Essays on Labor Markets, Migration and Trade

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To Jan

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Abstract

In Part I of this thesis, I show that, when immigrants' host and home countries engage in trade, labor market returns to cultural capital specific to the trading partner increase. Using two trade liberalization episodes, NAFTA and China's accession to the WTO, I examine how trade intensification between the US and Mexico, and the US and China affects wages, employment and occupations of Mexican and Chinese descendants in the US, respectively. I find that labor market demand for Mexican and Chinese descendants increase as a result of trade intensification with Mexico and China. In Part II, I develop a theoretical framework that integrates immigrant networks of heterogeneous qualities and decisions about cultural assimilation and investment in education into the context of a labor market with asymmetric information. I illustrate how network quality shapes individual incentives to acquire education and to assimilate.

Resumen

En la Parte I de esta tesis, demuestro que cuando los países de origen y de destino de inmigrantes empiezan a comercializar entre ellos, el valor del capital cultural de los inmigrantes aumenta en el mercado laboral del país receptor. Uso dos episodios de liberalización comercial, y examino cómo el aumento en el comercio entre los EEUU y México, y China afectó los salarios, el empleo y la ocupación de mexicanos y chinos en EEUU. En la Parte II, se desarrolla un marco teórico que integra la red de inmigrantes de calidades heterogéneas, y las decisiones sobre la asimilación cultural y la inversión en la educación en el contexto del mercado de trabajo con información asimétrica. Ilustro como calidad de la red inmigrante determina los incentivos individuales para adquirir educación así como de asimilarse culturalmente en el país de destino.

Preface

A series of issues all related to immigration lie in the core of this thesis: what are the returns to cultural capital that immigrants bring to the host country? Does trade with immigrants' country of origin affect these returns? How can networks affect immigrant decisions to assimilate culturally? How do they affect their decision to invest in education? Why are immigrant networks formed?

The thesis is structured in two parts and four chapters. In the first part of the thesis, I address questions related to immigrant cultural capital. I use trade intensification between home and host countries as a shock to the labor market demand for cultural capital specific to the trading partner. In particular, I use US data and focus on two immigrant-sending countries, which also are two of the most important trade partners of the United States, Mexico and China. I exploit the trade intensification between the United States and Mexico that followed the NAFTA implementation to identify the effect of US-Mexico trade on wages, employment and occupations of Mexican workers in the United States. Similarly, I use trade intensification between the United States and China induced by China's accession to the WTO, to identify the effect on Chinese workers in the United States. I find that both analyses give me very similar results, which are consistent with an increase in the labor market demand for workers endowed with Mexico- and China-specific cultural capital. I also find evidence that immigrant cultural capital becomes valuable in the host country labor market, but only when it is paired with generic human capital. In addition, assimilation also seems to be an important factor when it comes to returns to cultural capital, since host- and home-country cultural capital seem to be complementary.

In the second part of the thesis, I turn to a questions of the long term performance of immigrant groups. In a simple theoretical framework, I integrate immigrant networks of heterogeneous quality, and individual decisions to culturally assimilate and to acquire education. I thus point out the multidimensionality of the immigrant assimilation process. I show that immigrant network quality is crucial when it comes to incentives to invest in education and assimilate. In addition, I show how differences in costs of assimilation for different immigrant groups may lead to network formation and long term differences in immigrant performance. In the empirical analysis, I bring the model to the data. All correlations predicted by the model implications appear to be quite large

and significant, contributing to its validity.

By addressing the questions this thesis poses, I intend to shed some more light on the still controversial issue of immigration. While in Part I, I focus on cultural aspect of immigration, showing that the cultural capital immigrants bring to the host country might have positive returns in the host country labor market. In Part II, I propose a mechanism that might explain the differences in cultural and labor market assimilation we observe between and within different immigrant groups.

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Part I

Trade and Labor Market Returns to Cultural Capital

Introduction

It seems beyond doubt that the effect of immigration on the host country economy is not solely that of an increased labor supply, nor even a skill-biased increase in labor supply. Apart from labor, immigrants bring with them human and social capital specific to their country of origin, as well as local knowledge which is transfered to the second and further generations. Taking into account the growing flow of international migration, as well as the fact that in most immigrant receiving countries an increasing share of the population consists of second generation migrants, it seems of vital importance to understand the value of this source-country-specific human capital and how it affects immigrants' performance in the host country labor markets. In Part I, I undertake the task of shedding some light on the question of labor market returns to immigrant cultural capital.

I use trade liberalization in order to pin down the effect of trade on the labor market returns to immigrant cultural capital. In this chapter, cultural capital or country-specific human capital is defined as a combination of social capital (including trust and networks) and information or local knowledge (e.g. knowledge of language, social norms and rules, etc.). I focus on the US labor market and study how two of the largest immigrant groups in the United States, Mexicans and Chinese, are affected by the intensification in trade between the United States and their respective countries of origin.

I find that trade increases the labor market returns to the country-specific cultural capital. This increase is reflected in wages, employment and occupations of individuals endowed with this capital. High-skilled workers with Mexican and Chinese backgrounds experience faster wage growth following trade intensification with their respective countries of origin. Results imply that high-skilled Mexican descendants who work in an industry that increased its share of trade with Mexico by about 6 percentage points (which is about the average increase after the implementation of the agreement) ex-

perience 15 percent faster wage growth than individuals without Mexican ancestry or Mexican descendants who work in industries that are not exposed to trade with Mexico. The magnitude is similar for workers of Chinese background: average trade intensification with China is also about 6 percentage points, which leads to about 12 percent faster wage growth. High-skilled Mexican descendants also flow towards industries that increased their exposure to trade with Mexico —they become 3.5 percentage points more likely to be employed in those industries after shock—. In conclusion, both Mexican descendants and workers with Chinese background become considerably more likely to be employed in high-skilled of trade-related occupations.

Studying a question related to culture presents a number of identification challenges. Individual endowment with cultural capital is not observable, and even if it was observable it would be hard to measure. Therefore for identification, I need on the one hand a proxy for cultural capital endowment, and on the other an exogenous shock that affects the demand for country-specific cultural capital. Individual ancestry and trade liberalization shocks present me with two such instruments.

For individual ancestry to be a valid proxy of cultural capital endowment, the former must be correlated with the latter. This means that individuals of Mexican ancestry, for instance, should be relatively more endowed with Mexico-specific cultural capital than individuals coming from other backgrounds. This assumption implies that immigrants bring with them their cultural capital and then transfer it to their offspring. There is a vast body of evidence supporting this assumption. The literature on immigrants' assimilation documents persistent differences in a number of characteristics between immigrants and natives, and these differences survive into the second generation.[1] In addition, the literature on cultural transmission shows a number of channels through which cultural attitudes and identities can be transmitted (Fernández et al., 2004; Fernández and Fogli, 2009; Dohmen et al., 2012). Therefore, it seems reasonable to assume that individual ancestry is associated with the cultural capital endowment.

When it comes to shocks to the returns to country-specific cultural capital, trade seems a natural candidate. The labor market returns to cultural capital are likely to be affected by the intensity with which two countries interact, and trade is a well-defined form of such interaction. Informal barriers to trade are a long discussed subject in the trade literature that could be a reason for the apparent 'lack of trade'. Informational

[1] See Borjas 1985, 1992, 1993, 1994, 1995; Card et al. 1998; Algan et al. 2010, among others

asymmetries between trading partners as well as institutional differences are some of the most important examples of such barriers (Anderson and Marcouiller, 2002; Nunn, 2007). For a firm, entering the international market requires some initial investment, including researching potential markets, finding suppliers, adapting products to overseas consumers, etc. (Iacovone and Javorcik, 2012). Functioning in international markets also entails coordinating and bargaining with overseas partners. Rauch (1999) underlines the importance of pre-existing networks for the formation of buyer/seller relationships. Networks and local knowledge can overcome bad institutions, incomplete information about productive opportunities, and imperfect information about the trading partners.[2]

A growing literature documents a positive association between a country's immigrant stock and trade volumes with source countries (Gould, 1994; Head and Ries, 1998; Rauch, 2001). Rauch and Trindade (2002) analyze the association between trade and the Chinese diaspora. They look at contract enforcement and attempt to disentangle the effect of networks from the effect of information. They find that ethnic networks are positively associated with trade through both channels. In this sense, the cultural capital that immigrants possess is valuable to the firms operating in, and especially entering international markets. This literature is closely related to the current paper, but it differs in identification and the question of interest. While the existing literature, in attempts to learn about the effect of networks on trade, looks at the association between the immigrant stock and trade flows; I pin down the causal effect of trade on the labor market returns to skills that immigrants are endowed with, exploiting exogenous variation in bilateral trade flows. I use difference-in-difference and triple difference techniques in the analysis to identify the effect of trade. I examine what happens to wage and employment outcomes of first and higher generation immigrants employed in the industries exposed to trade with their countries of origin.

