12.24
Total	17.65	17.31	13.45	19.72	31.88	100

Source: U.S. Census PUMS

Table 2-5: Estimates of *θ* After Eliminating Various Year-Education Cells

Dependent Variable: Log Weekly Wage of Natives

Estimate of θ using all cells: -0.434 (0.219)

	Estimate of θ omitting Education-Year cell:					
	1960	**1970**	**1980**	**1990**	**2000**	***Total***
HS Dropout	-0.334	-0.397	-0.467	-0.455	-0.402	**0.011**
	(0.227)	(0.180)	(0.255)	(0.242)	(0.264)	**(0.442)**
HS Grad	-0.457	-0.455	-0.407	-0.474	-0.465	-0.517
	(0.213)	(0.212)	(0.227)	(0.202)	(0.216)	(0.192)
Some College	-0.427	-0.435	-0.433	-0.434	-0.476	-0.459
	(0.225)	(0.222)	(0.222)	(0.231)	(0.213)	(0.234)
College Grad	-0.392	-0.403	-0.499	-0.449	-0.406	-0.403
	(0.220)	(0.214)	(0.238)	(0.230)	(0.230)	(0.252)
Total	-0.337	-0.390	-0.497	-0.498	-0.470	
	(0.230)	(0.187)	(0.265)	(0.236)	(0.287)	

Source: U.S. Census PUMS
Note: standard errors in parenthesis are clustered on education-experience.

Table 2-6: Distribution of Educational Attainment of U.S. Natives, 1960-2000

	1960	1970	1980	1990	2000
HS Dropout	51.28	36.66	21.98	11.81	8.49
HS Grad	27.80	35.33	37.59	33.91	31.94
Some College	10.00	12.90	18.81	28.69	30.94
College Grad	10.92	15.11	21.62	25.58	28.63
Total	100.00	100.00	100.00	100.00	100.00

Source: U.S. Census PUMS

Table 2-7: Regression Results for De-Constructed Regression

	Estimated θ_1	Estimated θ_2
Unweighted	-0.00022	0.00535
	(0.01087)	(0.00158)
Weighted by Average Cell Size	-0.00023	0.00448
	(0.0105)	(0.00189)
Weighted by Total Cell Size	-0.00240	0.00395
	(0.01047)	(0.00193)

Source: U.S. Census PUMS
Note: standard errors in parentheses are clustered by education-experience. Effects given per 100,000 persons. All regressions include fixed effects for education, experience, year, and all two-way interactions.

Table 2-8: Regression Results for Canadian Census Data

Dependent Variable: Log Weekly Wage of Natives

	Effect of Fraction Immigrant, α
Unweighted	-0.175 (0.237)
Weighted by Number in Cell	-0.251 (0.264)

Source: Canadian Census PUMF
Note: standard errors in parentheses are clustered by education-experience. Both regressions include fixed effects for education, experience, year, and all two-way interactions.

Table 2-9: Percentage of Total Regression Weight for Canada, by Year and Education

	1971	1981	1986	1991	1996	*Total*
HS Dropout	3.93	3.94	4.50	4.17	4.04	20.57
HS Grad	13.68	4.56	4.21	3.54	3.79	29.77
Some College	3.94	5.53	6.30	5.26	5.06	26.08
College Grad	3.74	4.58	5.41	4.68	5.18	23.58
Total	25.28	18.60	20.40	17.65	18.06	100.00

Source: Canadian Census PUMF

Table 2-10: Regression for High School Dropouts Only, U.S. and Canada

Dependent Variable: Log Weekly Wage of Natives		
	Estimated Effect of Fraction Immigrant, θ (U.S.)	**Estimated Effect of Fraction Immigrant, α (Canada)**
Original Weighted Result	-0.434 (0.219)	-0.251 (0.264)
Weighted Result for High School Dropouts Only	-0.671 (0.105)	0.518 (0.784)

Source: U.S. Census PUMS and Canadian Census PUMF
Note: standard errors in parentheses are clustered by education-experience. All regressions include fixed effects for education, experience, year, and all two-way interactions.

Table 2-11: Testing for Measurement Error in the Canadian Regression Results

Dependent Variable: Log Weekly Wage of Natives		
	Original Analysis	***Using 6 experience Categories, with 26-40 yrs grouped together***
	Estimated Effect of Fraction Immigrant, α	**Estimated Effect of Fraction Immigrant, α**
Unweighted	-0.175 (0.237)	0.1006 (0.273)
Weighted by Number in Cell	-0.251 (0.264)	-0.260 (0.361)

Source: Canadian Census PUMF
Note: standard errors in parentheses are clustered by education-experience. All regressions include fixed effects for education, experience, year, and all two-way interactions.

Table 3-1: Fixed Effects Model Estimates

Dependent Variable: Log Weekly Wage Cohort Effects by Year	Model (1)	Model (2)	Model (3)
Wage effects in 1970 for:			
1965-69 cohort	-0.2203*** (0.0078)	-0.2264*** (0.0078)	-0.1988*** (0.0079)
1960-64 cohort	-0.0835*** (0.0089)	-0.0825*** (0.0089)	-0.0529*** (0.009)
1950-59 cohort	-0.007 (0.0071)	-0.0265*** (0.0071)	-0.0019 (0.0071)
<1950 cohort	-0.0117 (0.0082)	-0.0308*** (0.0081)	-0.0077 (0.0082)
Wage effects in 1980 for:			
1975-79 cohort	-0.2677*** (0.0057)	-0.2658*** (0.0057)	-0.2237*** (0.006)
1970-74 cohort	-0.1866*** (0.006)	-0.179*** (0.006)	-0.1343*** (0.0063)
1965-69 cohort	-0.1282*** (0.0067)	-0.1135*** (0.0067)	-0.069*** (0.0069)
1960-64 cohort	-0.0488*** (0.008)	-0.0298*** (0.008)	0.0134 (0.0082)
1950-59 cohort	0.0031 (0.0071)	0.0027 (0.007)	0.0376*** (0.0072)
<1950 cohort	0.0108 (0.0125)	0.0096 (0.0123)	0.0435*** (0.0124)
Wage effects in 1990 for:			
1985-89 cohort	-0.2624*** (0.0045)	-0.3171*** (0.0046)	-0.2531*** (0.0052)
1980-84 cohort	-0.2051*** (0.0046)	-0.253*** (0.0047)	-0.1894*** (0.0053)
1975-79 cohort	-0.1252*** (0.0054)	-0.1728*** (0.0054)	-0.1112*** (0.0059)
1970-74 cohort	-0.0674*** (0.0061)	-0.1184*** (0.0062)	-0.0555*** (0.0066)
1965-69 cohort	0.0214*** (0.0074)	-0.0259*** (0.0074)	0.0339*** (0.0078)
1960-64 cohort	0.0736*** (0.0095)	0.0375*** (0.0095)	0.0968*** (0.0098)
1950-59 cohort	0.1072*** (0.01)	0.0713*** (0.0099)	0.1197*** (0.0101)
<1950 cohort	0.0927*** (0.0215)	0.0599*** (0.0213)	0.1059*** (0.0214)
Wage effects in 2000 for:			
1995-99 cohort	-0.1853*** (0.0038)	-0.2179*** (0.0038)	-0.1543*** (0.0046)
1990-94 cohort	-0.1789*** (0.0048)	-0.2132*** (0.0048)	-0.1451*** (0.0055)
1985-89 cohort	-0.1712*** (0.0039)	-0.2024*** (0.004)	-0.1309*** (0.0049)
1980-84 cohort	-0.1303*** (0.0057)	-0.1596*** (0.0057)	-0.0883*** (0.0063)
1975-79 cohort	-0.099*** (0.0048)	-0.1208*** (0.0048)	-0.0498*** (0.0056)
1970-74 cohort	-0.0457*** (0.008)	-0.0694*** (0.008)	0.0017 (0.0085)
1965-69 cohort	-0.0238*** (0.0081)	-0.0419*** (0.0081)	0.0278*** (0.0086)
1960-64 cohort	0.0304** (0.0137)	0.023* (0.0136)	0.0911*** (0.0138)
1950-59 cohort	0.0343** (0.0152)	0.0196 (0.015)	0.0768*** (0.0152)
<1950 cohort	0.0802** (0.0356)	0.0596* (0.0353)	0.1147*** (0.0353)
Frac(I)*I			-0.2712*** (0.0108)
Year*MSA Effects	NO	YES	YES
Year Effects	YES	NO	NO
Educ, Age, Educ*Age effects	YES	YES	YES
F statistic			633.99

Source: U.S. Census PUMS Note: Each regression is estimated from 2,402,986 observations. Standard errors in parentheses. Natives comprise about 84% of the sample and immigrants the remaining 16%.

Table 3-2: Mean Fraction Immigrant

	Average Across MSAs (SD)
Frac(I)	0.076 (0.090)
Frac(I) in 1970	0.040 (0.040)
Frac(I) in 1980	0.058 (0.064)
Frac(I) in 1990	0.082 (0.097)
Frac(I) in 2000	0.124 (0.116)
Frac(Latin American Immigrant)	0.034 (0.056)
Frac(Mexican Immigrant)	0.023 (0.047)
Frac(Cuban Immigrant)	0.006 (0.028)
Frac(Other Hispanic Immigrant)	0.009 (0.023)
Frac(Asian Immigrant)	0.016 (0.024)
Frac(White Immigrant)	0.022 (0.018)
Frac(Black Immigrant)	0.004 (0.010)
Frac(Other Immigrant)	0.002 (0.004)
Frac(High School Dropout Immigrant)	0.025 (0.036)
Frac(High School Graduate Immigrant)	0.018 (0.024)
Frac(Some College Immigrant)	0.014 (0.019)
Frac(College Graduate Immigrant)	0.018 (0.022)
Frac(Fluent in English)	0.066 (0.069)
Frac(Not Fluent in English)	0.022 (0.033)

Source: U.S. Census PUMS
Note: The fraction of immigrants with the above characteristics by MSA is averaged over the 119 MSAs used in this analysis. Language variables differ from the others in this table in that they sum to the fraction immigrant averaged over 1980-2000, which is 0.088 (0.098)

Table 3-3: Immigrant Concentration Effects, by Language and Ethnicity

Dependent Variable: Log Weekly Wage		
	Concentration Measure	**Estimate (SE)**
Panel 1: Model (3)	Frac(I)*Immigrant	-0.271*** (0.011)
Panel 2a: Model (4)	Frac(I)*Immigrant	-0.200*** (0.010)
Panel 2b: Model (4)	Frac(I)*Native	0.430*** (0.009)
Panel 3: Model (3)	Frac(I)*Immigrant Fluent in English	-0.129*** (0.011)
by Language	Frac(I)*Immigrant not Fluent in English	-0.593*** (0.0124)
Panel 4: Model (3)	Frac(I)*Latin American Immigrant	-0.372*** (0.012)
by Source Country	Frac(I)*Non-Latin American Immigrant	-0.182*** (0.012)
Panel 5: Model (3)	Frac(I | Latin American Immigrant)*Latin American Immigrant	-0.321*** (0.021)
By Language	Frac(I | Latin American Immigrant)*Non-Latin American Immigrant	-0.083*** (0.024)
	Frac(I | Non-Latin American Immigrant)*Latin American Immigrant	-0.432*** (0.024)
	Frac(I | Non-Latin American Immigrant)*Non-Latin American Immigrant	-0.255*** (0.019)
Panel 6: Model (3)	Frac(I)*Mexican Immigrant	-0.335*** (0.013)
By Ethnicity	Frac(I)*Cuban Immigrant	-0.209*** (0.019)
	Frac(I)*Other Hispanic Immigrant	-0.419*** (0.013)
	Frac(I)*Asian Immigrant	-0.325*** (0.014)
	Frac(I)*White Immigrant	0.358*** (0.015)
	Frac(I)*Black Immigrant	-0.510*** (0.019)
	Frac(I)*Other Immigrant	-0.417*** (0.030)

Source: U.S. Census PUMS
*Note: all regressions estimated from 2,402,986 observations except for Panel 3 which is estimated from 2,200,671 observations (since uses only 1980-2000). Standard errors in parentheses. All include fixed effects for education, age, age*education, year*MSA, year*cohort.*

Table 3-4: Immigrant Concentration Effects, by Education

Dependent Variable: Log Weekly Wage		
	Concentration Measure	**Estimate (SE)**
Panel 1: Model (3) by Education	Frac(I)*Immigrant High School Dropout	-0.224*** (0.013)
	Frac(I)*Immigrant High School Graduate	-0.419*** (0.013)
	Frac(I)*Immigrant Some College	-0.270*** (0.014)
	Frac(I)*Immigrant College Graduate	-0.156*** (0.014)
Panel 2: Model (3) by Occupation	Frac(I)*Immigrant in Professional or Technical Occupation	0.002 (0.014)
	Frac(I)*Immigrant in Farming (non-labor) Occupation	-0.261 (0.231)
	Frac(I)*Immigrant in Managerial or Office Occupation	-0.213*** (0.016)
	Frac(I)*Immigrant in Clerical Occupation	-0.298*** (0.017)
	Frac(I)*Immigrant in Sales Occupation	-0.365*** (0.022)
	Frac(I)*Immigrant in Craftsman Occupation	-0.469*** (0.014)
	Frac(I)*Immigrant in Operative Occupation	-0.508*** (0.014)
	Frac(I)*Immigrant in Service Occupation	-0.210*** (0.015)
	Frac(I)*Immigrant in Farm Laborer Occupation	0.525*** (0.048)
	Frac(I)*Immigrant in Other Laborer Occupation	-0.116*** (0.018)
Panel 3: Model (3) by Industry	Frac(I)*Immigrant in Agriculture	0.020 (0.030)
	Frac(I)*Immigrant in Mining	0.062 (0.114)
	Frac(I)*Immigrant in Construction	-0.382*** (0.017)
	Frac(I)*Immigrant in Manufacturing	-0.540*** (0.014)
	Frac(I)*Immigrant in Transportation and Communication	-0.427*** (0.018)
	Frac(I)*Immigrant in Wholesale and Retail Trade	-0.311*** (0.013)
	Frac(I)*Immigrant in FIRE	-0.122*** (0.020)
	Frac(I)*Immigrant in Business and Repair Services	-0.218*** (0.017)
	Frac(I)*Immigrant in Personal Services	-0.039 (0.029)
	Frac(I)*Immigrant in Entertainment and Recreation	0.105*** (0.035)
	Frac(I)*Immigrant in Professional and Related Services	-0.064*** (0.017)
	Frac(I)*Immigrant in Public Administration	-0.236*** (0.027)

*Source: U.S. Census PUMS. Note: all regressions estimated from 2,402,986 observations. Standard errors are in parentheses. All include fixed effects for education, age, age*education, year*MSA, year*cohort.*

Table 3-5: Specification Tests on Immigrant Concentration

Dependent Variable: Log Weekly Wage		
	Specification of Concentration	**Estimate (SE)**
Panel 1: Model (3)	Frac(I)*Immigrant	-0.2712*** (0.0108)
Panel 2: Model (3) by Year	y1970*Frac(I)*Immigrant	-0.122* (0.0733)
	y1980*Frac(I)*Immigrant	-0.1722*** (0.0315)
	y1990*Frac(I)*Immigrant	-0.2436*** (0.0182)
	y2000*Frac(I)*Immigrant	-0.3195*** (0.0151)
Panel 3: Model (3) in Logs	log(Frac(I))*I	-0.0435*** (0.0018)
Panel 3b: Model (3) in Logs by Year	y1970*log(Frac(I))*Immigrant	-0.0053 (0.0059)
	y1980*log(Frac(I))*Immigrant	-0.0204*** (0.0039)
	y1990*log(Frac(I))*Immigrant	-0.0440*** (0.0030)
	y2000*log(Frac(I))*Immigrant	-0.0686*** (0.0031)
Panel 4: Model (3) Quadratic	Frac(I)*Immigrant	-0.45 (0.04)
	Frac(I)^2 * Immigrant	0.34 (0.07)
Panel 4b: Model (3) Quadratic by Year	y1970*Frac(I)*Immigrant	-0.28 (0.08)
	y1980*Frac(I)*Immigrant	-0.41 (0.04)
	y1990*Frac(I)*Immigrant	-0.58 (0.04)
	y2000*Frac(I)*Immigrant	-0.69 (0.05)
	Frac(I)^2 * Immigrant	0.66 (0.08)
Panel 5: Model (3) Non-Parametric	1(0-10 pctl of Frac(I))	Dropped
	1(10-20 pctl of Frac(I))	-0.0609* (0.0340)
	1(20-30 pctl of Frac(I))	-0.0765** (0.0322)
	1(30-40 pctl of Frac(I))	-0.0765** (0.0318)
	1(40-50 pctl of Frac(I))	-0.1110*** (0.0313)
	1(50-60 pctl of Frac(I))	-0.1245*** (0.0307)
	1(60-70 pctl of Frac(I))	-0.0786*** (0.0304)
	1(70-80 pctl of Frac(I))	-0.1042*** (0.0303)
	1(80-90 pctl of Frac(I))	-0.1208*** (0.0301)
	1(90-100 pctl of Frac(I))	-0.1740*** (0.0301)
Panel 6: Model (3) with MSAs in Common Support Every Year	Frac(I)*Immigrant	-0.0774 (0.280)
Panel 6b: Model (3) with MSAs in Common Support Every Year, by Year	Y1970*Frac(I)*Immigrant	1.5789** (0.7240)
	Y1980*Frac(I)*Immigrant	2.5266*** (0.870)
	Y1990*Frac(I)*Immigrant	-0.4761 (0.8320)
	Y2000*Frac(I)*Immigrant	-0.8197** (0.3510)
Panel 7: MSAs when in Common Support	Frac(I)*Immigrant	-0.5761*** (0.1083)
Panel 7b: Model (3) with MSAs when in Common Support, by Year	Y1970*Frac(I)*Immigrant	0.2368 (0.2150)
	Y1980*Frac(I)*Immigrant	-0.5160** (0.2095)
	Y1990*Frac(I)*Immigrant	-1.0484*** (0.2298)
	Y2000*Frac(I)*Immigrant	-1.0306*** (0.2130)