I use trade liberalization as a shock to bilateral trade flows. As formal barriers to trade decrease, an increasing number of firms find it profitable to enter international markets. These firms then have to face informal barriers to trade, which can potentially be reduced by employing individuals endowed with the relevant cultural capital. In particular, I use NAFTA and China's entry to the WTO as shocks to trade flows between the United States and Mexico and China, respectively. When analyzing NAFTA's effect

[2]On a related note, Burchardi and Hassan (2013) find a positive effect of social ties on regional growth.

on the Mexico-specific cultural capital, I use three waves of the US Population Census (1980, 1990 and 2000) and focus on US-born individuals, though I also report the results for immigrant workers in one of the robustness checks. The main advantage of using descendants instead of immigrants is that US-born Mexican descendants are more comparable to other natives. Arguably, US-born individuals possess cultural capital specific to both countries, while Mexico-born immigrants are relatively more endowed with Mexico-specific cultural capital. To analyze the effect of China's trade liberalization in 2001, however, I include both first and higher generations of immigrants and use the US Population Census and the American Community Survey (ACS) 2000 to 2005 waves.[3]

Both groups are interesting case studies. Mexico has been an immigrant-sending country to the United States throughout the whole of the 20th century, and Mexicans represent at the same time old and new migration to the United States. Ethnic Mexicans, both native and foreign-born, constitute an important part of the US labor force. Nevertheless, Mexicans' assimilation is slow and unequal. Second- and higher-generation Mexicans in the United States, compared to other natives, are less likely to have a college degree and to be employed in high skill occupations, while they are overrepresented among high school dropouts and tend to live in states with high concentration of foreign —in particular Mexican— populations. Ethnic Mexicans are one of the most vulnerable US minorities[4]. From the point of view of inequality, it is important to know how trade liberalization may affect this segment of the population.

Chinese, on the other hand, lie on the opposite end of the spectrum. They are overwhelmingly high-skilled, earn high wages and are employed in high-skilled occupations. Chinese immigrants are the fourth largest immigrant group in the United States, and China is the second largest trade partner of the United States. Despite these differences, the pattern of results is very similar across both analyses, contributing to their credibility.

The main hypothesis of the paper is that, if country-specific cultural capital is effi-

[3]Despite the fact that China is one of the most important immigrant-sending countries to the United States, the population share of Chinese second generation is small compared to the Mexican one. While about 3 percent of US population are Mexican descendants, for Chinese descendants this share hardly reaches the 0.5 percent. For this reason, I augment the sample in the analysis of China with foreign born individuals.

[4]In 1980 Mexican descendants earned about 25 percent lower wages than other natives and this gap, though reduced, remains significant even when we compare individuals of the same age, education, and those who are employed in the same industry and state.

cient in reducing barriers to trade, then trade liberalization should lead to an increase in the demand for this capital which, in turn, should be reflected in the increase of the demand for workers endowed with the relevant type of cultural capital. This would be reflected in wages, employment and, possibly, the occupational distribution of Mexican and Chinese workers. Throughout the analysis I focus on all three outcomes.

Although I find that the overall effect of trade on the demand for cultural capital seems to be small and insignificant, it masks a great deal of heterogeneity. Just like in classical trade theory, we would expect that only those individuals endowed with the skill mix required to reduce informal barriers to trade will benefit from the shock.[5] Reducing barriers to trade entails bargaining and coordination with the overseas partners, selection and processing of relevant information, among other tasks intensive in analytical and communication skills. Therefore the effect of trade should be concentrated among high-skilled individuals and/or in trade-related occupations,[6] since those are the occupations responsible for the establishment of trade relations and the dissemination of information. My results confirm these predictions: all of the effects are concentrated among high-skilled individuals and those employed in trade-related occupations, while slightly negative results for low-skilled individuals suggest some competition effect coming from trade.

The results are robust to a number of alternative specifications: I control for shares of immigrants in states and industries, allow for differential state trends, and eliminate border regions in the analysis of NAFTA to make sure that the results are not driven by the distance to *maquiladora* plants or states with very high shares of Mexican population. In addition, I run a placebo test using an increase in trade with Japan[7]. The results suggest that it is trade with the country of origin of migrants that matters and not trade in general, thus validating the hypothesis of the productivity of the cultural capital.

Once my main results are established, I attempt to identify channels and the specific elements of cultural capital that increase in value. One crucial element of cultural capital

[5]While if imports form Mexico or China actually substitute for skills possessed by Mexican and Chinese respectively, then trade with their countries of origin might actually hurt them. Think, for instance, of a somewhat archaic example of Chinese porcelain: if it can be cheaply imported from China, a demand for masters in the importing countries should go down.

[6]I build upon Aleksynska and Peri (2012) and define trade-related occupations by focusing on management and sales jobs (excluding those with a high share of high school dropouts).

[7]In 2012 Japan was the fifth most important trade partner of US, after Canada, China, Mexico and the European Union.

is, of course, language. I disentangle the effect of language from the rest of the elements of cultural capital by controlling for Spanish and Chinese skills and allowing returns to these skills to vary by time and by trade exposure. Moreover, in the case of Mexican workers I limit my sample to Spanish-speakers only, and estimate the effect of US-Mexico trade intensification on Mexican descendants relative to descendants from other Spanish-speaking countries. Including language controls doesn't change significantly the effect of trade on high skilled individuals, for low-skilled workers language skills seem to be of more importance, though the results for this group are mixed. In general, the results suggest that language is not the only driver of the effect and returns to other components of cultural capital go up. However, returns to language do seem to be affected by the trade liberalization.

To further investigate the channels, I run a partial treatment analysis. Not all the elements of cultural capital are country-specific. On top of language, several countries may share the same colonial past and legal principles. Social rules and norms might have also evolved from a common ancestral civilization. For instance, most of Central American and Mexican territories were part of the Mesoamerican civilizations that later were integrated into the Spanish colonial empire, which contributed to the development of many common cultural traits. Thus I allow individuals with Central American ancestry to be equally affected by the shock. I find that, though there is some evidence of an increase in a labor demand for workers with Central American ancestry, the effects for this group are weaker and exhibit different patterns. Therefore, at least part of the effect of trade stems from elements that are specific to Mexico but not to other countries with a related cultural capital.

Finally, I examine the differences in the effects for immigrants versus US-born workers. I find that, while the effect is still present among high-skilled immigrants, it is much weaker and not concentrated in trade-related occupations. This suggests that it is a combination of the US- and Mexico-specific cultural capital that increases in value.

Overall, my results suggest that the labor market returns to the cultural capital that immigrants bring with them to the host country go up as the host and home countries engage in trade. This effect is, at least to some extent, driven by elements of cultural capital that are specific to the trading partner, and being endowed with cultural capital specific to both, home and host, countries seems to make the effect of trade stronger.

To the best of my knowledge, this research is the first to address the question on re-

turns to cultural capital and its link to trade. It is also the first to identify and quantify the ethnic component of the trade effect. I show that immigrant cultural capital may be productive and beneficial to individuals endowed with it when relations between their host and source countries intensify. In addition, I do find strong complementarity between individual cultural capital and generic human capital, but my results also suggest that home and host country cultural capital may be complementary. I thus contribute to two strands of literature. On the one hand, I contribute to an ongoing debate on immigrant assimilation. And, on the other, this paper also is relevant for the growing literature documenting the relevance of culture and cultural diversity for economic outcomes.

Part I of this thesis is organized as follows. In Chapter 1, I analyze the effect of NAFTA on labor market returns to Mexico-specific cultural capital. In this chapter, I lay out the route also followed in Chapter 2 where I focus on the analysis of US-China trade intensification and Chinese workers in the United States. In each chapter I talk about the trade liberalization episodes used for identification; explain the empirical strategy used to pin down a causal effect of trade intensification on returns to cultural capital; and present data and the results. The analysis of China's accession to the WTO on Chinese cultural capital was designed to be as comparable to the analysis of NAFTA as possible. Therefore, the sections, tables and figures follow the same order and in general are comparable to those in Chapter 1. In Chapter 3, I discuss the findings from the first two chapters and describe similarities and differences between the two analyses when it comes to the each case, empirical design and results.