*Source: U.S. Census PUMS. Note: Panels 1-5 regressions estimated from 2,402,986 observations. Standard errors are in parentheses. All include fixed effects for education, age, age*education, year*MSA, year*cohort.*

Table 3-6: MSAs in the Common Support of Fraction Immigrant

1970-2000	*1970 Common Support*	*1980 Common Support*
Akron, OH	Bakersfield, CA	Albuquerque, NM
Albany-Schenectady, NY	Bergen-Passaic, NJ	Allentown-Bethlehem, PA/NJ
Baltimore, MD	Binghamton, NY	Atlanta, GA
Brockton, MA	Boston, MA	Austin, TX
Buffalo-Niagara Falls, NY	Chicago-Gary-Lake, IL	Bakersfield, CA
Cleveland, OH	Denver-Boulder-Longmont, CO	Baton Rouge, LA
Corpus Christi, TX	Flint, MI	Beaumont-Port Arthur,TX
Detroit, MI	Fort Lauderdale-Hollywood, FL	Boston, MA
Gary-Hammond, IN	Fresno, CA	Dallas-Fort Worth, TX
Madison, WI	Hartford-Bristol-Middleton, CT	Denver-Boulder-Longmont, CO
Milwaukee, WI	Honolulu, HI	Des Moines, IA
New Haven-Meriden, CT	Houston-Brazoria, TX	Fort Lauderdale-Hollywood, FL
New Orleans, LA	Las Vegas, NV	Hartford-Bristol-Middleton, CT
Philadelphia, PA/NJ	Nassau Co, NY	Houston-Brazoria, TX
Rochester, NY	Newark, NJ	Las Vegas, NV
Rockford, IL	Omaha, NE/IA	Minneapolis-St. Paul, MN
Salt Lake City-Ogden, UT	Orlando, FL	Nassau Co, NY
Spokane, WA	Phoenix, AZ	Norfolk-VA Beach, VA
Springfield-Holyoke, MA	Portland-Vancouver, OR	Omaha, NE/IA
Syracuse, NY	Providence-Fall River, MA/RI	Orlando, FL
Tacoma, WA	Riverside-San Bernadino, CA	Phoenix, AZ
Tampa-St. Petersburg, FL	Sacramento, CA	Portland-Vancouver, OR
Wilmington, DE/NJ/MD	Salinas-Sea Side-Monterey, CA	Providence-Fall River, MA/RI
	San Antonio, TX	Reading, PA
	San Diego, CA	Riverside-San Bernadino, CA
	San Francisco-Oakland, CA	Sacramento, CA
	San Jose, CA	San Antonio, TX
	Santa Barbara-Santa Maria, CA	Santa Barbara-Santa Maria, CA
	Seattle-Everett, WA	Seattle-Everett, WA
	South Bend-Mishawaka, IN	Stockton, CA
	Stockton, CA	Trenton, NJ
	Trenton, NJ	Tucson, AZ
	Tucson, AZ	Washington, DC/MD/VA
	Utica-Rome, NY	W.Palm Beach-Boca Raton, FL
	Ventura-Oxnard, CA	Wichita, KS
	Washington, DC/MD/VA	Worcester, MA
	W.Palm Beach-Boca Raton, FL	Youngstown-Warren, OH-PA
	Worcester, MA	

Source: U.S. Census PUMS

Continued on next page

Table 3-6 continued

1990 Common Support	*2000 Common Support*
Albuquerque, NM	Albuquerque, NM
Allentown-Bethlehem-Easton, PA/NJ	Allentown-Bethlehem-Easton, PA/NJ
Atlanta, GA	Appleton-Oskosh-Neenah, WI
Augusta-Aiken, GA-SC	Augusta-Aiken, GA-SC
Austin, TX	Baton Rouge, LA
Beaumont-Port Arthur-Orange,TX	Beaumont-Port Arthur-Orange,TX
Binghamton, NY	Binghamton, NY
Charlotte-Gastonia-Rock Hill, SC	Birmingham, AL
Chattanooga, TN/GA	Charleston-N.Charleston,SC
Denver-Boulder-Longmont, CO	Charlotte-Gastonia-Rock Hill, SC
Des Moines, IA	Chattanooga, TN/GA
Fort Wayne, IN	Cincinnati OH/KY/IN
Grand Rapids, MI	Columbia, SC
Greenville-Spartanburg-Anderson SC	Columbus, OH
Hartford-Bristol-Middleton, CT	Davenport, IA Rock Island-Moline, IL
Jacksonville, FL	Dayton-Springfield, OH
Lancaster, PA	Des Moines, IA
Las Vegas, NV	Erie, PA
Minneapolis-St. Paul, MN	Flint, MI
Norfolk-VA Beach, VA	Fort Wayne, IN
Oklahoma City, OK	Grand Rapids, MI
Orlando, FL	Greensboro-Winston Salem, NC
Phoenix, AZ	Greenville-Spartanburg-Anderson SC
Portland-Vancouver, OR	Harrisburg-Lebanon-Carlisle, PA
Providence-Fall River, MA/RI	Indianapolis, IN
San Antonio, TX	Jacksonville, FL
Seattle-Everett, WA	Kansas City, MO-KS
South Bend-Mishawaka, IN	Knoxville, TN
Toledo, OH/MI	Lancaster, PA
Trenton, NJ	Little Rock-North Little Rock, AR
Tucson, AZ	Louisville, KY/IN
Tulsa, OK	Memphis, TN/AR/MS
Wichita, KS	Minneapolis-St. Paul, MN
Worcester, MA	Mobile, AL
	Nashville, TN
	Norfolk-VA Beach, VA
	Oklahoma City, OK
	Omaha, NE/IA
	Peoria, IL
	Pittsburgh-Beaver Valley, PA
	Reading, PA
	Richmond-Petersburg, VA
	Shreveport, LA
	South Bend, IN
	St. Louis, MO-IL
	Toledo, OH/MI
	Tulsa, OK
	Utica-Rome, NY
	Wichita, KS
	York, PA

Table 3-7: Immigrants in More or Less Concentrated MSAs

	1970	*1980*	*1990*	*2000*
80-20 differential of mean fraction of Immigrants…				
From Latin America	1.85	4.92	3.75	1.20
High School Dropout	1.51	1.77	2.65	1.05
High School Graduate	1.09	0.84	1.10	1.20
Some College	0.70	1.33	1.38	0.91
College Graduate	0.60	0.62	0.51	0.92
Fluent in English	-	0.91	0.81	0.88
In Construction Industry	1.30	1.58	2.44	1.10
In Manufacturing Industry	1.07	0.66	0.86	1.02
In Personal Service Industry	1.55	2.41	1.67	1.25
In Professional or Technical Occupation	0.56	0.66	0.61	0.88
In Craftsmen Occupation	1.29	1.40	1.63	1.25
In Service Occupation	1.49	1.22	1.33	1.54
In Laborer Occupation	0.97	1.32	1.85	0.83
90-10 differential				
From Latin America	2.94	3.70	6.92	1.65
High School Dropout	2.13	2.27	3.83	5.27
High School Graduate	1.20	0.83	1.36	0.57
Some College	0.58	0.85	0.71	1.12
College Graduate	0.49	0.63	0.54	0.82
Fluent in English	-	0.81	0.77	0.94
In Construction Industry	2.03	1.49	2.20	1.99
In Manufacturing Industry	1.00	1.23	0.85	0.89
In Personal Service Industry	2.22	1.50	1.21	-
In Professional or Technical Occupation	0.44	0.66	0.57	0.83
In Craftsmen Occupation	1.33	1.20	1.19	1.02
In Service Occupation	1.71	1.73	2.78	1.05
In Laborer Occupation	1.68	1.81	2.06	10.02

Source: U.S. Census PUMS

Table 3-8: Immigrant Concentration Effects, Including Employment Measures

Including Zero Earners, Self-Employed and Unemployed		
	Concentration Measure	**Estimate (SE)**
(1) Dependent Variable: Log Weekly Wage	Frac(I)*Immigrant	-0.183*** (0.070)
(2) Dependent Variable: 1=employed, 0=unemployed	Frac(I)*Immigrant	0.027*** (0.003)
(3) Dependent Variable: 1=positive earnings last year, 0=0 earnings last year	Frac(I)*Immigrant	0.0015 (0.0004)

Source: U.S. Census PUMS
*Note: All regressions are estimated from 2,769,235 observations, using the linear probability model. Standard errors are in parentheses. All include fixed effects for education, age, age*education, year*MSA, year*cohort.*

Table 3-9: Wage Growth Decomposition

Panel 1 - Decompositions from Model (2)

	1970-1980*			1980-1990			1990-2000		
Time in U.S.*	**X-Sect (1980)**	**Within (1970-80)**	**Across (1970-80)**	**X-Sect (1990)**	**Within (1980-90)**	**Across (1980-90)**	**X-Sect (2000)**	**Within (1990-00)**	**Across (1990-00)**
	0.152	0.113	0.039	0.144	0.093	0.051	0.016	0.115	-0.099
< 5 yrs	(0.009)	(0.010)	(0.010)	(0.007)	(0.008)	(0.007)	(0.005)	(0.006)	(0.006)
	0.149	0.053	0.097	0.135	0.061	0.074	0.054	0.093	-0.04
5-10 yrs	(0.010)	(0.012)	(0.010)	(0.008)	(0.009)	(0.008)	(0.007)	(0.007)	(0.006)
				0.147	0.088	0.059	0.082	0.052	0.03
10-15 yrs	0.074	0.029	0.045	(0.009)	(0.010)	(0.009)	(0.006)	(0.007)	(0.007)
	(0.008)	(0.010)	(0.009)	0.156	0.067	0.089	0.09	0.049	0.041
15-20 yrs				(0.011)	(0.012)	(0.010)	(0.009)	(0.010)	(0.008)

Panel 2 - Decompositions from Model (3)

	1970-1980*			1980-1990			1990-2000		
Time in U.S.*	**X-Sect (1980)**	**Within (1970-80)**	**Across (1970-80)**	**X-Sect (1990)**	**Within (1980-90)**	**Across (1980-90)**	**X-Sect (2000)**	**Within (1990-00)**	**Across (1990-00)**
	0.155	0.13	0.025	0.142	0.113	0.029	0.023	0.122	-0.099
< 5 yrs	(0.009)	(0.010)	(0.009)	(0.007)	(0.008)	(0.007)	(0.005)	(0.006)	(0.006)
	0.148	0.066	0.081	0.134	0.079	0.055	0.057	0.101	-0.044
5-10 yrs	(0.010)	(0.012)	(0.011)	(0.008)	(0.009)	(0.008)	(0.007)	(0.007)	(0.007)
				0.145	0.103	0.042	0.081	0.061	0.02
10-15 yrs	0.065	0.04	0.026	(0.009)	(0.010)	(0.009)	(0.006)	(0.007)	(0.007)
	(0.009)	(0.010)	(0.009)	0.152	0.083	0.069	0.09	0.057	0.033
15-20 yrs				(0.011)	(0.012)	(0.010)	(0.010)	(0.010)	(0.008)

**in 1970, immigrants arriving 10-20 years earlier (1950-1959) cannot be broken down any further. So wage growth for this cohort is calculated as the difference between the 1950-1950 cohort and the average of the 1960-64 and 1965-69 cohorts, following Borjas (1985).*

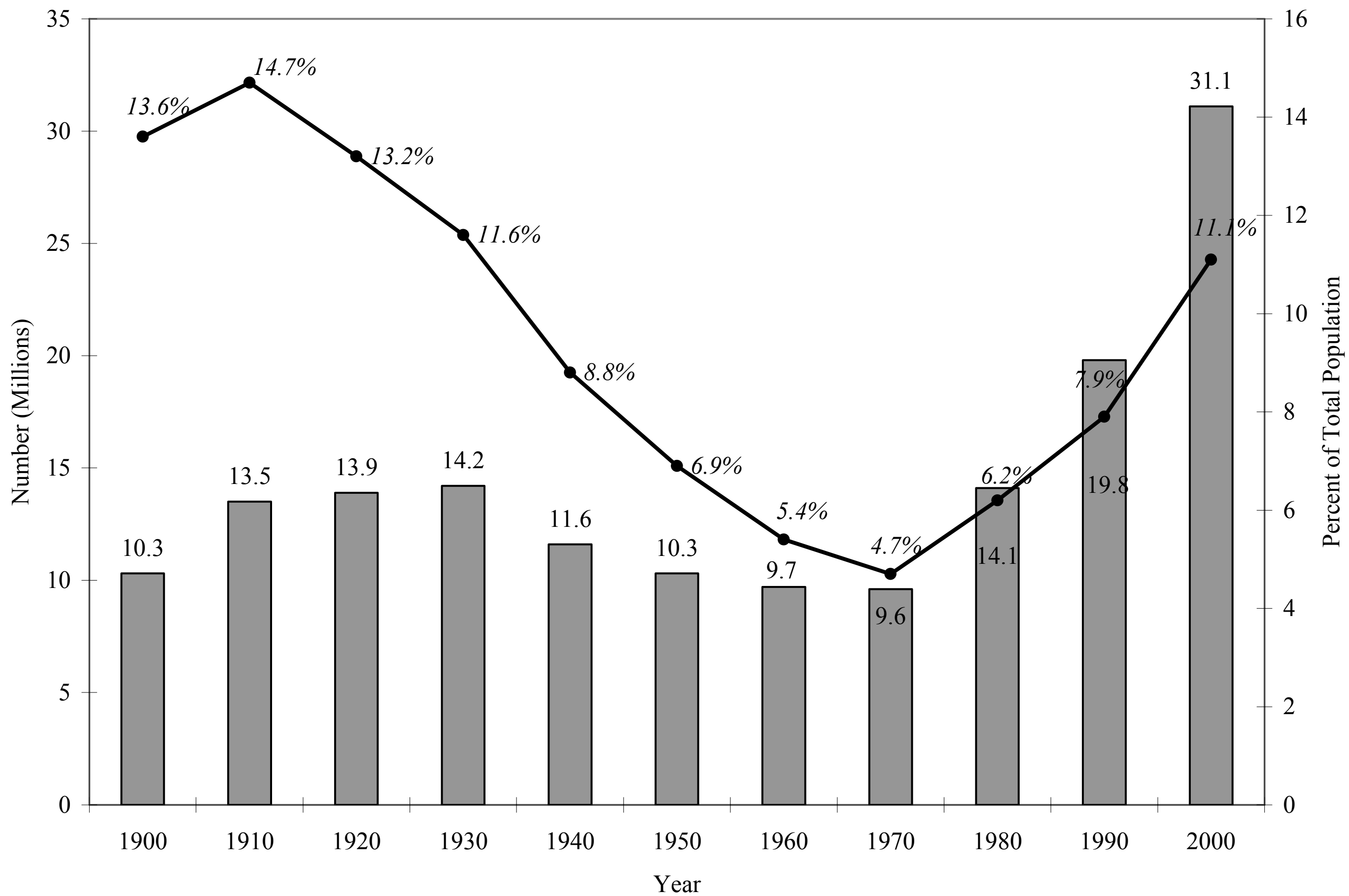
***Time in U.S. rather than cohort c is listed for parsimony. In 1980, "<5 yrs" corresponds to cohort 1975-79 whereas in 1990 "< 5 yrs" corresponds to the cohort 1985-1989 and in 2000 "<5 yrs" corresponds to the cohort 1995-1999*

Source: U.S. Census PUMS

Note: standard errors given in parentheses

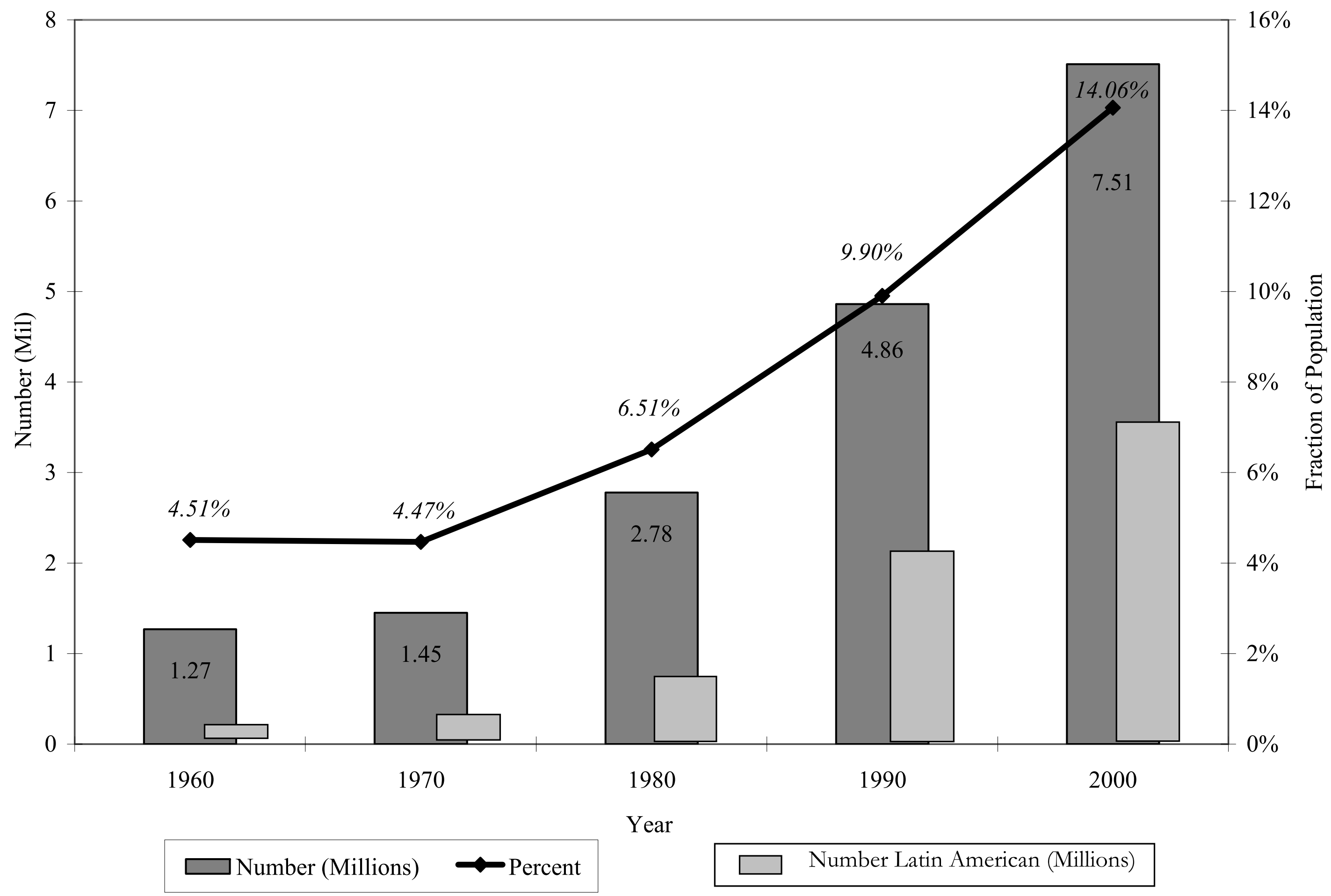
Figures

Figure 1-1: Immigrant Population in the U.S. 1900-2000



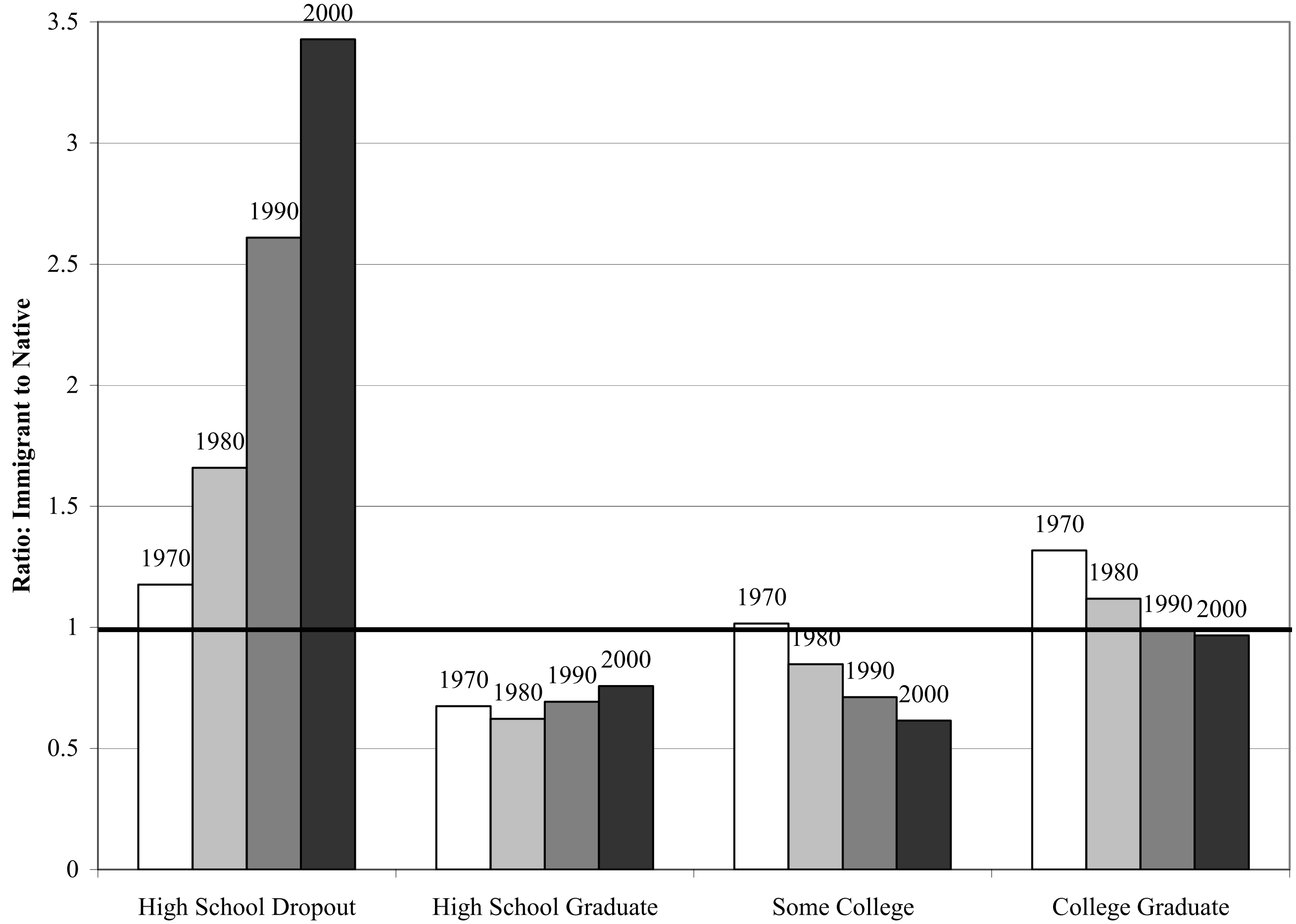
Source: Singer (2004)

Figure 1-2: Male Immigrant Population in the U.S. 1960-2000



Source: U.S. Census PUMS. Note: Sample is composted of men, Age 18-55, in the Labor Force, Not Self-Employed or in the Military

Figure 1-3: Education of Immigrants Relative to Native-Born, U.S.



Source: U.S. Census PUMS

Figures 1-4 to 1-6: Growth and Dispersion of Immigrants over 1970-2000, by MSA

Figure 1-4: 1970 v. 1980

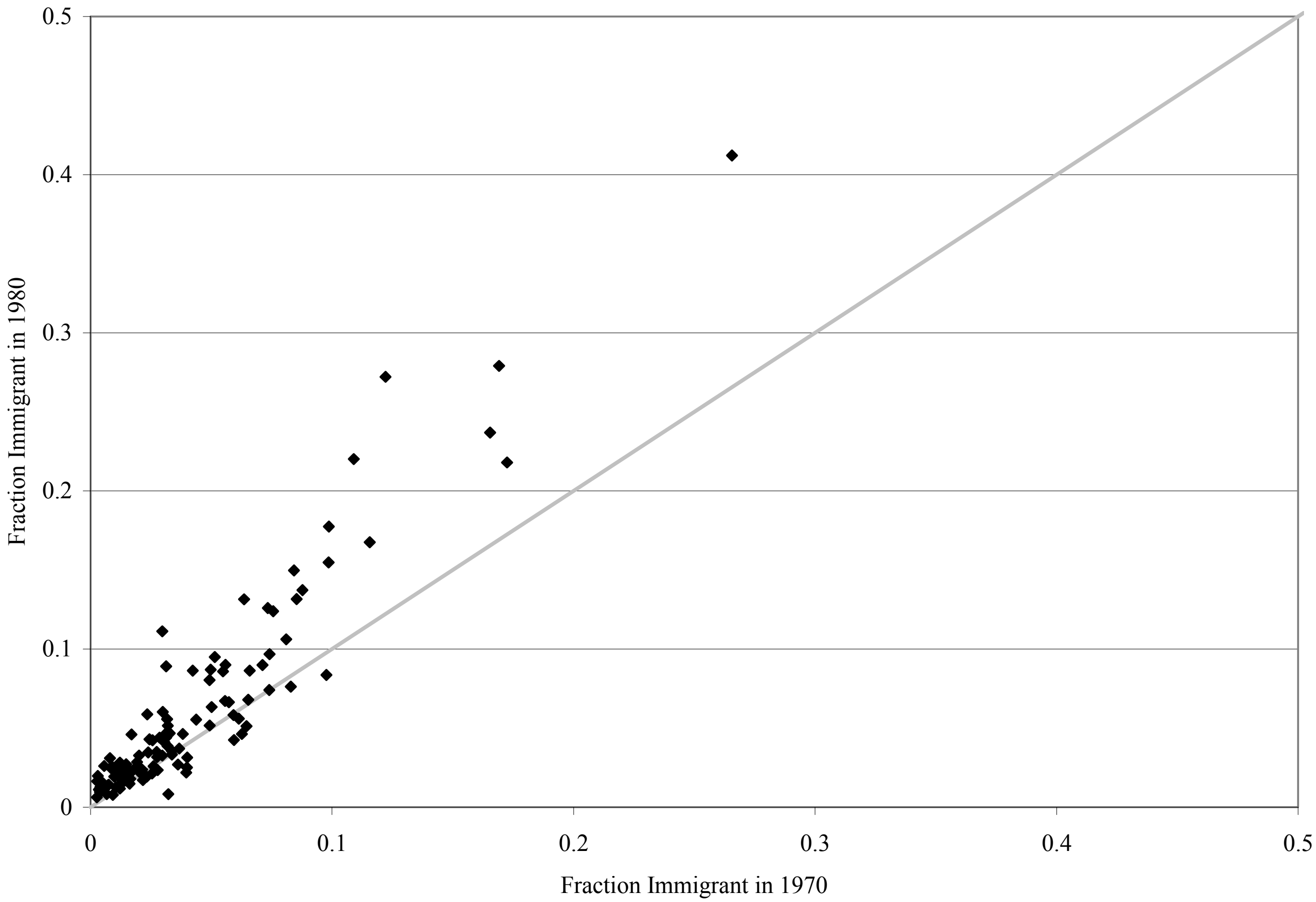


Figure 1-5: 1970 v. 1990

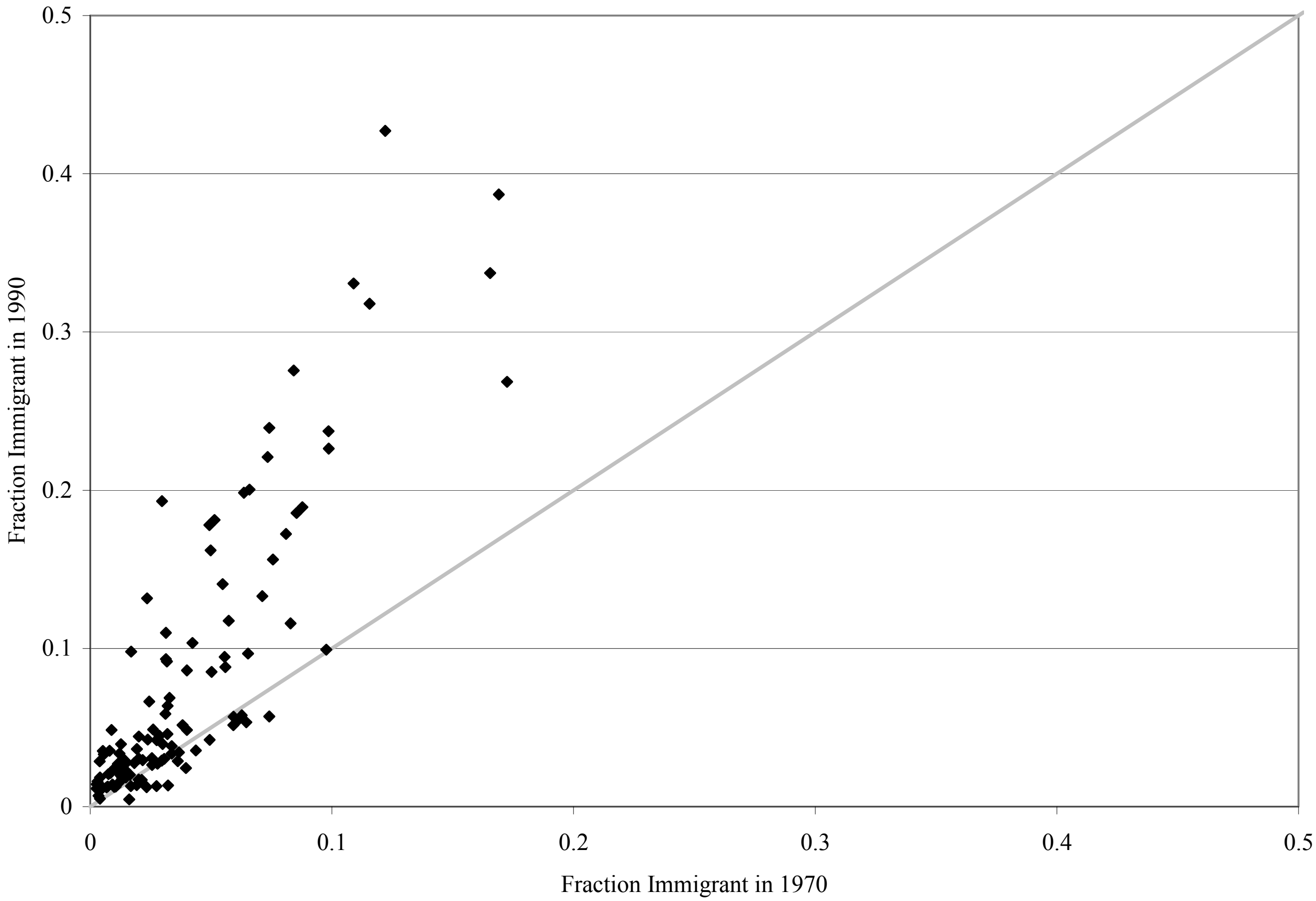
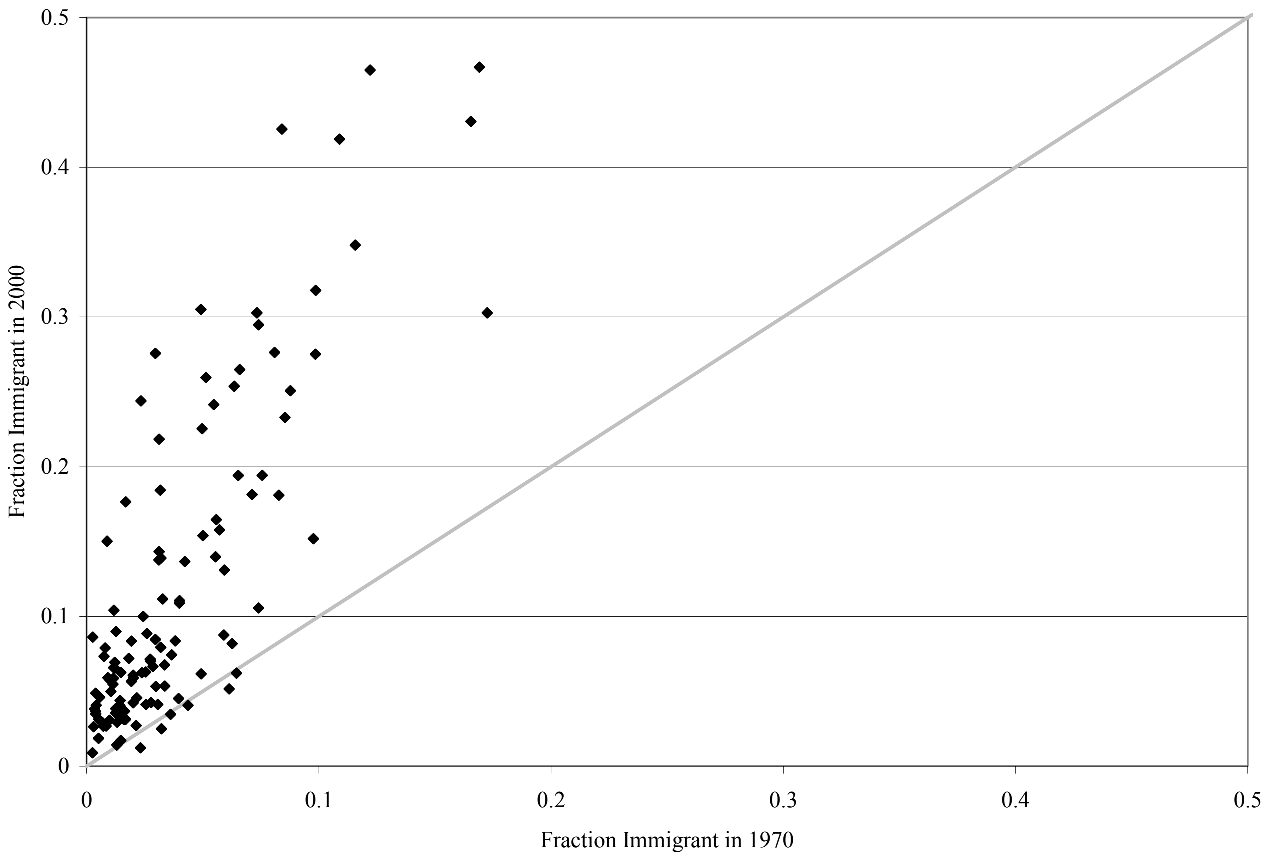
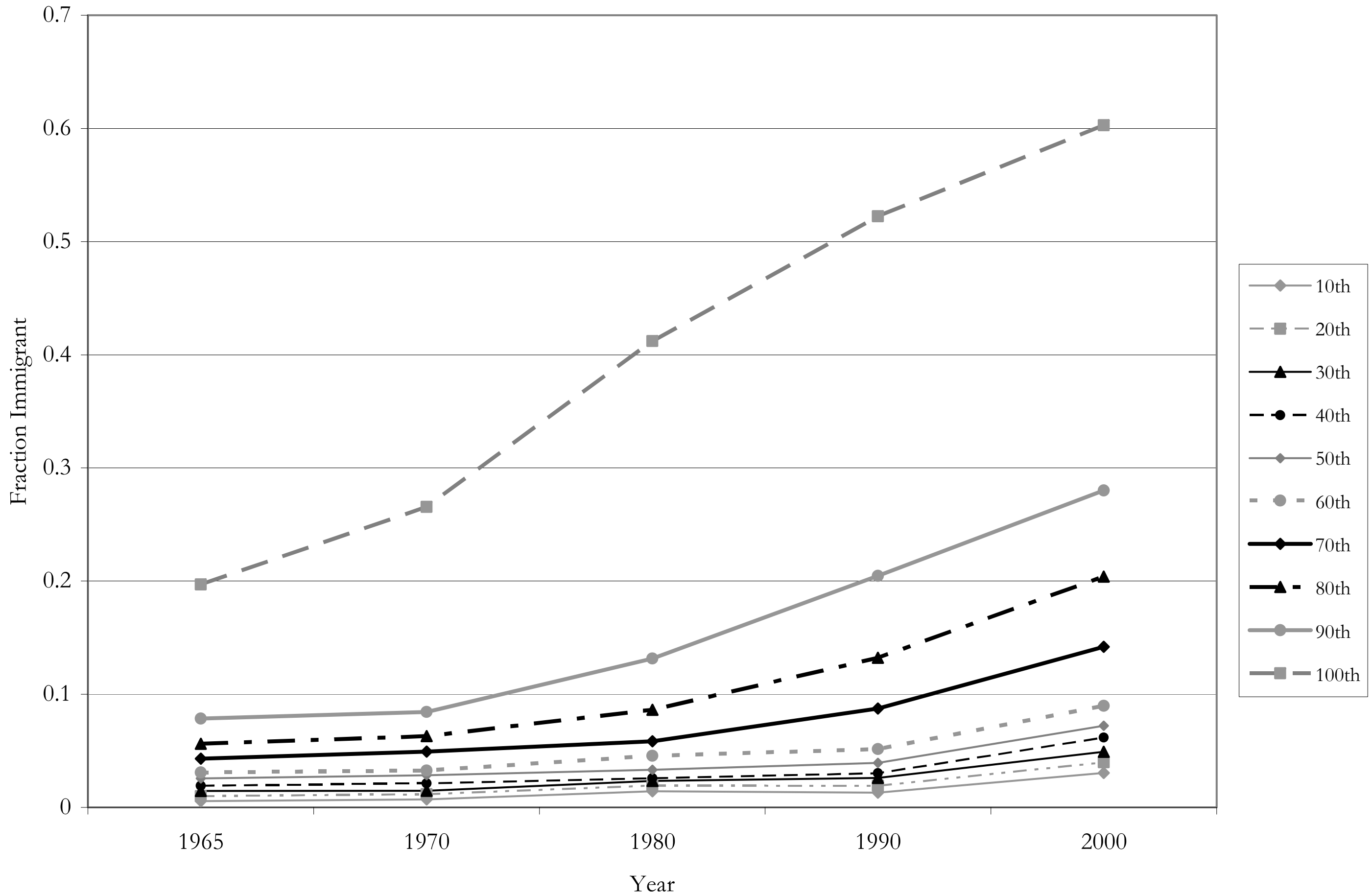