Chapter 1

NAFTA AND MEXICO-SPECIFIC CULTURAL CAPITAL IN THE US LABOR MARKET

In this chapter, I focus of the largest immigrant group in the United States, Mexicans, and I analyze how intensification in trade between Mexico and the United States affected the returns to Mexican cultural capital in the US labor market. I estimate an effect of the US-Mexico trade on wages, employment and occupations of Mexican descendants in the United States. In order to be able to give the results causal interpretation, I exploit variation in trade that followed a free trade agreement signed by the United States and Mexico in 1994 and which therefore can be deemed exogenous for the purposes of this analysis.

This chapter is structured as follows. In Section 1.1, I describe how an increase in the labor market demand for cultural capital should be reflected in the labor market outcomes of individuals endowed with it. In Section 1.2, I give some historic and economic background to NAFTA's implementation, which I use as a natural experiment for identification. In Section 1.3, I show the econometric specifications used to identify industries' exposure to trade with Mexico, as well as two specifications used to derive the main results. Section 1.4 describes the data used in the analysis and presents some summary statistics. In Section 1.5, main results are reported and discussed. In Section 1.6, I describe several threats to validity, explain how I address each of them and show the re-

sults from the robustness checks. Section 1.7 focuses on the channels and mechanisms at work: I isolate language skills from the rest of the elements of cultural capital; I run a partial treatment test on individuals endowed with a related cultural capital; compare the effect of trade on first- versus higher-generation Mexicans; and I analyze medium- and long-term effects of trade liberalization on Mexicans. Section 1.8 summarizes the main findings.

1.1 Identifying an increase in labor demand

An increase in labor demand for workers endowed with a certain type of cultural capital, in this case Mexico-specific, should be reflected in workers wages and/or employment outcomes. If trade makes certain set of skills more valuable, then the price of these skills is likely to go up. This premium, in turn, should attract workers with the relevant set of skills towards industries and occupations that pay this premium, generating an employment and occupational effect of trade. Therefore, if trade with Mexico shifts the demand for Mexico-specific cultural capital, I expect wages of Mexican descendants to go up in industries exposed to increasing trade with Mexico. Similarly, occupational effects should be reflected in an inflow of Mexican workers into occupations related to trade activity, in those industries that increase trade with Mexico. Finally, employment effects should show up as an inflow of these workers towards industries that trade with Mexico.

Increase in demand, however, does not necessarily have to be reflected in all of these effects. Workers' mobility costs and the overall speed of labor market adjustment will determine which effects prevail. For instance, if inter-industry mobility costs where high, then an increase in the demand would be mostly reflected in wages and, probably, occupational upgrading, as workers would move towards occupations that reward their cultural capital.[1] If, in addition, occupational mobility was low then the increase in the demand would show up as a wage premium among trade-related occupations.

I do not make any assumptions about the inter-industry and occupational mobility costs, therefore, when estimating the effect of trade on labor market demand for workers with Mexican background, I estimate all three effects in parallel.

[1] Occupational upgrading itself should attenuate the wage premium as the supply of cultural capital increases in those occupations.

It is important to keep in mind that all these effects are expected to be highly heterogeneous by skill level of workers. Coordination, bargaining, information processing, navigating through foreign institutions, among other tasks involved in reducing informal barriers to trade are tasks intensive in communication and analytical skills. The latter are usually acquired through investment in education. Therefore, high-skilled workers are the ones most likely to be affected by the shock.[2]

1.2 US-Mexico trade: North American Free Trade Agreement

To identify the effect of US-Mexico trade on the labor market returns to Mexico-specific cultural capital, I use intensification in the trade flows between these two countries that followed the implementation of the North American Free Trade Agreement (NAFTA).

In January 1st 1994, a free trade agreement between Canada, the United States and Mexico was implemented, creating thus one of the largest free trade blocs in the world. It was the culmination of the much debated negotiation process started by the Mexican President Salinas, US President George H. W. Bush and Canadian Prime Minister Brian Mulroney in the 1990. NAFTA extended to Mexico a free trade agreement that already existed between the United States and Canada since October 1988 (CUSFTA). It also followed Mexican unilateral trade liberalization in 1986 when the country joined the General Accord on Tariffs and Trade (GATT). NAFTA was designed to create a trilateral trade bloc by eliminating trade and investment barriers between the three countries.

The implementation of NAFTA meant an immediate elimination of more than half of the tariffs on the US imports to Mexico and a third of the US tariffs on Mexican imports. Almost all of the tariffs between the United States and Mexico were supposed to be eliminated within 5 to 10 years.[3] A series of non-tariff barriers were also eliminated by NAFTA such as quotas and licensing requirements that constituted one of the main obstacles for small businesses that operated on or considered entering the international market. Overall, NAFTA's provisions successfully guaranteed market integration

[2]While my baseline results are estimated with and without taking into account this heterogeneity, the rest of the results of the papers allow for heterogeneous effects.

[3]With the exception of agricultural products, on which the tariffs were supposed to be phased out within 15 years.

between the bloc members, greatly facilitating the intra-bloc trade.

The trade agreement has been in a center of an intense economic and political debate since the negotiations started. Its detractors claimed that it would hurt low-skilled workers in the United States and would negatively affect development of the US regions that heavily rely on manufacturing and agriculture. Others suggested that NAFTA would mostly affect Mexico and its effects on the US economy would be very limited. Early papers (e.g. Gould 1998; Krueger 1999; Lederman et al. 2005), indeed, found no trade diversion effect of the FTA. Later studies, however, attribute this lack of evidence to poor data quality and the fact that NAFTA coincides in timing with the Mexican peso crisis. So Romalis (2007) finds considerable effects of the agreement on trade flows. After ratification in 1994, levels of international trade increased in all member countries. Mexico's trade as a share of GDP increased by 100 percent and the US and Canadian trade did so by about 30 percent. Caliendo and Parro (2012) attribute about 93 percent of the trade increase in Mexico to NAFTA, for the United States the number is about 55 percent, which is lower but still quite substantial.

Figure 1.1 displays the evolution of trade shares with Mexico over the total US trade with other GATT/WTO members between 1990 and 2000, before and after the agreement. Trade between the United States and Mexico had been increasing since 1986 when Mexico joined GATT, but NAFTA had further reduced formal barriers to trade between the members of the trade block. The vertical red line marks the implementation of the agreement. There exists an initial drop in the trade shares in 1995 attributed in its integrity to a decrease in the US exports to Mexico following the peso crisis that hit Mexico in 1994. In 1996, US-Mexico trade shares recover its pre-crisis level. The fast recovery in the US-Mexico trade following the peso crisis has been often attributed to NAFTA.

NAFTA is a suitable policy experiment for several reasons. First, for the Unites States it was a political rather than an economic decision, mostly promoted by Mexico. Second, the negotiations between the Mexican and US Presidents began in 1990. Hence, the anticipatory effect should not go further back than 1990, which makes them irrelevant in this analysis because the micro data used in the analysis is decennial. Finally, despite its considerable effects on trade, NAFTA's effect on the US labor market was concentrated among manufacturing workers (Burfisher et al., 2001; McLaren and Hakobyan, 2010), without large spillover effects on the US economy overall.

1.3 Econometric specification: the triple difference approach

Given that I use a policy 'experiment' for identification, difference-in-difference and triple difference techniques are the most logical choice for an estimator. The time dimension is determined by the timing of the trade liberalization, and the cross-sectional dimension by individual ancestry and industry of employment (the latter is only used in the specifications that estimate wage and occupational effects of trade).

Wage and occupational effects would be expected to be observed within industries that increased their exposure to trade with Mexico as a result of trade liberalization. Hence, the first step to the estimation of the main results is the identification of the industrial trade exposure.

Identifying industry's exposure to trade with Mexico

Throughout the analysis I focus on manufacturing as it is the main tradable sector, at least when it comes to the trade liberalization episode considered in this chapter. NAFTA's phase-in period when it comes to agricultural goods spans 15 years, well beyond the time period I use in the analysis.