Figure 1-6: 1970 v. 2000



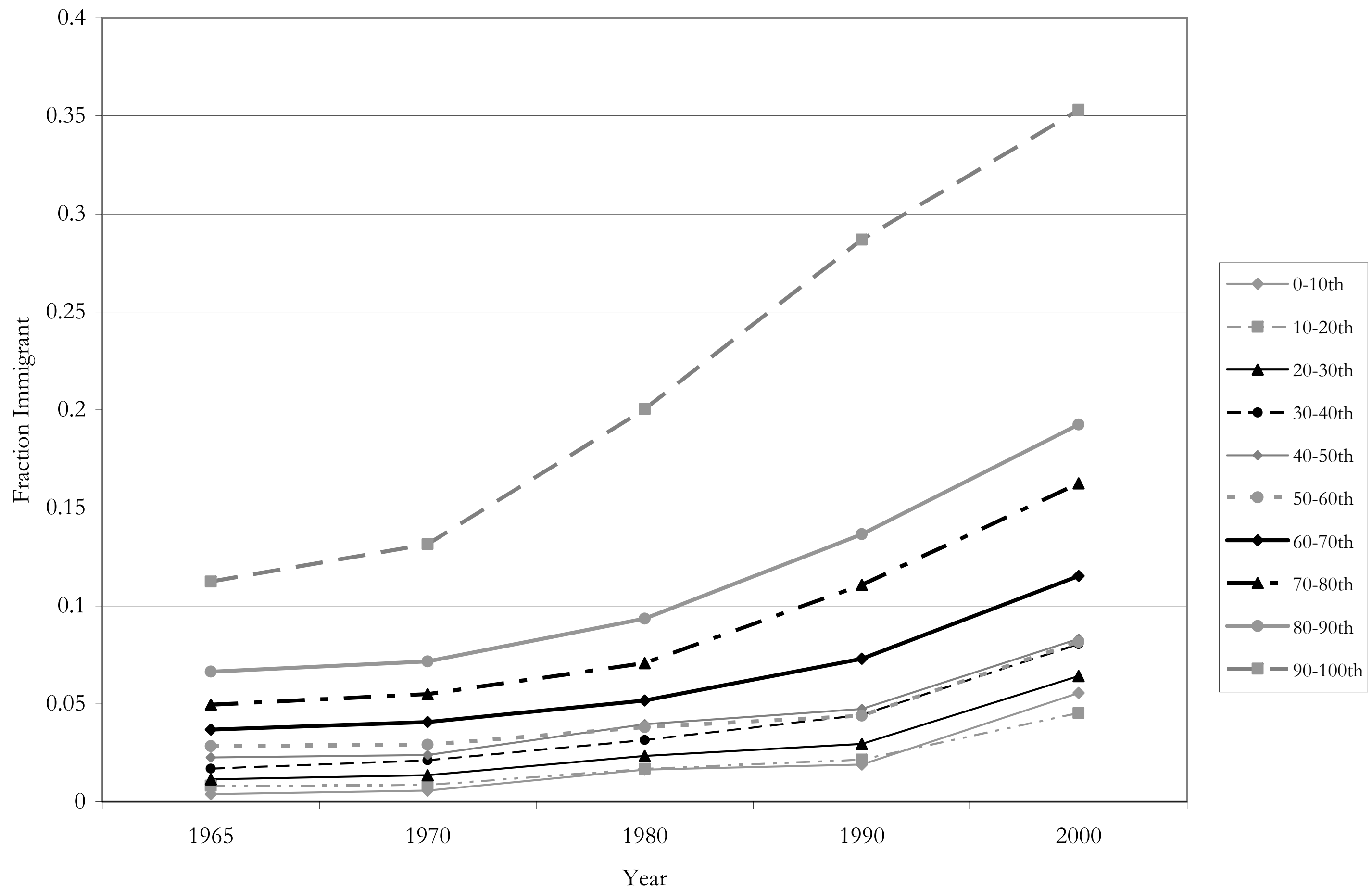
Source: U.S. Census PUMS. Note: each observation plotted above represents one of the 119 major MSAs used in this study. The fraction immigrant in each MSA-year is calculated as the number of immigrants over the number of immigrants plus natives (all weighted). The line in the above plots is a 45-degree line for reference.

Figure 1-7: Fraction Immigrant by Metropolitan Statistical Area, by Decile



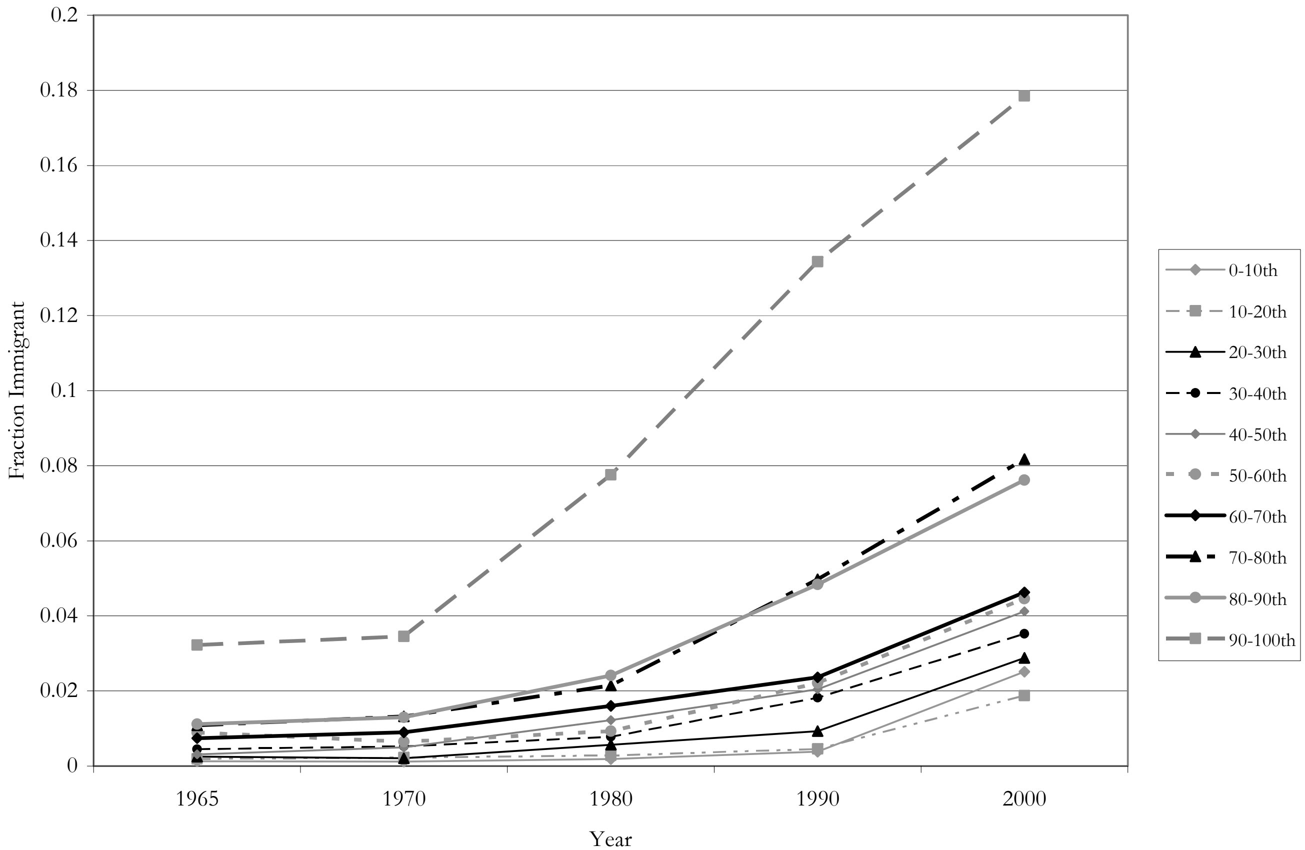
Source: U.S. Census PUMS. Note: 1965 statistics are from 1970 forecasting the population backward using "state of residence 5 years ago". Each point represents the xth percentile of the distribution of fraction immigrant in given year.

Figure 1-8: Fraction Immigrant by Metropolitan Statistical Area, by 1965 Deciles



Source: U.S. Census PUMS. Note: 1965 statistics are from 1970 Census forecasting the population backward using "state of residence 5 years ago". Each point represents the average fraction immigrant for MSAs that fall in the x-yth percentiles of the distribution of fraction immigrant in 1965.

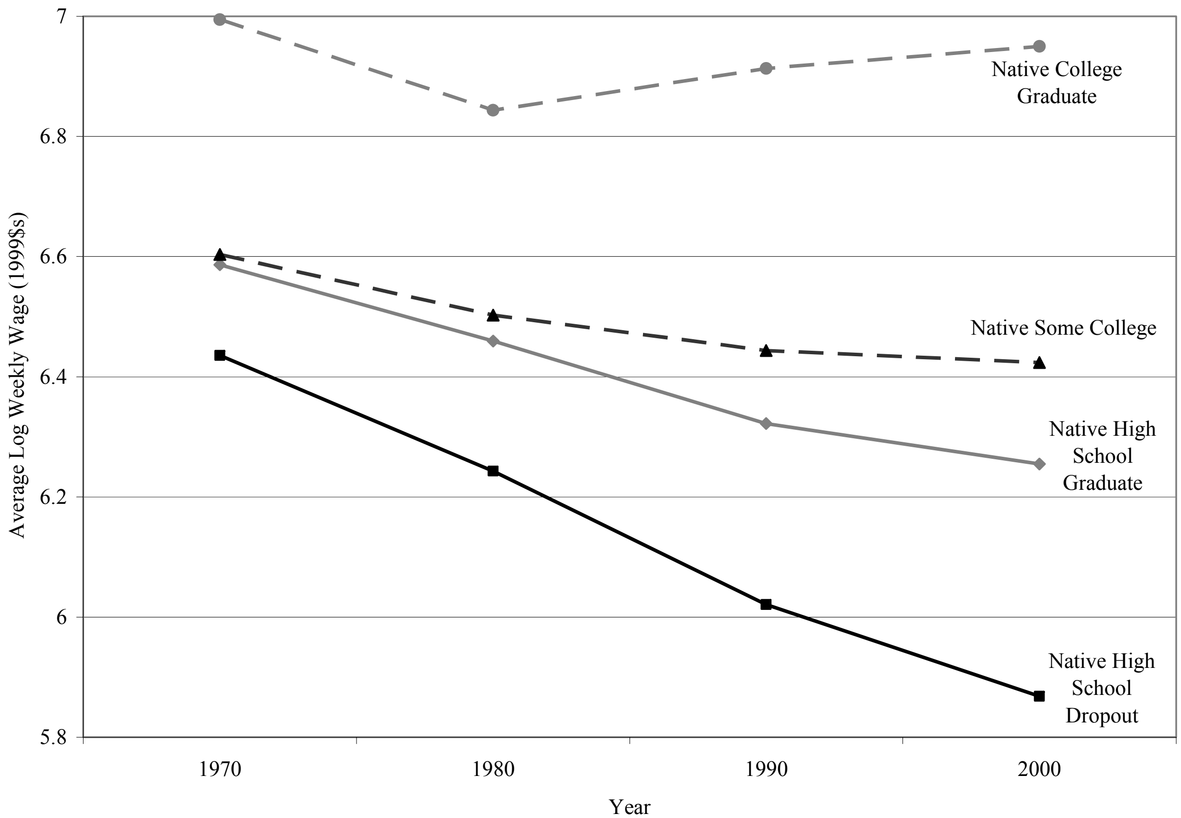
Figure 1-9: Fraction Latin American Immigrant by Metropolitan Statistical Area, by 1965 Deciles