I use manufacturing import and export data assembled by Robert Feenstra and Peter Schott from the US Census Bureau (Feenstra, 1996, 1997; Feenstra et al., 2002). The exposure measure is constructed as follows: I regress shares of trade with Mexico by industry on the set of industry indicators, year fixed effects and interactions between industry indicators and the post-trade-liberalization dummy. I use trade data that spans years 1986 to 2000. Equation (1.1) is used for this purpose:

$$TradeShare_{jt}^{MEX} = \sum_{j=1}^{65} \theta_{0j} Ind_j + \sum_{j=1}^{65} \theta_{1j} Ind_j \cdot Post_t + \delta_t + \gamma ShareMex_j \cdot t + u_{jt} \quad (1.1)$$

where $TradeShare_{jt}^{MEX}$ is the US share of trade with Mexico over the total trade with WTO-member countries in industry j and year t. Ind_j is an indicator of industry j and $Post_t$ indicates whether year t is in the post-NAFTA period, that is it takes on value 1 if year is 1994 or later, and 0 otherwise; δ_t is a set of year dummies. Deviations from the trend might be endogenous to many industry characteristics (e.g., product mix,

structural costs to trade, etc.), but my results would not be affected unless one of those characteristics were correlated with the presence of individuals with the relevant cultural background in the industry and/or their wages. However, since I cannot rule out that such correlation exists, I address this issue by including the share of individuals with Mexican background –either first- or higher-generation Mexican immigrants– employed in each industry before the NAFTA's implementation as an additional covariate. Actually, I interact these shares with time trend, $ShareMex_j \cdot t$, thus allowing industries' to follow different trends depending on the initial shares of Mexican descendants employed in these industries.

Coefficient θ_{1j} measures industry *j*'s deviation of trade with Mexico from the trend after the shock, net of any possible effects of Mexican workers being employed in the industry before the liberalization. It is estimated for all 65 manufacturing industries that could be consistently matched through the Censuses and to the trade data.

Taking the estimation results from equation (1.1), I generate a *trade exposure* variable, which for each industry *j* takes on value θ_{1j}. Figure 1.2 shows the distribution of the industrial exposure to trade with Mexico. The average of the distribution is 5.8-percentage point increase, which represents around a 30 percent increase in trade shares. The distribution is spread between 0 and 15 percentage point changes. This means that, conditional on the concentration of workers with Mexican background in every industry, some industries experienced much slower increase in the trade volume with Mexico, though overall changes were positive.

On the basis of these estimates, I define *high-trade-exposure industries* as those above the 70th percentile of the trade intensification distribution, represented as a shadowed area in the Figure 1.2. Those are the industries that increased their trade share with Mexico by at least 6.7 percentage points.[4] These measures of trade exposure estimated here are then used to estimate the main results, i.e. wage, employment and occupational effects.

Triple difference specification: wage and occupational effects

To identify the effect of trade on wages and occupations, I use a triple difference specification, where the 'treated' group are individuals with Mexican background employed

[4]The analysis is not sensitive to this particular threshold for top trade intensification. 60th, 75th and 80th percentile cutoffs provide similar results.

in industries exposed to increasing trade with Mexico in the post-NAFTA period. The econometric specification takes on the following form:

$$y_{ijst} = \beta_0 + \beta_1 \textbf{Mexican}_i \cdot \textbf{TradeExp}_j \cdot \textbf{Post}_t + \beta_2 Mexican_i \cdot Post_t + \beta_3 Mexican_i \cdot TradeExp_j$$

$$+\beta_4 TradeExp_j \cdot Post_t + \beta_5 Mexican_i + \beta_6 TradeExp_j + \delta_t + \lambda_s + \gamma X_{ijst} + u_{ijst} \qquad (1.2)$$

the outcome y_{ijst} in the *wage* regressions measures log weekly wages of individual i, in industry j, state s and time t, while when estimating the occupational effects the outcome indicates that individual i, in industry j, state s and time t is employed in a trade-related occupation.[5] Following Aleksynska and Peri (2012), I define trade-related occupations as follows: I take occupations listed in the Standard Occupational Classification (SOC) as Management Occupations, Business and Financial Operations Occupations, and Sales and Related Occupations, and from each category I drop those occupations with high shares of low-skilled workers.[6] Occupations surviving this selection process are defined as being trade-related. On the right-hand side of the equation (1.2), $Mexican_i$ indicates that individual i is a US-born Mexican descendant; $TradeExp_j$ measures industry j's exposure to trade intensification with Mexico (the percentage-point increase in trade share with Mexico after NAFTA was implemented); and $Post_t$ is a post-liberalization indicator, which in case of NAFTA indicates the year 2000. δ_t and λ_s are the time and state fixed effects and X_{ijst} is a set of controls that comprises individual, industry and state characteristics. Individual controls include age (up to a cubic form), years of education, race, Hispanic indicator and family controls, such as marital status and number of children. Returns to education are allowed to vary in time and by industry trade exposure. In a subset of baseline regressions, I also control for the shares of all foreign-born individuals, as well as Mexican immigrants in the every industry, state and year.

The coefficient of interest is on the triple interaction between Mexican ancestry indicator, trade exposure measure and post-liberalization indicator, β_1. In the wage regressions, β_1 gives us a differential increase in wages for individuals endowed with

[5] Wages are winsorized at 1 percent to avoid measurement errors and extreme values.

[6] I drop those occupations that fall above 60th percentile of the distribution of high school dropouts across occupations, using this selection process I eliminate from trade-related occupations such categories as agriculture-related managerial occupations, or door-to-door salesmen and cashiers, which are unlikely to be related to international trade.

Mexico-specific cultural capital by industry's exposure to trade with Mexico. In the occupational regressions that are estimated as a linear probability model, β_1 is interpreted as a differential change in the probability of being employed in a trade-related occupation, for individuals with Mexican background by exposure to trade with these two countries. In other words, it represents a within-industry differential occupational upgrading for workers endowed with the relevant cultural capital.[7]

Taking an example of wages of Mexican descendants, the triple differences strategy can be loosely interpreted as identifying the wage growth of Mexican descendants in industries affected by trade relative to the wage growth of other natives employed in these industries, over and above the relative wage growth of Mexican descendants in other industries.

$$\beta_1(W) = (\Delta W^{\text{Mexican}}_{\text{high exposure}} - \Delta W^{\text{non-Mexican}}_{\text{high exposure}}) - (\Delta W^{\text{Mexican}}_{\text{low exposure}} - \Delta W^{\text{non-Mexican}}_{\text{low exposure}})$$

Difference-in-difference specification: employment effects

To tackle the effect of trade liberalization on the flow of workers with the Mexico-specific cultural capital towards industries that increased the most their trade with Mexico after the liberalization, I use a difference-in-difference approach. Specification (1.3) is a difference-in-differences version of equation (1.2).

$$HighTradeExp^{MEX}_{ist} = \alpha_0 + \alpha_1 \textbf{Mexican}_i \cdot \textbf{Post}_t + \alpha_2 Mexican_i + \delta_t + \lambda_s + \gamma X_{ist} + u_{ist} \quad (1.3)$$

$HighTradeExp^{MEX}_{ist}$, the outcome, is a dummy variable that indicates that individual i, in state s and time t is employed in one of the industries defined as 'high-exposure', i.e. industries that increased their trade share with Mexico by at least 6.7 percentage points. The coefficient of interest is on the interaction between Mexican ancestry and post-liberalization indicators, α_1. It gives us a post-NAFTA change in probability of being employed in an industry highly exposed to trade with Mexico –relative to other

[7]The rest of the interaction terms can be interpreted as follows: changes in wages/probability of being employed in trade-related occupation of Mexican descendants ($Mexican_i \cdot Post_t$) and other workers (δ_t), differential returns/probability to/for Mexican descendants by ex-post trade exposure before the shock ($Mexican_i \cdot TradeExp_j$), and changes in wages/probability of being employed in trade-related occupation of other workers by trade exposure in the post-liberalization period ($TradeExp_j \cdot Post_t$), as well as differential returns/probability to/of Mexican descendants ($Mexican_i$) and differential returns/probability by ex-post trade exposure ($TradeExp_j$) in the pre-liberalization period.

manufacturing industries– for individuals endowed with Mexico-specific cultural capital.[8] Individual controls used in this specification are the same as in Specification (1.2), but now returns to education are allowed to vary in time only, and shares of immigrants are estimated on a time and state level, not industry.