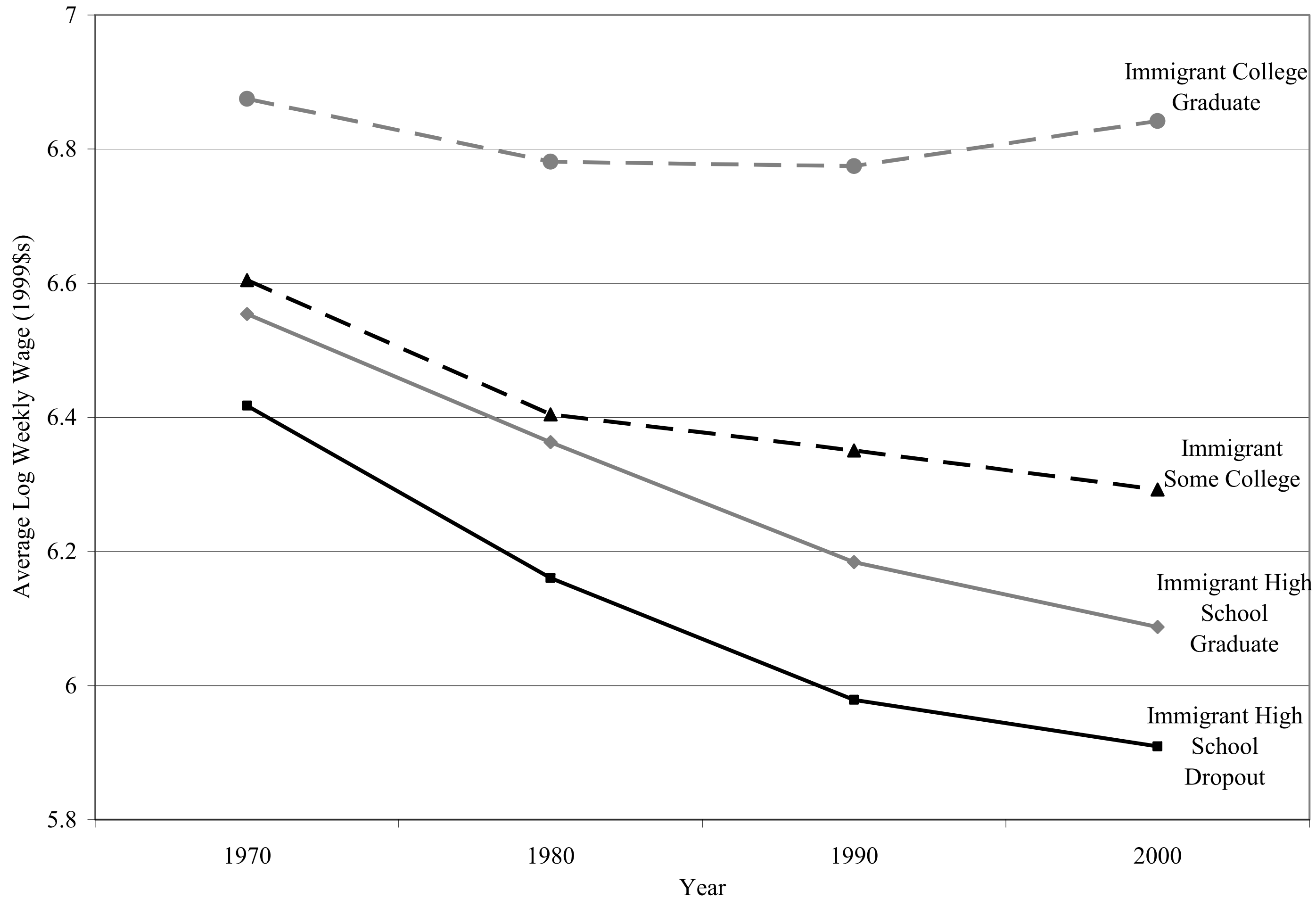
Source: U.S. Census PUMS. Note: 1965 statistics are calculated from the 1970 Census using the "state of residence 5 years ago" variable. Each point represents the average fraction immigrant from Latin America for MSAs that fall in the x-yth percentiles of the distribution of fraction immigrant in 1965. Latin American immigrants are defined as those born in Central or South America.

Figures 1-10 and 1-11: Wages of Native-born and Immigrants, by Education

Figures 1-10: Wages of Native-born, by Education

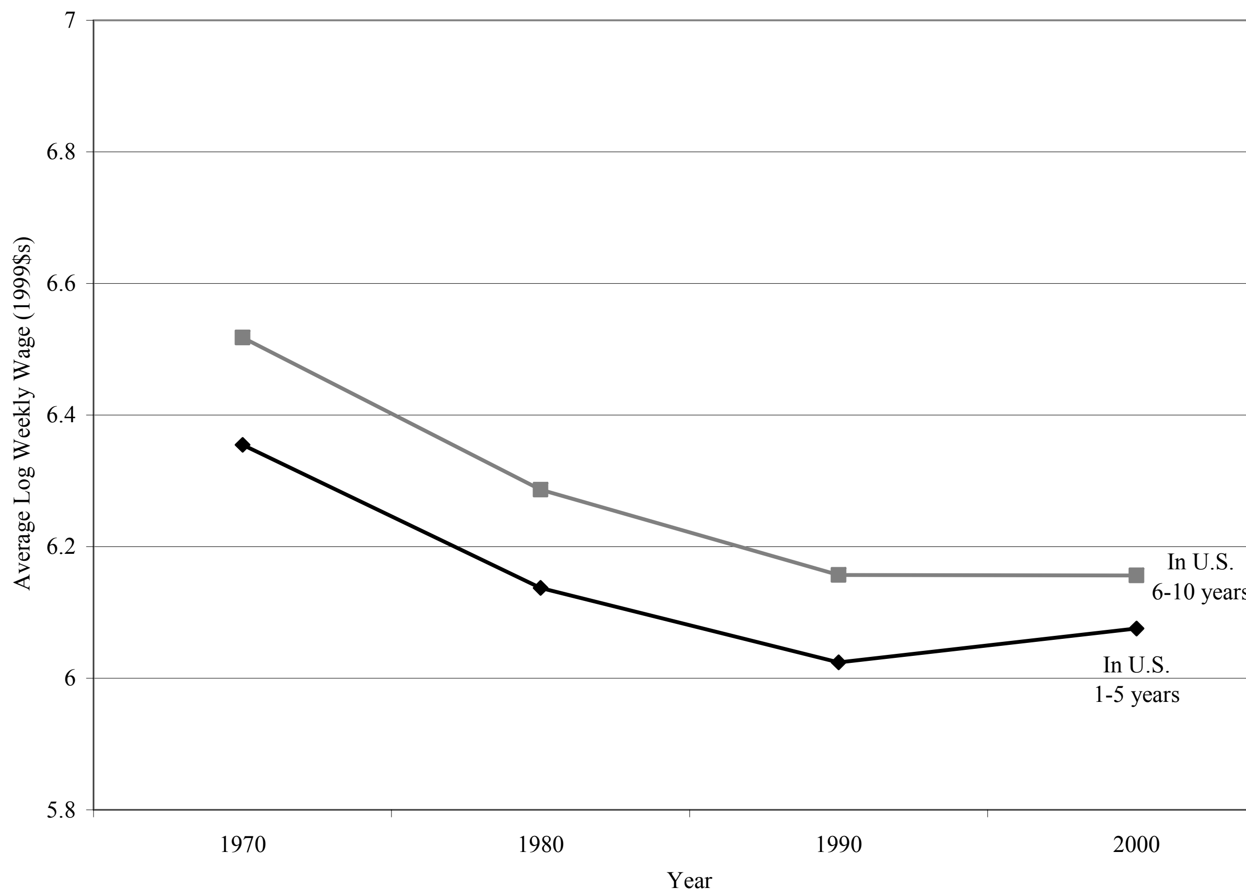


Figures 1-11: Wages of Immigrants, by Education



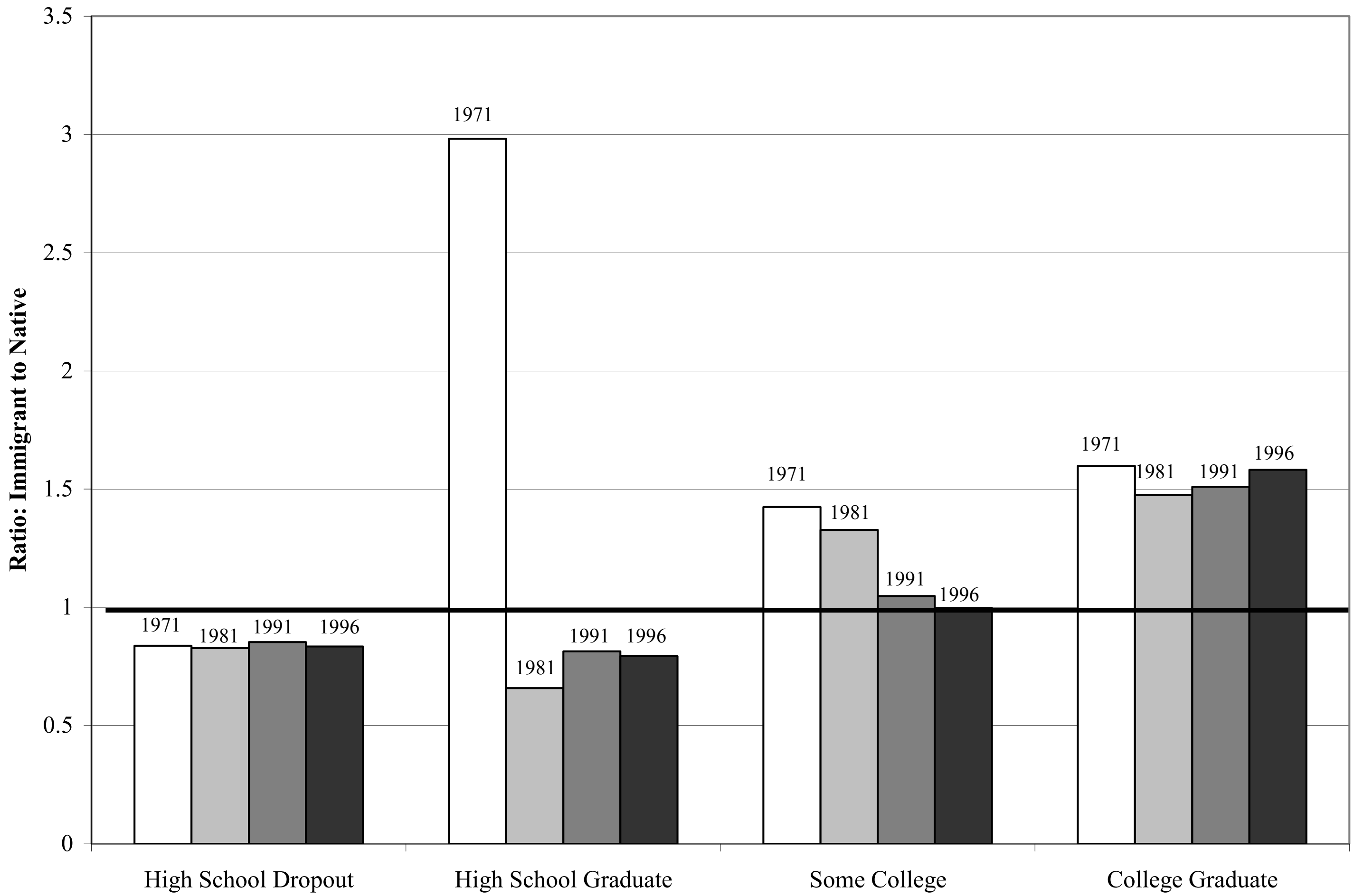
Source: U.S. Census PUMS

Figures 1-12: Wages of New Immigrants, by Time in the U.S.



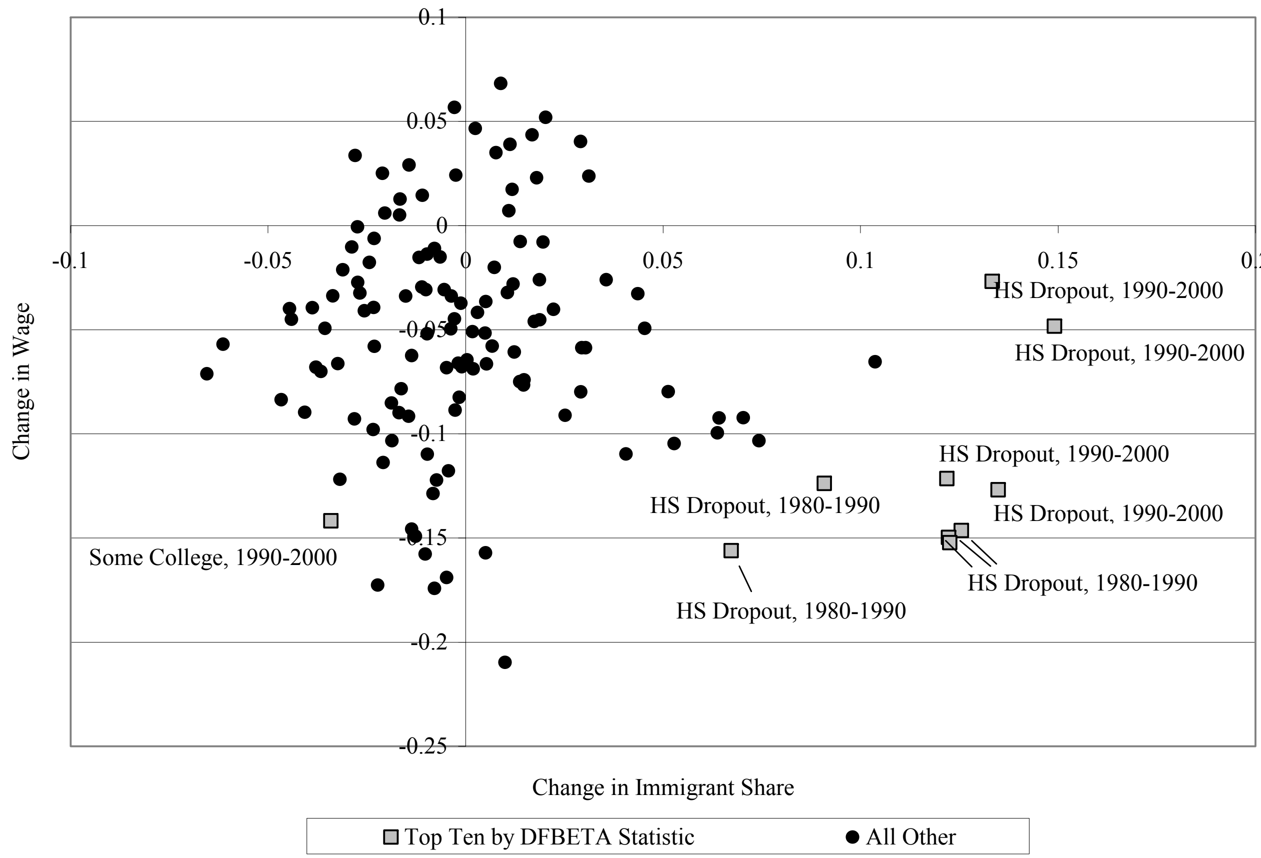
Source: U.S. Census PUMS

Figure 2-1: Education of Immigrants Relative to Native-Born, Canada



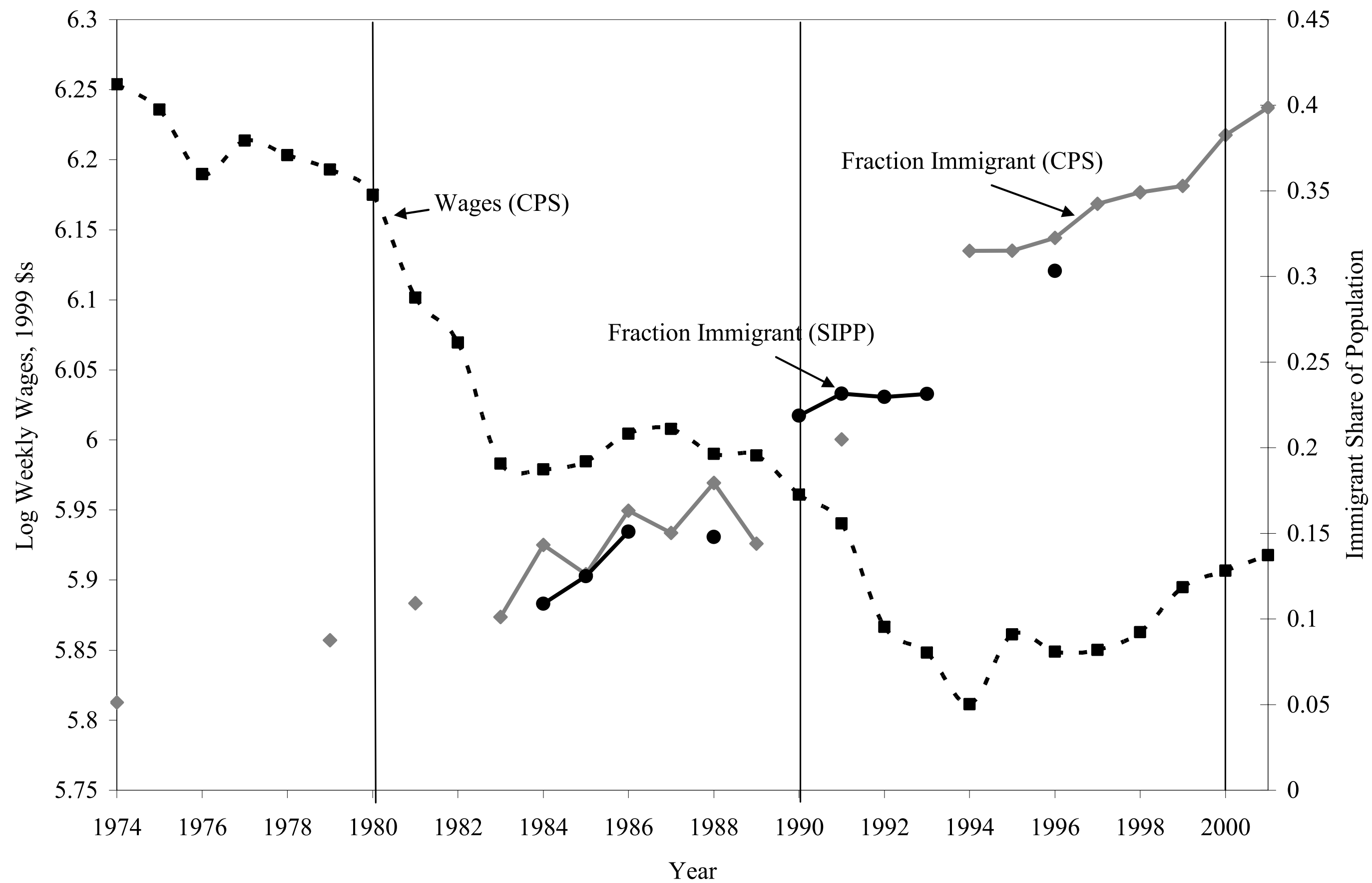
Source: Canadian Census PUMF

Figure 2-2: Change in Wages of Native-born vs. Change in Immigrant Share Highlighting Top 10 Influential Observations



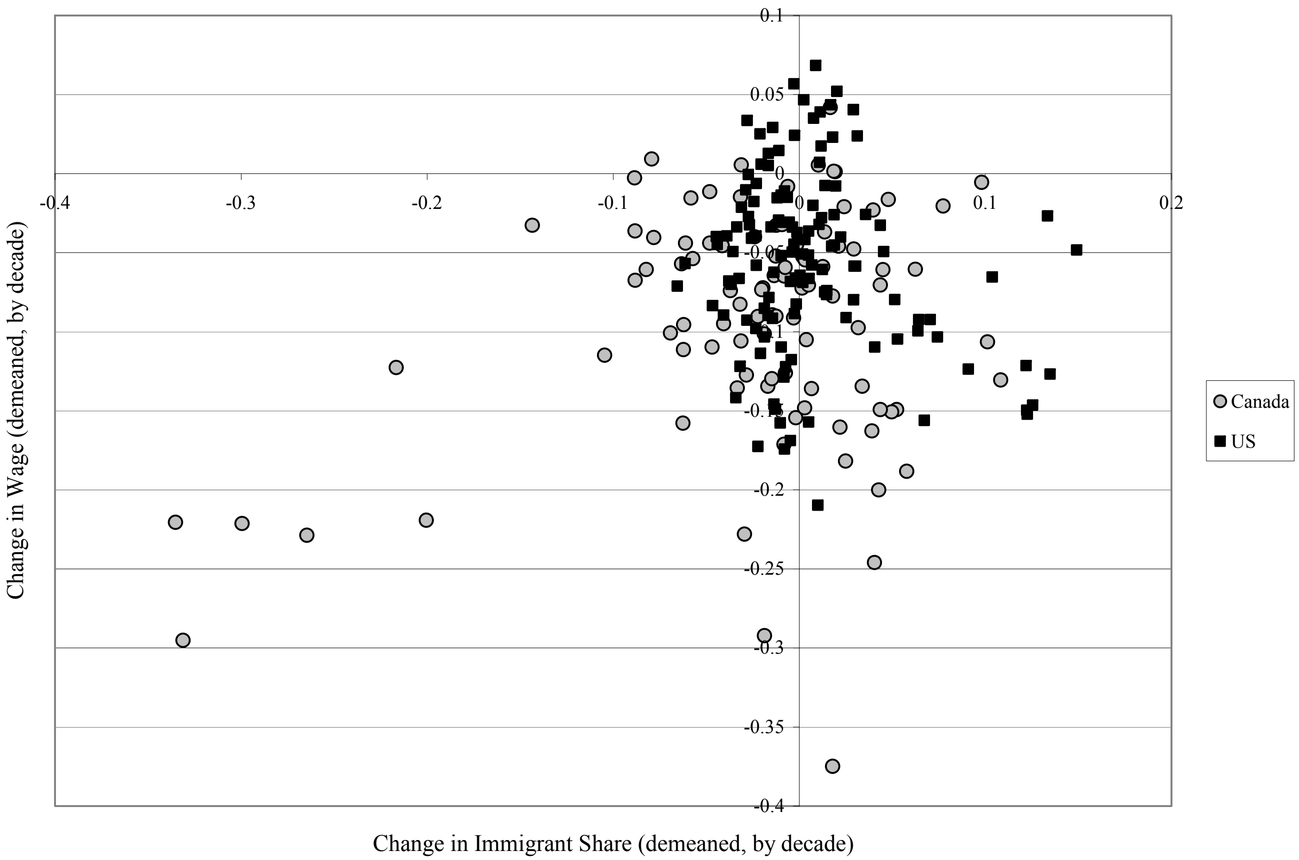
Source: U.S. Census PUMS

Figure 2-3: Trends in Wages and Immigration, for High School Dropouts in the U.S.



Source: 2000 U. S. Census PUMS, 1986-2001 CPS (June and March Supplements), and 1984-1996 SIPP. Note: Wage series includes immigrants and native-born high school dropouts.

Figure 2-4: Change in Wage vs. Change in Immigrant Share, U.S. and Canada



Source: U.S. Census PUMS

Appendices

Appendix A: MSAs Used in Analysis, Average Wage and Fraction Immigrant, 1970-2000

MSA	Average Log Weekly Wage of Native Workers (1999 dollars)				Fraction of Workers that are Immigrant			
	1970	1980	1990	2000	1970	1980	1990	2000
Akron, OH	6.66	6.57	6.43	6.44	0.036	0.027	0.029	0.035
Albany-Schenectady-Troy, NY	6.63	6.47	6.51	6.46	0.034	0.033	0.038	0.054
Albuquerque, NM	6.48	6.36	6.31	6.31	0.024	0.043	0.066	0.100
Allentown-Bethlehem-Easton, PA/NJ	6.60	6.57	6.52	6.47	0.024	0.035	0.042	0.062
Appleton-Oskosh-Neenah, WI	6.58	6.51	6.47	6.44	0.017	0.022	0.013	0.031
Atlanta, GA	6.55	6.48	6.52	6.58	0.009	0.026	0.048	0.150
Augusta-Aiken, GA-SC	6.45	6.26	6.46	6.34	0.005	0.014	0.035	0.032
Austin, TX	6.26	6.34	6.32	6.49	0.017	0.046	0.098	0.177
Bakersfield, CA	6.51	6.48	6.48	6.38	0.051	0.095	0.181	0.260
Baltimore, MD	6.55	6.49	6.54	6.54	0.028	0.032	0.042	0.070
Baton Rouge, LA	6.52	6.55	6.40	6.36	0.020	0.025	0.017	0.042
Beaumont-Port Arthur-Orange,TX	6.49	6.70	6.46	6.36	0.012	0.028	0.034	0.066
Bergen-Passaic, NJ	6.77	6.49	6.75	6.77	0.099	0.077	0.226	0.318
Binghamton, NY	6.57	6.42	6.45	6.28	0.028	0.024	0.027	0.042
Birmingham, AL	6.43	6.42	6.41	6.45	0.003	0.011	0.007	0.038
Boston, MA	6.64	6.50	6.66	6.72	0.071	0.090	0.133	0.182
Brockton, MA	6.64	6.42	6.58	6.58	0.040	0.031	0.086	0.111
Buffalo-Niagara Falls, NY	6.63	6.47	6.39	6.38	0.044	0.055	0.036	0.041
Canton, OH	6.64	6.58	6.38	6.38	0.013	0.017	0.020	0.014
Charleston-N.Charleston,SC	6.35	6.30	6.31	6.31	0.010	0.024	0.024	0.058
Charlotte-Gastonia-Rock Hill, SC	6.45	6.35	6.39	6.52	0.012	0.021	0.026	0.104
Chattanooga, TN/GA	6.43	6.44	6.33	6.35	0.004	0.009	0.029	0.037
Chicago-Gary-Lake, IL	6.71	6.64	6.57	6.64	0.085	0.032	0.186	0.233
Cincinnati OH/KY/IN	6.58	6.54	6.45	6.49	0.013	0.024	0.020	0.038
Cleveland, OH	6.68	6.58	6.49	6.47	0.061	0.056	0.055	0.052
Columbia, SC	6.37	6.30	6.37	6.37	0.004	0.017	0.018	0.049
Columbus, OH	6.57	6.46	6.41	6.46	0.012	0.019	0.022	0.066
Corpus Christi, TX	6.37	6.38	6.24	6.34	0.030	0.060	0.040	0.053
Dallas-Fort Worth, TX	6.52	6.51	6.50	6.61	0.023	0.059	0.132	0.244
Davenport, IA Rock Island-Moline, IL	6.62	6.67	6.43	6.33	0.019	0.024	0.014	0.057
Dayton-Springfield, OH	6.68	6.53	6.46	6.42	0.013	0.016	0.018	0.029
Denver-Boulder-Longmont, CO	6.61	6.57	6.47	6.55	0.031	0.047	0.059	0.138
Des Moines, IA	6.60	6.52	6.36	6.47	0.020	0.033	0.030	0.061
Detroit, MI	6.75	6.70	6.58	6.61	0.059	0.058	0.052	0.088
Duluth-Superior, MN/WI	6.52	6.57	6.33	6.32	0.023	0.019	0.012	0.012
El Paso, TX	6.33	6.27	6.15	6.15	0.172	0.218	0.268	0.303
Erie, PA	6.56	6.47	6.30	6.29	0.016	0.015	0.005	0.031
Flint, MI	6.72	6.69	6.42	6.30	0.032	0.008	0.013	0.025
Fort Lauderdale, FL	6.54	6.46	6.47	6.51	0.049	0.080	0.178	0.305
Fort Wayne, IN	6.62	6.49	6.46	6.42	0.022	0.017	0.029	0.046

Appendix A Continued

MSA	Average Log Weekly Wage of Native Workers (1999 dollars)				Fraction of Workers that are Immigrant			
	1970	1980	1990	2000	1970	1980	1990	2000
Fresno, CA	6.51	6.42	6.38	6.26	0.073	0.126	0.221	0.303
Gary-Hammond-East Chicago, IN	6.70	6.73	6.52	6.49	0.049	0.052	0.042	0.062
Grand Rapids, MI	6.59	6.52	6.51	6.48	0.018	0.024	0.028	0.072
Greensboro-Winston Salem-High Point, NC	6.38	6.34	6.35	6.39	0.003	0.016	0.014	0.086
Greenville-Spartanburg-Anderson SC	6.37	6.33	6.35	6.40	0.011	0.019	0.027	0.055
Harrisburg-Lebanon-Carlisle, PA	6.55	6.44	6.43	6.43	0.012	0.020	0.016	0.036
Hartford-Bristol-Middleton-New Britain, CT	6.66	6.57	6.65	6.60	0.098	0.084	0.099	0.152
Honolulu, HI	6.56	6.44	6.51	6.38	0.076	0.124	0.156	0.194
Houston-Brazoria, TX	6.57	6.65	6.51	6.56	0.030	0.111	0.193	0.276
Indianapolis, IN	6.62	6.54	6.46	6.50	0.011	0.013	0.013	0.050
Jackson, MS	6.33	6.36	6.25	6.34	0.005	0.015	0.012	0.019
Jacksonville, FL	6.43	6.43	6.36	6.39	0.020	0.022	0.044	0.059
Jersey City, NJ	6.54	6.37	6.55	6.52	0.169	0.279	0.387	0.467
Johnstown, PA	6.46	6.52	6.23	6.22	0.003	0.006	0.011	0.009
Kansas City, MO-KS	6.59	6.54	6.45	6.51	0.015	0.022	0.023	0.063
Knoxville, TN	6.45	6.39	6.28	6.31	0.003	0.020	0.016	0.026
Lancaster, PA	6.48	6.47	6.54	6.45	0.014	0.024	0.027	0.041
Las Vegas, NV	6.68	6.49	6.44	6.46	0.031	0.089	0.110	0.219
Little Rock-North Little Rock, AR	6.37	6.38	6.25	6.33	0.004	0.013	0.005	0.035
Los Angeles-Long Beach, CA	6.66	6.54	6.61	6.50	0.122	0.272	0.427	0.465
Louisville, KY/IN	6.54	6.47	6.34	6.38	0.004	0.011	0.011	0.041
Madison, WI	6.53	6.44	6.27	6.43	0.037	0.037	0.034	0.074
Memphis, TN/AR/MS	6.40	6.39	6.35	6.40	0.009	0.008	0.014	0.059
Miami-Hialeah, FL	6.51	6.43	6.40	6.34	0.266	0.412	0.522	0.603
Milwaukee, WI	6.67	6.58	6.46	6.51	0.034	0.036	0.034	0.068
Minneapolis-St. Paul, MN	6.67	6.59	6.53	6.60	0.019	0.029	0.036	0.084
Mobile, AL	6.34	6.37	6.33	6.32	0.007	0.008	0.012	0.029
Nashville, TN	6.45	6.41	6.39	6.44	0.008	0.014	0.021	0.073
Nassau Co, NY	6.81	6.64	6.78	6.76	0.083	0.076	0.116	0.181
New Haven-Meriden, CT	6.60	6.47	6.66	6.56	0.074	0.074	0.057	0.106
New Orleans, LA	6.42	6.50	6.33	6.30	0.029	0.044	0.045	0.067
New York-Northeastern NJ	6.56	6.49	6.64	6.63	0.165	0.237	0.337	0.431
Newark, NJ	6.71	6.60	6.72	6.75	0.088	0.137	0.189	0.251
Norfolk-VA Beach-Newport News, VA	6.44	6.40	6.41	6.32	0.006	0.026	0.033	0.046
Oklahoma City, OK	6.48	6.45	6.34	6.29	0.013	0.023	0.039	0.090
Omaha, NE/IA	6.59	6.48	6.36	6.44	0.027	0.035	0.013	0.072
Orlando, FL	6.46	6.32	6.38	6.37	0.031	0.044	0.093	0.143
Peoria, IL	6.66	6.69	6.49	6.44	0.008	0.025	0.021	0.027
Philadelphia, PA/NJ	6.60	6.51	6.56	6.57	0.038	0.046	0.052	0.084
Phoenix, AZ	6.49	6.46	6.43	6.48	0.032	0.056	0.092	0.184
Pittsburgh-Beaver Valley, PA	6.62	6.60	6.43	6.40	0.021	0.024	0.017	0.027
Portland-Vancouver, OR	6.63	6.54	6.45	6.52	0.032	0.052	0.064	0.139
Providence-Fall River-Pawtucket, MA/RI	6.51	6.38	6.50	6.43	0.056	0.090	0.088	0.165