Heterogeneous effects

Heterogeneity is a crucial aspect to trade effects, either if we are looking at the general effects of trade on workers or measuring the effect of trade on the labor market returns to cultural capital. Low-skilled individuals are not expected to benefit from trade with their country of origin since they are likely to lack generic human capital that is necessary in performing tasks that reduce barriers to trade, such as information search and processing, and bargaining. Moreover, to truly identify the effect of trade on occupations, I have to look at both an inflow of workers towards occupations related to trade activity and a wage premium paid in those occupations. Specifications (1.2) and (1.3), as presented above, estimate the overall wage, occupational and employment effects for individuals with the relevant cultural capital. To estimate heterogeneous effects by skills and occupations, I interact both models with college and trade-related occupation indicators. This allows me to estimate wage, occupational and employment effects for high-skilled workers endowed with Mexico-specific cultural capital, as well as the wage premium and employment effect for individuals in trade-related occupations.

In sum, if trade affects the demand for country-specific cultural capital, then the coefficients β_1 and/or α_1 should be positive and significantly different from zero. Put differently, wages of Mexican descendants who work in the affected industries should grow relatively faster than the wages of individuals not endowed with the relevant cultural capital or those who work in industries not particularly affected by the shock. This differential growth in wages should attract individuals of Mexican descent toward industries and occupations with the fastest growing demand for their unique background. Thus, we should also observe a relatively higher growth in the share of Mexican descendants working in the affected industries and occupations related to trade activity, though we don't necessarily expect to observe all the effects at once.

[8]The coefficient α_2 on $Mexican_i$ gives us a differential probability of being employed in high-trade-exposure industries that Mexican descendants had before the liberalization.

1.4 Data and pre-NAFTA sample description

When studying the effect of NAFTA on the value of Mexico-specific cultural capital I use the 5 percent sample from the US Population Census for the years 1980, 1990 and 2000.[9][10]

The sample consists of US-born male manufacturing workers aged 16 to 65 with positive salary income in the year prior to the interview, which amounts to 1,499,841 individuals.[11] Descriptive statistics for the sample in the pre-liberalization period are shown in Table 1.1, where first two columns correspond to the whole sample used in the analysis of NAFTA, and in the last two columns I focus on a subsample of college graduates. About 2.5 percent of individuals in the sample report having Mexican ancestry. The observations are split quite evenly across the years.

Among men with no Mexican ancestry, 26 percent work in manufacturing; this probability is smaller for individuals with Mexican ancestry, only 22 percent of whom worked in manufacturing before the implementation of NAFTA. The difference is even more striking when comparing college graduates, only 12 percent of high-skilled Mexican descendants worked in manufacturing before the agreement compared to 20 percent for individuals without Mexican ancestry. Mexican descendants earned about 170 dollars less per week than individuals without Mexican ancestry, which corresponds to about 25 percent lower wages.[12] Even when we compare similarly educated individuals, the pay gap is still there.

About a third of individuals in the sample worked in industries that considerably

[9] I exclude waves prior to 1980 because they did not include questions on individual ancestry comparable to those asked in later waves; also, other individual characteristics would not be comparable throughout the sample if earlier waves were included. Since NAFTA was implemented in 1994, the 2000 wave marks the post-liberalization period.

[10] As a secondary data source, I use the US Current Population Survey (CPS), March supplement, for the years 1980 to 2002. In this survey I can track workers with Mexican ancestry, though I cannot distinguish between first- and higher-generation workers, because the question on the individual place of birth was only introduced in 1994. For this reason, this data is not suitable for the main analysis. I use this data to see the trends in wages and exposure to trade with Mexico for workers with Mexican ancestry before the shock, see Figures 1.3 and 1.4.

[11] Self-employed workers are likely to react differently to the trade shock, particularly in industries in which they are likely to establish commercial links with their ancestral countries, I exclude such individuals from my sample to avoid reverse causality problem. The analysis, however, is robust to the inclusion of the self-employed.

[12] Weekly wage is computed using the pre-tax salary income and weeks of work in the previous year reported by the individual. Wages are adjusted for inflation using 1999 US dollars.

increased their trade with Mexico after 1994 –high-trade-exposure industries–. Mexican descendants were as likely to to work in these industries as other natives, though this was not true for the high-skilled individuals. Only 24 percent of the high-skilled Mexican descendants work in the high-exposure industries, compared to 28 percent for other natives. About 16 percent of natives were employed in the high-skilled trade-related occupations, while the share of Mexican descendants in these occupations is only 6 percent. When looking at the high-skilled individuals, overall probability of being employed in a trade-related occupation increases but the gap between Mexican descendants and other natives remains. Mexican descendants also were younger than other natives, and they were much less likely to have graduated from college: only 4 percent of Mexican descendants had college or higher levels of education, which is about 4 times smaller than for other natives. Mexican descendants lived in states with higher shares of foreign-born population and, in particular, states with high shares of Mexican immigrants.

In few words, in 1980 and 1990 Mexican descendants constituted a largely disadvantaged minority. They earned lower wages, were less likely to be employed in trade-related occupations, not any more likely to work in the ex-post high-trade-exposure industries, and were less educated than other natives. These differences remain large even when we compare similarly skilled individuals.

1.5 The effect of NAFTA on wages, employment and occupation of Mexican descendants

In this section, I present the estimated effects of US-Mexico trade intensification on the returns to Mexican cultural capital in the US labor market.

Before moving to the regression results, in Figures 1.3 and 1.4, I show how wages and exposure to trade with Mexico evolved before and after the shock. In these figures, I use the CPS data that covers years 1980 to 2002. I do not use the census data, because it is decennial and this makes it hard to appreciate the year-to-year evolution in wages and exposure to trade.[13] In Figures 1.3 and 1.4, I plot log weekly wages and exposure

[13]The last year of the sample is 2002 because after that the categories within question on whether individual is of Hispanic origin change, this change makes the samples of individuals defined as Mexicans

to trade increase with Mexico after NAFTA for Mexican and non-Mexican manufacturing workers between 1980 and 2002. The plots are the result from the non-parametric regressions of wages and exposure to trade with Mexico on year.

In the Figure 1.3, I show the evolution of wages of Mexican descendants versus workers with no Mexican ancestry.[14] Before NAFTA's implementation, wages of Mexican descendants appear to be on a decreasing trend, while those for workers with no Mexican ancestry, fluctuate a little but in general appear stable. After NAFTA's implementation, wages of Mexican workers change trend and start increasing, while those of other workers also appear to increase but without a break in trend observed for Mexican descendants.

In Figure 1.4, I plot exposure to trade with Mexico for Mexican and non-Mexican manufacturing workers. This figure can be interpreted as the evolution of employment by trade exposure. For instance, the fact that industry trade exposure for Mexican descendants in 1980 is 0.056 means that an average Mexican manufacturing worker in 1980 was employed in an industry that after NAFTA's implementation would increase it's trade with Mexico by 5.6 percentage points. In general there are no significant differences in terms of exposure to trade between Mexican and non-Mexican workers. However, Mexicans seem to be less exposed to trade with Mexico than the rest of workers throughout the period. Average exposure to trade is increasing for both groups during the 1980s, but thereafter it is decreasing, and more so for non-Mexican workers, although the difference is not significant.

At a first glance it seems like Mexican descendants might be differentially affected by trade with Mexico in terms of their wages, though it is not very apparent. Now I move towards a regressions analysis, which allows me to quantify the differences between Mexicans and non-Mexicans in a more systematic and accurate way.

1.5.1 Wage effect

Estimated wage effects of NAFTA are shown in Table 1.2.[15] In columns (1) and (2), I show the overall effect of NAFTA on wages of Mexican descendants; in columns (3) and

before and after 2002 not comparable.

[14] Notice that here I cannot distinguish between natives and foreign-born individuals.

[15] Only the coefficients on the triple interaction between the Mexican-ancestry indicator, industry trade exposure and post-NAFTA period indicator are displayed.

(4), these effects are allowed to vary by education; and in columns (5) and (6), I estimate heterogeneous effects by occupation. Columns (1), (3) and (5) show the baseline results that include individual covariates, state fixed effects, and controls for education. I allow returns to education to change in time and to be different for industries more or less exposed to trade with Mexico.[16]

The overall effect of NAFTA on Mexican workers is small and insignificant. However, these small overall results mask strong heterogeneous effects by skills level (see columns (3) and (4)). High-skilled Mexican descendants appear to strongly benefit from NAFTA. The effect of trade with Mexico on wages of the high-skilled Mexican descendants is high, positive and very significant. Negative coefficients for the low-skilled workers are small and insignificant. These may be attributed to the competition effect from import of goods, which could be intensive in skills specific to Mexican workers. This, however, is just a conjecture and goes beyond the scope of this paper. In addition, from columns (5) and (6), we can see that there's important heterogeneity by occupation. All of the wage premium is concentrated among workers employed in trade-related occupations.