Appendix A Continued

MSA	Average Log Weekly Wage of Native Workers (1999 dollars)				Fraction of Workers that are Immigrant			
	1970	1980	1990	2000	1970	1980	1990	2000
Reading, PA	6.51	6.51	6.53	6.47	0.014	0.026	0.022	0.044
Richmond-Petersburg, VA	6.49	6.46	6.48	6.48	0.012	0.019	0.023	0.059
Riverside-San Bernadino, CA	6.56	6.51	6.56	6.44	0.066	0.086	0.200	0.265
Rochester, NY	6.69	6.55	6.55	6.44	0.065	0.051	0.053	0.062
Rockford, IL	6.64	6.64	6.43	6.50	0.026	0.026	0.049	0.089
Sacramento, CA	6.64	6.49	6.48	6.48	0.057	0.066	0.118	0.158
Salinas-Sea Side-Monterey, CA	6.52	6.49	6.45	6.45	0.109	0.220	0.331	0.419
Salt Lake City-Ogden, UT	6.54	6.47	6.35	6.40	0.040	0.025	0.048	0.109
San Antonio, TX	6.32	6.28	6.26	6.27	0.042	0.086	0.104	0.137
San Diego, CA	6.59	6.46	6.51	6.48	0.064	0.131	0.198	0.254
San Francisco-Oakland-Vallejo, CA	6.71	6.60	6.66	6.80	0.116	0.167	0.318	0.348
San Jose, CA	6.76	6.67	6.70	6.85	0.084	0.150	0.276	0.425
Santa Barbara-Santa Maria-Lompoc, CA	6.60	6.47	6.47	6.40	0.074	0.097	0.239	0.295
Seattle-Everett, WA	6.72	6.65	6.57	6.63	0.050	0.063	0.085	0.154
Shreveport, LA	6.40	6.35	6.30	6.25	0.007	0.014	0.013	0.027
South Bend-Mishawaka, IN	6.56	6.47	6.45	6.42	0.025	0.021	0.031	0.063
Spokane, WA	6.55	6.50	6.33	6.30	0.026	0.042	0.026	0.041
Springfield-Holyoke-Chicopee, MA	6.56	6.40	6.46	6.39	0.063	0.046	0.058	0.082
St. Louis, MO-IL	6.62	6.52	6.47	6.46	0.016	0.018	0.020	0.037
Stockton, CA	6.61	6.47	6.46	6.46	0.081	0.106	0.172	0.276
Syracuse, NY	6.61	6.48	6.44	6.39	0.031	0.041	0.030	0.041
Tacoma, WA	6.58	6.58	6.42	6.48	0.032	0.039	0.046	0.079
Tampa-St. Petersburg-Clearwater, FL	6.41	6.33	6.33	6.37	0.033	0.047	0.069	0.112
Toledo, OH/MI	6.63	6.58	6.43	6.40	0.014	0.021	0.029	0.034
Trenton, NJ	6.66	6.53	6.67	6.73	0.065	0.068	0.097	0.194
Tucson, AZ	6.51	6.36	6.21	6.27	0.056	0.067	0.095	0.140
Tulsa, OK	6.53	6.51	6.40	6.39	0.012	0.012	0.026	0.069
Utica-Rome, NY	6.57	6.32	6.32	6.28	0.040	0.022	0.024	0.045
Ventura-Oxnard-Simi Valley, CA	6.67	6.64	6.71	6.64	0.099	0.155	0.237	0.275
Washington, DC/MD/VA	6.71	6.64	6.70	6.71	0.050	0.087	0.162	0.225
West Palm Beach-Boca Raton-Delray Beach, FL	6.48	6.44	6.49	6.53	0.055	0.086	0.141	0.241
Wichita, KS	6.49	6.52	6.44	6.42	0.008	0.031	0.035	0.079
Wilmington, DE/NJ/MD	6.63	6.51	6.60	6.58	0.030	0.033	0.029	0.085
Worcester, MA	6.58	6.47	6.61	6.54	0.059	0.042	0.057	0.131
York, PA	6.53	6.50	6.52	6.46	0.010	0.019	0.013	0.031
Youngstown-Warren, OH-PA	6.61	6.59	6.37	6.35	0.015	0.027	0.019	0.017

Source: U.S. Census PUMS

Appendix B: Details on the Dispersion of Immigrants by MSA

The MSAs with the highest average fraction of immigrants over the period are shown below in Table B Panel A.[51] Unsurprisingly, the twenty MSAs with the highest average fraction of immigrants are all in California, Florida, Texas, Illinois, and the New York City area. Most of these top MSAs also fall among those with highest average growth in the fraction of immigrants. In large part, high fractions of immigrants are correlated with high growth in immigrant population (relative to native population). This is evidence of the chain-migration theory of immigrant location choice. However, that theory does not tell the whole story. In the 1980s and 1990s, MSAs with historically low levels of immigrants began receiving more immigrants.

As Singer (2004) also shows, in the 1970s most new immigrants settled in MSAs that have traditionally received the majority of immigrants. Over time, however, new immigrants began to settle in MSAs that traditionally had low ratios of immigrant to native population. Over the 1980s and 1990s the number of immigrants in the U.S. grew rapidly, as did the dispersion of these new immigrants. In the 1980s a new set of MSAs, which had very few immigrants in 1965, began to receive more; likewise in the 1990s another set of MSAs experienced new immigrant growth. This variation in immigrant population across time and place is crucial to the identification of labor market effects of immigration on natives.

Table B Panel B shows the MSAs with the lowest average fraction of immigrants and the largest decreases in number of immigrants relative to natives. As would be expected, most of these MSAs are in the Midwest, Rust Belt and Southeast. In Johnstown, Pennsylvania, the fraction of immigrants to natives varied from 0.3 to 1% between 1965 and 2000. And in Jackson, Mississippi, the fraction varied between only 0.5 and 1.9%. These are in stark contrast to the high-immigrant areas such as Miami, Florida that varied between 19.7 and 60.3% immigrant and Jersey City, New Jersey that varied between 12.3 and 46.7%.

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[51] 1960 data is not available at the MSA level. I use the 1970 Census, and in particular the variable for place of residence 5 years earlier, to get an estimate of immigrant and native populations in 1965.

The variation in fraction immigrant across MSA and across time was shown in Figures 1-7 and 1-8. The variation across MSAs progresses with time. The bulk of MSAs had very low fractions of immigrants in 1965; Miami, El Paso, New York City, and Jersey City are the exceptions. These low levels changed very little between 1965 and 1970, the period in which new immigration policy was enacted. However, over the 1970s, immigration began to grow. These new immigrants continued to flock to the original high-immigrant areas of Miami, El Paso, and the New York City area. But they also began settling in high numbers in California, Hawaii, and additional areas of Texas and the Northeast.

Similarly, in the 1980s another set of MSAs were affected by large influxes of new immigrants (relative to natives). Some of the previously low-immigrant MSAs experiencing the largest growth in fraction immigrant over the 1980s were: Santa Barbara, California; Riverside, California; Yakima, Washington; Bakersfield, California; Ft Lauderdale, Florida; Stockton, California; Washington, DC; Vallejo, California; Middlesex, New Jersey; West Palm Beach, Florida; Reno, Nevada; Boston, Massachusetts; Dallas, Texas; and Norwalk and Danbury, Connecticut.

And again, another set of MSAs were affected in the 1990s. These include: Las Vegas; Trenton, New Jersey; Santa Rosa, California; Salem, Oregon; Richland, Washington; Phoenix, Arizona; Austin, Texas; Providence, Rhode Island; Fort Worth, Texas; Waterbury, Connecticut; Seattle, Washington; Hartford, Connecticut; Atlanta, Georgia; Lowell, Massachusetts; Orlando, Florida; Tucson, Arizona; Portland, Oregon; and Raleigh-Durham, North Carolina.

It is apparent from Figures 1-7 and 1-8 that both time and place are key components of the variation in fraction immigrant. By 2000, most of the large MSAs in the U.S. experienced one or more decades of significant growth in immigrant population. Among the MSAs with the smallest fraction of immigrants by 2000 are: Billings, Montana; Sharon, Pennsylvania; Altoona, Pennsylvania; Johnstown, Pennsylvania; Monroe, Louisiana; Glens Falls, New York; Evansville, Indiana; Duluth, Minnesota; Decatur, Illinois; Terre Haute, Indiana; and Canton, Ohio.

Table B: Fraction Immigrant by Metropolitan Statistical Area

MSA *Panel A: Top 20 by Average Fraction*	Fraction Immigrant Average	1965	1970	1980	1990	2000
Miami-Hialeah, FL	0.451	0.197	0.266	0.412	0.522	0.603
Jersey City, NJ	0.325	0.123	0.169	0.279	0.387	0.467
Los Angeles-Long Beach, CA	0.322	0.100	0.122	0.272	0.427	0.465
New York-Northeastern NJ	0.293	0.138	0.165	0.237	0.337	0.431
Salinas-Sea Side-Monterey, CA	0.270	0.089	0.109	0.220	0.331	0.419
El Paso, TX	0.240	0.173	0.172	0.218	0.268	0.303
San Francisco-Oakland-Vallejo, CA	0.237	0.102	0.116	0.167	0.318	0.348
San Jose, CA	0.234	0.070	0.084	0.150	0.276	0.425
Bergen-Passaic, NJ	0.205	0.089	0.099	0.177	0.226	0.318
Ventura-Oxnard-Simi Valley, CA	0.191	0.090	0.099	0.155	0.237	0.275
Fresno, CA	0.181	0.069	0.073	0.126	0.221	0.303
Santa Barbara-Santa Maria, CA	0.176	0.053	0.074	0.097	0.239	0.295
Newark, NJ	0.166	0.069	0.088	0.137	0.189	0.251
San Diego, CA	0.162	0.053	0.064	0.131	0.198	0.254
Stockton, CA	0.159	0.085	0.081	0.106	0.172	0.276
Chicago-Gary-Lake, IL	0.159	0.072	0.085	0.132	0.186	0.233
Riverside-San Bernadino, CA	0.154	0.066	0.066	0.086	0.200	0.265
Fort Lauderdale, FL	0.153	0.040	0.049	0.080	0.178	0.305
Houston-Brazoria, TX	0.152	0.022	0.030	0.111	0.193	0.276
Bakersfield, CA	0.147	0.046	0.051	0.095	0.181	0.260

MSA *Panel B: Lowest 20 by Average Fraction*	Fraction Immigrant Average	1965	1970	1980	1990	2000
Johnstown, PA	0.007	0.008	0.003	0.006	0.011	0.009
Jackson, MS	0.013	0.005	0.005	0.015	0.012	0.019
Mobile, AL	0.014	0.005	0.007	0.008	0.012	0.029
Little Rock-North Little Rock, AR	0.014	0.004	0.004	0.013	0.005	0.035
Birmingham, AL	0.015	0.001	0.003	0.011	0.007	0.038
Shreveport, LA	0.015	0.008	0.007	0.014	0.013	0.027
Canton, OH	0.016	0.011	0.013	0.017	0.020	0.014
Knoxville, TN	0.016	0.000	0.003	0.020	0.016	0.026
Louisville, KY/IN	0.017	0.004	0.004	0.011	0.011	0.041
Erie, PA	0.017	0.016	0.016	0.015	0.005	0.031
Duluth-Superior, MN/WI	0.017	0.027	0.023	0.019	0.012	0.012
York, PA	0.018	0.010	0.010	0.019	0.013	0.031
Dayton-Springfield, OH	0.019	0.010	0.013	0.016	0.018	0.029
Youngstown-Warren, OH-PA	0.019	0.026	0.015	0.027	0.019	0.017
Chattanooga, TN/GA	0.020	0.006	0.004	0.009	0.029	0.037
Flint, MI	0.020	0.028	0.032	0.008	0.013	0.025
Peoria, IL	0.020	0.008	0.008	0.025	0.021	0.027
Appleton-Oskosh-Neenah, WI	0.021	0.018	0.017	0.022	0.013	0.031
Harrisburg-Lebanon-Carlisle, PA	0.021	0.011	0.012	0.020	0.016	0.036
Indianapolis, IN	0.021	0.009	0.011	0.013	0.013	0.050
Augusta-Aiken, GA-SC	0.022	0.005	0.005	0.014	0.035	0.032

Source: U.S. Census PUMS

Appendix C: Issues in Data Comparability between the U.S. and Canada

Both in replicating the Borjas analysis and in comparing U.S. and Canada Censuses, we had to make a number of judgment calls with the data. These are outlined below.

1) United States Censuses:
   a) Definition of Immigrant: Individual is defined as an immigrant if:
      i) Born outside the U.S. and U.S. territories, and
      ii) Either:
         (1) Naturalized or Non-Citizen, or
         (2) Neither parent born in U.S. and U.S. territories (this applies to the 1970 Form 2 only, where citizenship status is not available)
2) Canadian Census:
   a) Reconciliation of Education Groups with the U.S.:

	United States	Canada
High School Dropout	Did not finish 12th Grade	No degree or certificate
High School Graduate	Completed 12th Grade, including did or did not receive diploma and including GED	Secondary/High School graduate certificate or equivalent
Some College	1,2, or 3 years of college	Trade certificate/diploma, other non-university certificate, or university certificate < B.A.
College Graduate	4+ years of college, B.A./M.A./Professional degree/Ph.D.	B.A., >B.A., /Medical/Dental/Veterinary degree, M.A., Ph.D.

Both censuses have education definitions which vary over the period of analysis; some provide an individual's highest degree attained, others provide the number of years of schooling, and some provide both. The IPUMS data provides a variable which bridges these two and is comparable across years, and that is what is used above ("educrec" variable, and scheme suggested by Jaeger (1997)). We attempt to construct a similar variable for the Canadian Censuses, both to make the education definition comparable across years and comparable with the U.S. definition. One difficulty arises from differences in the countries' education systems. In the U.S. a high school education is completed in 12 years, and this is standard across the country. However in Canada, high school may be considered complete in anywhere from 11 to 13 years depending on the province.

b) Wage topcoding: Borjas adjusts the topcoded salaries in the U.S. between 1960 and 1980 by multiplying the top values by 1.5 (which amounts to $25,000*1.5 in 1960, $50,000*1.5 in 1970, and $75,000*1.5 in 1980). These adjusted values are still lower than the top values in the Canadian census (after adjusting for the exchange rate), so we do not make a topcoding adjustment in Canada.

c) Exchange rate and inflation adjusting: Following Borjas, we deflate U.S. dollars to 1999 dollars using the CPI-U series. For Canadian dollars, we first adjust to U.S.

dollars using the Federal Reserve H.10 release and then convert to 1999 dollars again using the CPI-U.

Appendix D: Year-Education-Experience Cell Sizes

Education	Years of Experience	*Raw # of US/Canadian Immigrants*				
		1960 (US)	**1970/1971**	**1980/1981**	**1990/1991**	**2000/1996**
HS Dropout	**1-5**	427	3484/593	10432/656	15323/692	21514/540
	6-10	644	4405/773	11623/699	18551/1010	26015/676
	11-15	845	5849/823	11025/882	18043/1283	25617/1045
	16-20	1137	6818/948	9738/1099	16264/1317	23881/1226
	21-25	1235	7381/1029	9347/1061	13549/1458	20468/1214
	26-30	1577	7815/1034	8946/1233	10632/1521	17029/1345
	31-35	2425	7747/845	8327/1268	8891/1515	13453/1278
	36-40	3423	8384/575	8288/1368	7967/1676	9372/1276
HS Grad	**1-5**	208	3326/87	7887/653	12720/1462	18317/1104
	6-10	282	3591/141	7761/546	14148/1309	20004/1020
	11-15	336	3667/129	7315/592	12607/1094	20057/1152
	16-20	568	3335/118	5900/402	10603/1098	18607/1140
	21-25	487	3425/132	5568/332	8770/1157	15530/998
	26-30	559	4274/126	4778/227	7033/844	12396/1044
	31-35	555	3213/95	4439/240	5871/595	9793/694
	36-40	592	3577/87	4398/207	4807/448	6471/448
Some College	**1-5**	153	2553/170	6477/626	10618/870	12273/755
	6-10	233	2464/133	6684/1108	12257/1512	13774/1408
	11-15	240	2132/124	5456/1447	11599/1829	14850/1799
	16-20	290	1902/98	3890/1244	9647/2097	15033/1928
	21-25	253	1764/95	3191/1171	7510/2265	12550/2168
	26-30	234	1926/80	2557/1109	5446/1851	10027/2142
	31-35	313	1375/44	2271/970	4169/1504	7025/1721
	36-40	248	1406/41	1906/676	2941/1213	4420/1206
College Grad	**1-5**	222	2971/253	5930/410	9031/866	14504/861
	6-10	373	4447/219	10433/908	13848/1193	20755/1439
	11-15	410	3766/199	9291/952	14600/1427	22973/1510
	16-20	319	3385/162	8027/650	14447/1748	21117/1497
	21-25	306	3103/148	5573/436	10879/1592	18250/1773
	26-30	314	2148/109	4492/357	8706/1011	16185/1513
	31-35	303	1996/49	3575/291	5535/674	10660/966
	36-40	246	1743/47	2198/160	3891/436	7163/517
Min		*153*	*1375/41*	*1906/160*	*2941/436*	*6471/448*
Max		*3423*	*7815/1034*	*11623/1447*	*18551/2265*	*25617/2168*

Source: U.S. Census PUMS and Canadian Census PUMF

Appendix E: Controlling for Education Selection

High school dropouts are the main identifying force in the fixed effects model of immigration and wages utilized in this paper and in Borjas (2003). We exhibited why using decadal data on dropouts and wages may be misleading. Here, we will show why failing to account for nation-wide trends in education may also lead to spurious conclusions about the effect of immigration on wages of U.S. workers. First we will tell the story about changes in education over the period and second will present a method for controlling these trends in the immigration model.

Table E-1 shows the trend of increasing education among male workers in the U.S. over the 1960-2000 period. Over half of native-born males age 18 to 64 in 1960 were high school dropouts, but only about 12 percent were in 1990 and only 8.49 percent in 2000. The percentage with some college education or a college degree nearly tripled between 1960 and 2000.

Table E-1: Distribution of Educational Attainment of U.S. Natives, 1960-2000

	1960	*1970*	*1980*	*1990*	*2000*
HS Dropout	51.28	36.66	21.98	11.81	8.49
HS Grad	27.80	35.33	37.59	33.91	31.94
Some College	10.00	12.90	18.81	28.69	30.94
College Grad	10.92	15.11	21.62	25.58	28.63
Total	100.00	100.00	100.00	100.00	100.00

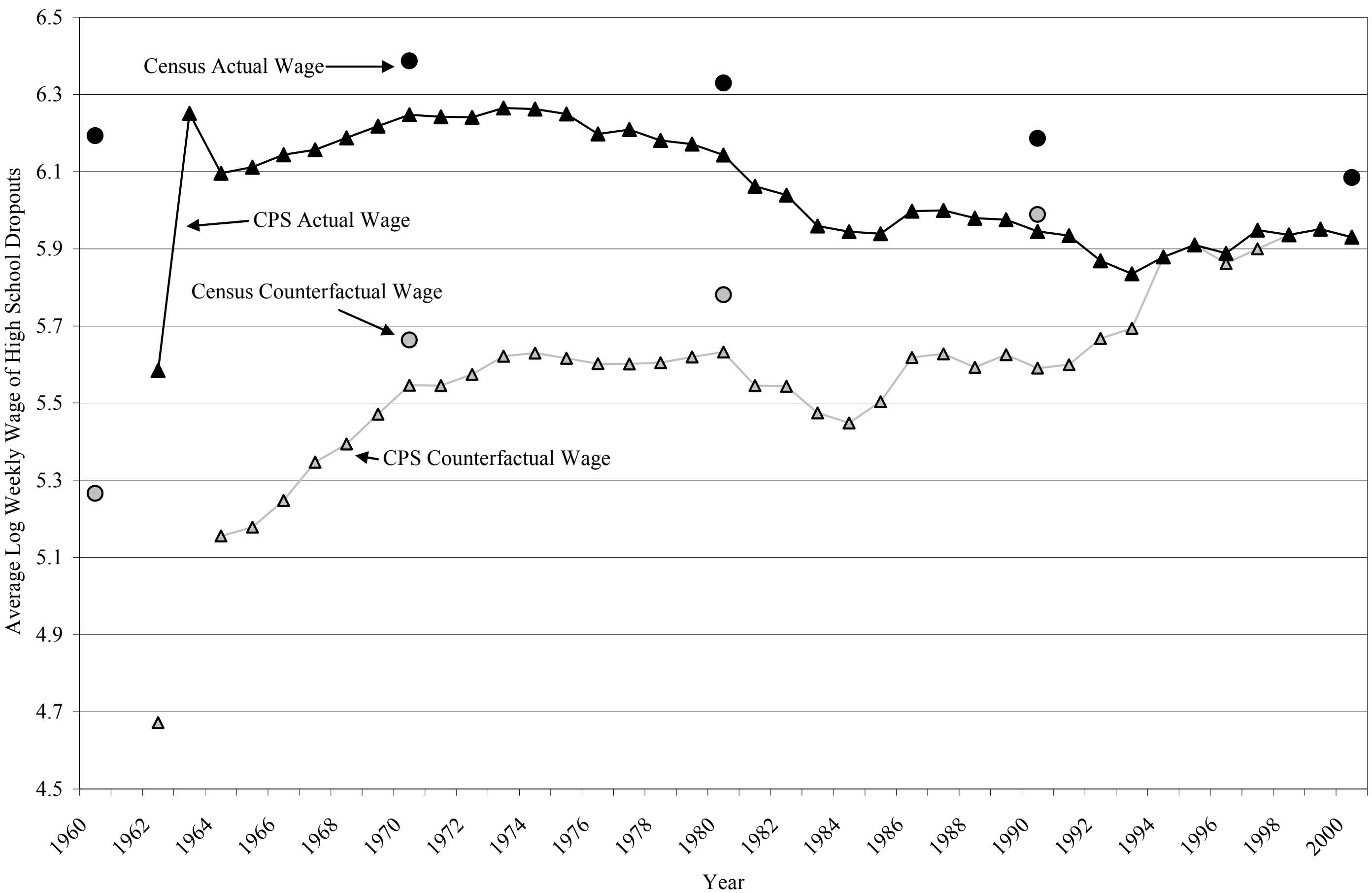
Source: U.S. Census PUMS

If those workers "left behind" in the high school dropout category are actually of lower unobserved skill or ability, then using the same definition of education across the forty years of this study may lead to biased results. Under the model that those remaining in the lowest educated category are negatively selected, and assuming that translates into lower wages, the fixed effects regression presented earlier would tend to overestimate the negative effect of immigration on wages of natives. Even in the absence of immigration, wages of native high school dropouts would be falling over the period due to the negative selectivity of high school dropouts.

We construct a counterfactual wage for high school dropouts in 1960-1990 representing what the wage *would have been* if the most successful dropouts *would have* gotten a high school degree had they been of the same age in 2000. We use the percentage of dropouts in each year to calculate a cutoff percentile as follows. If 10% of men in 2000 are dropouts and 40% of men in 1960 are dropouts, then we estimate that one-quarter (10/40) of the dropouts in 1960 *would have still been dropouts* had they been of the same age in 2000. Under the model that those with lowest wages among high school dropouts would have still been dropouts, the counterfactual wage is the average wage over the 1^{st} to 25^{th} percentile, in this example.

We construct this counterfactual wage for each year using the decennial Census data and the annual June CPS wage data. Figure E-1 compares the actual trends in wages to the counterfactual, and we see that under the counterfactual model we assume, wages of dropouts would have been rising rather than falling were it not for education selection.

Figure E-1: Actual and Counterfactual Wages of Native-born High School Dropouts, 1960-2000



This group, high school dropouts, controls the estimate of the correlation between immigration and wages and is thus extremely important. Non-immigration related factors impact the wages of high school dropouts and must be considered. Here, we have shown that negative selectivity of high school dropouts has a striking effect on the wages of this group. Once accounted for, the trend in native wages earlier attributed to immigration has disappeared. Education is a key identifying factor in the effect of immigration on wages and thus trends in education of natives cannot be ignored without risking making spurious conclusions. This increasing negative selectivity should be considered as an alternative explanation of the observed negative correlation between immigration and wages within skill groups.

Appendix F: Testing National Labor Market Predictions

One of the key insights in Borjas (2003) was to estimate immigration effects on the national labor market, avoiding biases from migration that arbitrages wages. If the U.S. labor market is truly national, and immigration impacts the market as expected by theory, then there are several predictions that we can test in the U.S. market. First, no matter where an immigrant arrives in the U.S., if the national labor market presumption is correct, the effect on native-born wages should be the same in all regions of the U.S. Second, in any given area of the country, under a national labor market hypothesis, the wage in each region should be a function of immigration shocks in all other regions. We proceed by analyzing these predictions in turn.

If a surge of immigrants arrive in New York City and the labor market is truly national, this supply shock should affect the national wage the same as if a surge of immigrants arrived in Ohio, for example. To test this prediction, we decompose the national immigrant shock into regional shocks in the following way:

$$X_{ijt} = \sum_{r=1}^{5} \frac{I_{ijtr}}{I_{ijtr} + N_{ijtr}} * \gamma_{ijtr} \equiv \sum_{r=1}^{5} X_{ijtr} * \gamma_{ijtr} \tag{F.1}$$

where X_{ijtr} is the region immigrant shock and $\gamma_{ijtr} = {I_{ijtr} + N_{ijtr}} \big/ {I_{ijt} + N_{ijt}}$ scales the regional immigrant shock by population. We use five U.S. regions, defined roughly by the Census.[52] There is a lot of variation in X_{ijtr} across regions and across time, as Table F-1 shows.

[52] Region 1: New England (CT, ME, NH, RI, VT) and NJ, NY. Region 2: Rust Belt (PA, OH, IN, and MI) with East North Central states (IL, IN, and WI). Region 3: West North Central Region (IA, KS, MN, MO, NE , ND, SD). Region 4: The South (DE, DC, FL, GA, MD, NC, SC, VA, WV, AL, KY, MS, TN, AR, LA, OK, TX). Region 5: The West (AZ, CO, ID, MT, NV, NM, UT, WY, AK, CA, HI, OR, WA).

Table F-1: Immigrant Share by Region, 1960-2000

	1960	*1970*	*1980*	*1990*	*2000*
NY/NJ/New England	11.13%	9.40	11.80	15.12	20.06
Rust Belt	4.65	3.93	4.24	4.99	7.46
West Central	1.81	1.45	1.74	2.19	4.80
South	1.72	2.27	4.24	7.08	11.63
West	7.14	7.61	11.90	19.08	23.30
National	5.20	4.75	6.82	10.24	14.19

Source: U.S. Census PUMS

The share of immigrants is increasing in most periods for most regions, but is increasing much more quickly in the South and West regions across the period. The Northeast and West have the highest proportions of immigrants to all residents in all years. As described above, if the national labor market hypothesis holds, the fact that immigrant share is increasing faster in the South than in the West Central region should not affect the impact immigrants to both these areas have on the national wage. To test this, we estimate the model

$$Y_{ijt} = \sum_{r=1}^{5} \beta_r X_{ijtr} \gamma_{ijtr} + s_i + x_j + \pi_t + s_i x_j + s_i \pi_t + x_j \pi_t + \varphi_{ijt} \qquad \text{(F.2)}$$

Note that the left-hand-side variable is the national wage with skill group *ijt* rather than the region wage. So equation F.2 relates regional immigrant shares to the overall U.S. wage within education-experience groups over time (hence the model has 160 observations). The prediction from the national labor market hypothesis is that $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5$. Instead, we find that only two of the coefficients are statistically significant:

Table F-2: Testing National Labor Market Prediction 1

Dependent Variable: X_{ijt}	**Estimate**
$\hat{\beta}_1$ ***(NY/Northeast)***	-2.292*** (0.808)
$\hat{\beta}_2$ ***(Rust Belt)***	3.271 (2.299)
$\hat{\beta}_3$ ***(West Central)***	-0.732 (6.192)
$\hat{\beta}_4$ ***(South)***	0.257 (0.720)
$\hat{\beta}_5$ ***(West)***	-1.233*** (0.296)

Note: standard errors in parentheses, regression is weighted by population in cell

Equality of the coefficients is rejected with a Wald test F-statistic of 3.54 (with p-value of 0.0103) on the weighted regression.

The second prediction we test is that if there is a national labor market, then wages in any region should be a function, in part, of immigrant shocks in all regions. As above, we will use regional immigration shares on the right-hand-side but instead of the national wage, we use regional wage on the left:

$$Y_{ijtr} = \sum_{r=1}^{5} \beta_r X_{ijtr} \gamma_{ijtr} + s_i + x_j + \pi_t + s_i x_j + s_i \pi_t + x_j \pi_t + \varphi_{ijt} \qquad \text{(F.3)}$$

This equation relates regional wage to all five regional immigrant shocks, within education-experience groups over time (hence there are 800 cells: 4 education, 8 experience, 5 year, 5 region cells). The national labor market hypothesis predicts that the coefficients β_{ijtr} will be statistically significant. Table F-3 shows otherwise:

Table F-3: Testing National Labor Market Prediction 2

Dependent variable: X_{ijtr}	***Unweighted***	***Weighted***
$\hat{\beta}_1$ ***(NY/Northeast)***	-0.906 (1.339)	-2.149 (1.880)
$\hat{\beta}_2$ ***(Rust Belt)***	0.513 (3.794)	3.306 (5.358)
$\hat{\beta}_3$ ***(West Central)***	4.946 (9.417)	-0.889 (14.333)
$\hat{\beta}_4$ ***(South)***	-0.138 (1.211)	0.035 (1.670)
$\hat{\beta}_5$ ***(West)***	-1.210*** (0.515)	-1.038** (0.685)

Note: standard errors in parentheses, regression is weighted by population in cell.

Rather than finding that immigration shares in all regions are important in determining wages across the country, we find that only the coefficient on the West's share is statistically significant.

These results lead us to believe that the hypothesis of a national labor market is not on the mark. If wages within skill groups on a national level are affected by immigration, then they should relate equally to immigrant shocks in different areas of the U.S. However, we find that the immigrant shares across regions have very different correlations (or none) with national wages. Likewise, we expect that wages anywhere are determined by wages everywhere if the U.S. is a truly national labor market. But only the immigrant share in the West has a statistically significant impact on wages in all other regions, even though other areas of the country have experienced increasing shares of immigrants.

Appendix G: Additional Explanatory Variables in Chapter 3 Models (1) – (3)

Dependent Variable: Log Weekly Wage			
VARIABLE	**Model (1)**	**Model (2)**	**Model (3)**
High School Grad Dummy (HSG)	0.2482*** 0.0026)	0.2414*** (0.0026)	0.2411*** (0.0026)
Some College Dummy (SCOL)	0.164*** (0.0029)	0.1604*** (0.0028)	0.1597*** (0.0028)
College Grad Dummy (COLG)	0.5221*** (0.004)	0.5054*** (0.004)	0.5042*** (0.0039)
Age 25-34	0.5669*** 0.0029)	0.5688*** (0.0029)	0.5689*** (0.0029)
Age 35-44	0.7193*** 0.0029)	0.7192*** (0.0029)	0.7196*** (0.0029)
Age 45-55	0.7781*** 0.0028)	0.7744*** (0.0028)	0.7747*** (0.0028)
HSG * Age 25-34	-0.0526*** (0.0036)	-0.053*** (0.0035)	-0.0531*** (0.0035)
HSG * Age35-44	-0.016*** (0.0036)	-0.0153*** (0.0036)	-0.0154*** (0.0036)
HSG * Age45-55	-0.0029 (0.0036)	-0.0005 (0.0036)	-0.0005 (0.0036)
SCOL*Age 25-34	0.1274*** (0.0038)	0.123*** (0.0037)	0.1229*** (0.0037)
SCOL*Age 35-44	0.2316*** (0.0038)	0.2295*** (0.0038)	0.2293*** (0.0038)
SCOL*Age 45-55	0.2514*** (0.0039)	0.2524*** (0.0039)	0.2525*** (0.0039)
COLG*Age 25-34	0.0219*** (0.0047)	0.021*** (0.0046)	0.0206*** (0.0046)
COLG *Age 35-44	0.2371*** (0.0047)	0.2379*** (0.0046)	0.2374*** (0.0046)
COLG *Age 45-55	0.2663*** (0.0047)	0.2716*** (0.0047)	0.2716*** (0.0047)
1970 Dummy	5.806*** (0.0023)		
1980 Dummy	5.71*** (0.0023)		
1990 Dummy	5.5888*** (0.0023)		
2000 Dummy	5.5382*** (0.0023)		
Year*MSA Effects	NO	YES	YES
Year Effects	YES	NO	NO
Education, Age, Education*Age effects	YES	YES	YES
Frac(I)*I	NO	NO	YES

Source: U.S. Census PUMS. Note: standard errors in parentheses.

Appendix H: Immigrant Concentration Effects Within and Across Language Groups

Table H-1: Immigrant Concentration Effects, by Language

Dependent Variable: Log Weekly Wage		
	Concentration Measure	**Estimate (SE)**
Panel 5: Model (3)	Frac(I | Fluent in English)* Immigrant Fluent in English	-0.151*** (0.027)
By Language	Frac(I | Fluent in English)* Immigrant not Fluent in English	-0.091*** (0.061)
	Frac(I | Not Fluent in English)* Immigrant Fluent in English	-1.065*** (0.039)
	Frac(I | Not Fluent in English)* Immigrant not Fluent in English	0.512*** (0.086)

Source: U.S. Census PUMS
*Note: regression estimated from 2,200,671 observations. Standard errors are in parentheses. Includes fixed effects for education, age, age*education, year*MSA, year*cohort.*

Appendix I: Immigrant Concentration Effects by Ethnicity

Table I-1: Immigrant Concentration Effects, by Ethnicity including Direct Effects of Ethnicity

Dependent Variable: Log Weekly Wage of Immigrants	
Direct Effects of Ethnicity for Group:	**Estimate (SE)**
Mexican	-0.143*** (0.002)
Cuban	-0.133*** (0.009)
Other Hispanic	-0.169*** (0.002)
Asian	-0.136*** (0.004)
White	Dropped
Black	-0.268*** (0.001)
Other	-0.170*** (0.005)
Immigrant Concentration Effects by Ethnicity:	
Frac(I)*Mexican Immigrant	-0.394*** (0.014)
Frac(I)*Cuban Immigrant	-0.254*** (0.027)
Frac(I)*Other Hispanic Immigrant	-0.393*** (0.014)
Frac(I)*Asian Immigrant	-0.334*** (0.017)
Frac(I)*White Immigrant	-0.122*** (0.016)
Frac(I)*Black Immigrant	-0.162*** (0.019)
Frac(I)*Other Immigrant	-0.356*** (0.033)

Source: U.S. Census PUMS
*Note: regression estimated from 2,402,986 observations. Standard errors in parentheses. Includes fixed effects for education, age, age*education, year*MSA, year*cohort.*

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