In columns (2), (4) and (6), I control for the shares of foreign-born population in general, as well as Mexico-born in particular in each state, year and industry. I include immigration controls in order to take into account an inflow of migrants into the United States during the period. Most worrisome is an increase in migration from Mexico due to the peso crisis that coincides with NAFTA's implementation. Such migration flows, if anything, should increase the supply of Mexican cultural capital in the United States, hence biasing downwards the results. In this case, the results of my analysis should be interpreted as lower bound of the true effect. Shares of migrants, however, should not be taken as controls since they might be endogenous. If they are related to wages and to exposure to trade with Mexico, for instance, then the main coefficients should be affected by the inclusion of such variables into regression. This is not the case, the results are very robust to the inclusion of share of foreign-born and Mexican immigrants into the regression, suggesting that the baseline results are not driven by any underlying trends in migration in general and Mexican migration in particular.

Back-of-the-envelope calculations show that a 1 percentage point increase in an in-

[16]Individual controls (apart from age and education) include marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators.

dustry trade share with Mexico is associated with approximately 2.5 percent faster wage growth for high-skilled Mexican descendants. This means that high-skilled Mexican descendants that work in an industry that experienced larger than a median increase in trade shares with Mexico benefit from about 10 percent faster wage growth in the post-NAFTA period. All-in-all, trade liberalization seems to generate a wage premium for workers endowed with cultural capital specific to the trading partner country, and this effect is concentrated among high-skilled individuals. We also observe an increased wage premium in trade-related occupations for Mexican descendants, further suggesting that the wage premium we observe for Mexican descendants is a product of an intensified trade relationship between Mexico and the United States.

1.5.2 Employment effect

Employment effects estimated using equation (1.3) are presented in Table 1.3. The organization of the table is the same as in Table 1.2. All controls included in the baseline specification are the same as in the wage regressions, excluding industry-level covariates. This means that returns to education are allowed to vary in time but not by exposure to trade, and shares of migrant workers are computed on year and state level.

From the coefficients in Table 1.3, there seems to be an overall outflow of workers with Mexican ancestry from industries highly exposed to trade with Mexico (see column (1)). The coefficient decreases to zero and becomes insignificant once I include controls for shares of immigrants in each year and state (column (2)). This suggests that the outflow of workers from industries most exposed to trade intensification with Mexico is driven by immigration, which pushes workers from these industries by generating competition. In particular, given that Mexican migrants are the ones most likely to compete with Mexican descendants, together with the fact that Mexican migrants were mostly low skilled, we would expect this competition effect to be concentrated among the low-skilled group. Indeed, from columns (3) to (6), we can see that this is exactly what happens. The inclusion of migrant shares only affects coefficients for the low-skilled Mexican descendants and those not employed in trade-related occupations, while the coefficients for the high-skilled groups and for workers employed in trade-related occupations remain unchanged.

High-skilled Mexican descendants become more likely to work in industries that in-

creased trade with Mexico a lot –*high-trade-exposure* industries– and this result is not affected by migration. Inflow of the high-skilled Mexican descendants into high-trade-exposure industries is considerable in magnitude, about 4 percentage points, which represents almost 14 percent over the initial share of high-skilled Mexican descendants in these industries. The effect for Mexican descendants employed in trade-related occupations is smaller (though not significantly so) and very significant. These results suggest that industries that increased their trade with Mexico the most not only attracted high-skilled Mexican descendants, but also Mexican-descendants employed in trade-related occupations.

1.5.3 Occupational effect

Effects on occupations are estimated using equation (1.2) and shown in Table 1.4. This table is organized in the same way as Tables 1.2 and 1.3, with the only exception that now there are no results on heterogeneity by occupation, since the outcome is an indicator of being employed in a trade-related occupation. The set of controls used in these regressions is the same as the one used in wage regressions, that is, age, education, and other demographic controls, in addition to an interaction between years of education and post-NAFTA indicator, and industry trade exposure measure to allow for differential returns to education in time and by exposure to trade with Mexico.

The general pattern of coefficients is the same as with wages. Overall the effect of trade on probability of being employed in a trade-related occupation is positive for Mexican descendants, but not significant. As in the case of wages and employment in the exposed industries, the overall effects mask strong heterogeneity by skill level: while low-skilled individuals are slightly negatively affected by trade liberalization in terms of occupational upgrading, the high-skilled group becomes substantially more likely to be employed in a trade-related occupation as the industry they are employed in engages in trade with their ancestral country. The effect for the high-skilled group is very significant and large. On average, manufacturing industries increased their share of trade with Mexico by almost 6 percentage points. For a high-skilled Mexican descendant employed in such industry this means that his or her probability of being employed in a trade-related occupation increases by 10 percentage points, which represents a 30 percent increase from the pre-NAFTA average. Inclusion of migrant shares, does not affect

the results.

Summarizing the baseline results, I don't find evidence for a general increase in the demand for Mexican descendants as a result of trade liberalization with Mexico. The effect of trade is highly heterogeneous in skill level, and I do observe a considerable increase in the demand for high-skilled workers with Mexican background following industries' increased exposure to trade with Mexico. This increase in demand is reflected in faster wage growth, an increased inflow of workers into trade-related occupations, as well as an inflow of workers towards industries with an increased exposure to trade with Mexico. In addition, we don't only observe that Mexican descendants become more likely to be employed in trade-related occupations, but they also experience faster wage growth in these occupations.

1.6 Robustness checks

To test the validity of my results, I run two main robustness checks (in addition to the inclusion of migrant shares): i) a 'placebo' test where I test whether Mexican descendants are affected by an increase in trade with countries other than Mexico; and ii) I test for robustness to geographic controls and differentiate between border and non-border regions. The results to these tests are presented in the two following subsections.

1.6.1 Placebo test: trade with Japan and Mexican descendants

My main hypothesis is that cultural capital specific to the trading partner can reduce informal barriers to trade with this country. Hence, we should see an increase in the demand for high-skilled Mexican descendants in industries that engage in trade with Mexico. We shouldn't, however, observe such a differential increase in the demand for this group if trade increased with a country culturally unrelated to Mexico. In this section, I estimate changes in the demand for Mexican descendants in industries that increased their trade with Japan. If it was really trade with Mexico what drives the demand for Mexican cultural capital and not trade in general, then we should not observe any differential increase in the demand for Mexican descendants as a result of trade with Japan.

Japan is the US fifth most important trade partner. I estimate changes in trade with Japan for every industry using the same strategy I used to estimate an increase in trade with Mexico (that is, using equation (1.1)). When running the placebo test, I use a change in exposure to trade with Japan after 1994, instead of using trade with Mexico. Then, I test whether an increase in trade with Japan was reflected in an increase in demand for workers with Mexican background.

The results for this placebo test are shown in Table 1.5. Since the baseline results proved to be highly heterogeneous in skills and occupations, rendering overall results little informative, hereafter I will focus on results by skills and occupation. Wage effects are displayed in columns (1) and (2), columns (3) and (4) show the effects on the probability of being employed in industries that increased their exposure to trade with Japan the most, and column (5) shows the effect of trade on occupational upgrading.[17]

Most of the coefficients are insignificant, except for the occupational effects, and in any case the effects are of opposite sign of what we observe in the baseline. While higher exposure to trade with Japan leads to a slightly higher probability of being employed in a trade-related occupation for lower skilled individuals, high-skilled workers with Mexican background become less likely to be employed in these occupations. Since I define increase in trade exposure as increase in trade *share* with a given country, this patterns of coefficients might be due to trade diversion effect of trade with Japan. When it comes to wages, the coefficients for Mexican workers are negative and mostly insignificant, with high-skilled individuals being hurt by trade with Japan though this effect is only marginally significant.

To sum up, when looking at the trade increase with a country with unrelated cultural capital, we do not observe an increase in the demand for Mexican descendants like the one we observe when analyzing an increase in trade with Mexico. On the contrary, there is a limited evidence that the demand for these workers might actually shrink, probably due to crowding out effect of trade with Japan in deterrence of trade with Mexico.

[17] Using the same strategy as with Mexico, I focus on industries whose exposure to trade with Japan falls in the top 30 percent of the distribution of trade exposure across industries.

1.6.2 Sensitivity to geographic controls and importance of the border

Trade has an important geographic component. On the one hand, geographical distance is a common predictor of trade flows in the standard gravity models. On the other, the impact of trade on local labor markets is determined by the pre-existing industrial structure (Autor et al., 2013). In this paper, these considerations are of secondary importance, because I am interested in differential effects of trade on individuals of particular cultural background. However, geography gains relevance if consider patterns of immigrant settlement across the US regions and the degree of persistence in these patterns. From Table 1.1 we can see that Mexican descendants are much more likely to live in states with higher shares of foreign-born population than other individuals. Not just that, they also live in states with high shares of Mexican immigrants. Figure 1.5 illustrates the clustering of Mexican workers across states before the trade shock occurred. Mexican descendants mostly seem to cluster along the US-Mexico border. If trade effects are localized, the variations in the supply of cultural capital across different regions that comes with ethnic clustering may affect the results.

To deal with this, I allow state fixed effects to vary after the shock, therefore allowing for differential changes in wages, employment and occupation by states. In addition, I exclude border states and run the analysis on the sample of non-border states. I do so for two reasons. On the one hand, border states are the ones with the highest concentration of individuals with Mexican ancestry, both native and foreign-born, thus the supply of Mexico-specific cultural capital will be higher in these regions. At the same time, informational asymmetries in the border states are plausibly lower due to constant flows of goods and people between Mexico and the United States. On the other, states that border Mexico are more likely to be disproportionately affected by trade with Mexico because of the lower transportation costs and growth of 'maquiladora' plants along the US-Mexico border (Hanson, 1996). While higher supply of cultural capital should lead to smaller wage premium for Mexican descendants, more trade with Mexico should translate into higher demand for Mexico-specific cultural capital. This latter channel is likely to be less relevant, however. In Figure 1.6, I show state-level shares of employment in industries with high exposure to trade with Mexico before NAFTA's implementation. States with highest shares of employment in high-exposure industries concentrate on

the west of the United States, and not along the border. Therefore, whether the effect of trade with Mexico will be higher or lower in the border states is an empirical question addressed in this section.

Results from these sensitivity tests are presented in Table 1.6, where columns (1) to (5) show the robustness to the inclusion of interaction between state-specific fixed effects and post-liberalization indicator, and columns (6) to (10) show the results for the non-border US regions. Columns (1), (2), (6) and (7) display results from the wage regressions; columns (3), (4), (8) and (9) show the results from the employment regressions; and columns (5) and (10) display the occupational effects.

All results survive the inclusion of the interaction between state fixed effects and post-liberalization indicator, neither magnitudes nor significance are affected by these additional covariates. This suggests that an increase in the demand for Mexican descendants observed in the baseline was not driven by changes in wages and employment in states with high shares of Mexican descendants. Instead, there was a differential effect of trade with Mexico on individuals with Mexican ancestry.

When border states are excluded, the following changes with respect to the baseline results are observed. The wage premium for high-skilled Mexican descendants becomes larger, and the wage premium among trade-related occupations also increases, although this latter increase is insignificant due to an increase in the standard errors. On the other hand, the employment effects become insignificant and smaller. The occupational effects are also larger in the non-border regions. That is, while wage and occupational effects seem to be larger in the non-border regions, employment effects become smaller. Thus, in the states relatively more abundant in Mexico-specific cultural capital, employment effects are relatively more important, while in the states with lower density of workers with Mexican ancestry, NAFTA's effect is mostly reflected in wages and occupational upgrading.

In conclusion, I still observe an increase in a demand for Mexico-specific cultural capital as a result of higher exposure to trade with Mexico, even when I control for the fact that both the trade and migration have pronounced geographical patterns. Moreover, I can conclude that relative scarcity of Mexico-specific cultural capital leads to larger wage and occupational effects and smaller employment effects, consistent with the standard labor supply and demand theory.

1.7 Cultural capital: isolating the channels and mechanisms

I defined cultural capital as a combination of social capital, and local knowledge and skills. These broad categories include networks, knowledge of social rules and norms, and language. Some of these elements are specific to one particular country, while others are shared by several countries; some are easily identified while others are unobservable. In this section, I exploit different characteristics of cultural capital components to see which of them increase in demand after trade liberalization. In particular, I check whether the increase in the demand for Mexican descendants reflects an increase in the demand for language skills; whether this increase affects individuals with a potentially related cultural capital; I also inquire into the differences between native and foreign-born individuals, to isolate the value of assimilation; and, finally, I look at the longer term effects by combining the Census data with the American Community Survey and estimating NAFTA's effect 10 to 15 years after the implementation of the agreement.

1.7.1 Spanish skills and trade with Mexico

Language is probably one of the first things that come to mind when one thinks about culture or country-specific skills. It is one element of cultural capital that can be easily observed and it is a fundamental element of communication skills. The question I want to answer is whether an increase in the demand for Mexican descendants is solely explained by language skills and how the returns to Spanish skills changed after the implementation of the agreement. I do two separate tests in this section: i) I include controls for individual Spanish skills into the regression to test whether the main results are affected by these additional covariates, and to estimate changes in the returns to Spanish; and ii) I estimate the effect NAFTA on a subsample of descendants from all Spanish-speaking countries, estimating thus an effect of trade with Mexico on Mexican descendants relative to the rest of Spanish-speakers. The results are reported in Table 1.7

In the baseline specifications, I control for English proficiency, but what I am interested in here is whether conditional on individual level of English proficiency, speaking Spanish has any labor market returns. In the data I have information on the language

individuals use in the household and I use this information as a proxy for Spanish proficiency. If trade affects the value of language skills, then we would need to allow the return to Spanish to vary in time. This is what do in columns (1) to (5) of Table 1.7.[18] In columns (6) to (10), I report the estimated effect of NAFTA on Mexican descendants' wages, employment and occupations relative to descendants from other Spanish-speaking countries. Spanish is spoken in 20 countries and it is the second language in the world by the number of native speakers, focusing on the subsample of individuals who descend from countries where Spanish is an official or national language –this includes all Spanish-speaking Latin America and Spain– leaves me with a sample of 52,765 individuals.

I find that before NAFTA having Spanish as a household language is associated with lower wages, but higher probability of being employed in a high-exposure industry and being employed in a trade-related occupation. After NAFTA came in effect, returns to Spanish changed and significantly so. In particular, there was an increase in wages for Spanish speakers after the shock, and though it did not fully compensate for the initial penalty, it did reduce it by about a half. Speaking Spanish became even more strongly associated with being employed in a trade-related occupation, but the initial positive association with probability of being employed in a high-exposure industry is reduced to almost zero.[19] The main effects however are not affected by the inclusion of these additional controls. Therefore, while Spanish skills are undoubtedly important, from this first test it does not seem that it is the driving force of the effect of trade with Mexico on labor market returns to Mexico-specific cultural capital.

When we compare Mexican descendants to descendants from other Spanish-speaking countries, however, we see that wage and employment effects for the high-skilled Mexican descendants actually go up. Wage effects for high-skilled Mexican descendants increase by almost 2 points and employment effects for this group also increase by almost 3.5 percentage points relative to the baseline results (see columns (6) and (8)). When looking for individuals in trade-related occupations, we do observe higher wage

[18] Alternatively, I also allow returns to Spanish to vary in time and by industry exposure to trade with Mexico, but these additional interactions proved to be small and insignificant, while not affecting the main coefficients. Therefore, in this specification I only control for whether individual uses Spanish as a household language, and I interact it with a post-NAFTA indicator.

[19] Notice that since my sample only includes manufacturing workers, these coefficients should be interpreted as returns to and changes in returns to Spanish in manufacturing, rather than in the US labor market overall.

premium compared to the baseline, but the occupational effect remains the same.

In general, all results survive the inclusion of language controls, and Mexican descendants seem to be affected by trade with Mexico even when compared to other Spanish-speakers. Hence, it can be concluded that, although undoubtedly language skills are important as proven by significant coefficients on the language controls, it is not Spanish skills that drive the increase of demand for workers with Mexican background. The residual increase in demand may be driven by an increase in the value of networks or knowledge of local institutions, among other things which, unfortunately, cannot be easily identified from the data.

1.7.2 Related cultural capital: partial treatment test

Language is not the only aspect of cultural capital that might be common to several countries. Common colonial past, religion, or historical migration patterns might have evolved into similar institutions, common legal principles, shared social norms, etc. In this subsection, I examine the effect of NAFTA on the value of cultural capital which is related to but not specific to Mexico. To do so, I allow Central American descendants to be equally affected by NAFTA.[20] I focus on Central America because it is a region that throughout history, since pre-Colombian times until the onset of 19th century, was closely linked to what currently constitutes Mexico, especially its southern regions, developing an affluence of common cultural traits ranging from language to cuisine, to gender roles and family structure. These traits are likely to make communication with Mexican partners easier, although other aspects of cultural capital such as social capital and local knowledge are likely to be specific to Mexico.

To understand how NAFTA affects Centran American descendants, I estimate the effect of trade on Mexican and Central American descendants at the same time, treating Central Americans as a 'partially affected' group. The results from this test are presented in Table 1.8. Columns (1) and (2) display wage effects; columns (3) and (4) show employment effects, and column (5) shows occupational effects of NAFTA. Each column represents regression results from Specification (1.2) in columns (1), (2) and (5), and Specification (1.3) in columns (3) and (4), in which, in addition to the effect

[20]In particular, I focus on Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama. I exclude Belize as being the only English-speaking country.

of NAFTA on Mexican descendants, I estimate the effect on Central American descendants.

On the one hand, the results for Central American descendants are overwhelmingly insignificant. The effect of trade with Mexico for this group is far noisier than for individuals with Mexican ancestry. Despite lack of statistical significance, the coefficients are strikingly consistent across wage, occupational and employment regressions and, thus, deserve some attention. What we observe from Table 1.8 is that the effect of trade on low-skilled Central-American descendants is positive, while high-skilled Central Americans remain unaffected by post-NAFTA trade intensification with Mexico. This is a sort of pattern we would expect if communication and coordination with Mexican partners was less skill-intensive than, for instance, navigation through local institutions. Moreover, Central American descendants are unlikely to suffer from differential competition coming from imports intensive in Mexico-specific skills.

On the other hand, the results for Mexican descendants remain insensitive to the exclusion of this additional (partially) treated group from the control pool. Granting all this, the results for Mexican descendants are the only strongly significant ones. This suggests that at least part of the effect of trade on the demand for cultural capital is specific to Mexico.

1.7.3 Role of assimilation: migrants versus natives

Throughout the paper I was focusing on the US-born individuals. One important difference between the first- and higher-generation immigrants is that while first-generation immigrants are probably more endowed with home-country-specific cultural capital, higher-generation individuals, through assimilation, are endowed with both US- and home-country-specific cultural capital. Following the debate about immigrant assimilation, it is interesting to see whether it is just the demand for home-country-specific cultural capital, or the combination of both which goes up. For this test, I include foreign-born individuals into the sample.[21] I follow similar methodology as the one used for partial treatment test: to the baseline specification I add one more treated group, and estimate the effect of NAFTA on first- and higher-generation Mexicans at the same time. Since now also first-generation immigrants are included in the sample, it is important

[21] I only include immigrants with at least 5 years tenure in the United States, who arrived prior to 1994.

to control for the number of years individual spent in the United States. No just that, I allow the assimilation pace of Mexican descendants to be different from the rest of the immigrants by interacting number of years in the United States with an indicator of having Mexican ancestry. Similarly, I allow this pace it to change after the implementation of the agreement.

The results from this test are shown in Table 1.9. As in the previous section, columns (1) and (2) show wage effects; columns (3) and (4) display employment effects, while occupational effects are in column (5). All of these show separate results for immigrants and higher-generation individuals. In general, the results for higher-generation Mexican descendants remain unchanged, while coefficients for first-generation Mexican-immigrants are mostly insignificant. While the effects for high-skilled Mexican immigrants are positive (except for employment effect), they are generally small and not significant. When it comes to the wage premium among trade-related occupations, the coefficient is actually negative, while still insignificant. At the two bottom lines of the tables, I show coefficients for differential assimilation of Mexican immigrants before and after the shock. Coefficients on the interaction between years in the United States and Mexican background are quite small, and in the case of employment and occupational regressions these are very close to zero, but always significant (see columns (3) to (5)). Negative coefficients on the interaction between years in the United States and Mexican origin from wage regression imply that Mexican wages catch up at a slower pace than those for other immigrants. After 1994, this changes quite drastically and assimilation of Mexican descendants in terms of wages becomes even faster than that of other migrants.

It seems thus that it is mostly the demand for higher-generation Mexicans that goes up, rather than for first-generation Mexican immigrants. This result is consistent with an increase in the demand for Mexico-specific cultural capital combined with US-specific cultural capital, or assimilation. Though alternative explanations are also possible, since immigrants are likely to differ from natives in a number of characteristics other than assimilation. For instance, it could also be US-acquired education in combination with Mexican cultural capital, rather than US cultural capital. Unfortunately, I cannot disentangle these two explanation due to the data limitations. However, the fact that pace at which Mexican wages catch up after the shock is consistent with the idea of complementarity of US- and Mexico-specific cultural capital.

1.7.4 Long-run effects

In the analysis so far, I have been measuring the effect of NAFTA on wages, employment and occupations in the year 2000, 6 years after the implementation of the agreement. NAFTA, however, had 5 to 10 years phase in period, therefore it would be of interest to analyze longer term effects of NAFTA. To do so, in addition to the main data, I use data for years 2005 to 2010 from the American Community Survey (ACS). The ACS sample consists in 1 percent of the US households and the questionnaire is consistent with that used in the Census. Since in the main analysis I use 5 percent census, in this test I pool data from the ACS 2005 to 2010 waves. I then adjust Specifications (1.2) and (1.3) as follows: instead of using a post-NAFTA indicator (that with this new data would indicate the years 2000 and 2005 to 2010), I generate two post-NAFTA indicators, one indicating the year 2000 that would be used to estimate a medium-run effects, and another that indicates the years 2005 to 2010 that will be used to estimate longer-term effects of NAFTA.

The results from this specification are shown in Table 1.10. Columns (1) and (2) show the results from the wage regressions, columns (3) and (4) display estimated employment effects, and column (5) shows occupational effects. The four top rows show medium-term effects, while the bottom four rows show the longer term effects. While the medium term effects are, as expected, the same as in the baseline specification, longer term estimates deserve some attention. We still observe wage, employment and occupational effects among high-skilled Mexican descendants even up to 16 years after the implementation of the agreement. NAFTA seems to have a persistent effect on this group. However, when we focus on trade-related occupations we see that the wage premium among individuals employed in these occupations disappears and so does the employment effect. The pattern of coefficients is the same as for medium-run but now they are smaller and not significant.

This pattern of coefficients is consistent with the following dynamics: after the agreement Mexico-specific cultural capital appreciates especially among trade-related occupations, which is manifested by wage premium observed in the medium-run estimates. This premium attracts Mexican-descendants towards industries that trade with Mexico and towards trade-related occupations. As more Mexican descendants enter these occupations, wage premium dissipates. We still observe, however, that more high-

skilled Mexican descendants are employed in these occupations even on the longer term.

1.8 Summary

The aim of this chapter is to identify the effect of trade on the value of cultural capital specific to the trading partner. I use NAFTA to estimate the causal link between the US-Mexico trade and the labor market returns to Mexico-specific cultural capital in the United States.

Two principle findings generated by the analyses are i) the demand for Mexico-specific cultural capital goes up when the US-Mexico trade relations intensify; ii) this increase in the demand is concentrated among the high-skilled workers implying complementarity between cultural and generic human capital. The main results show that labor market demand for workers endowed with Mexican cultural capital goes up after NAFTA and this shift in the demand is reflected in workers' wages, employment and occupational distribution.

High-skilled Mexican descendants experience substantially higher wage growth when the industry they are employed in trades more with Mexico. Mexican descendants also flow towards industries that intensified their trade with Mexico after the implementation of the agreement. Finally, occupational distribution of high-skilled Mexican descendants shifts towards occupations related to trade activity, such as sales and managerial jobs.

Further tests show that this increase in the demand is specific to a particular country. On the one hand, tests show that an intensification in trade with countries with unrelated cultural environment, such as Japan, does not have an effect on the demand for Mexico-specific cultural capital. On the other, individuals with cultural capital related to Mexican, such as Central American, seem to be affected to a lesser extent. Results from the tests designed to disentangle the channels and elements of cultural capital suggest that language is not the element of cultural capital that drives the results, in lieu other elements of cultural capital, more specific to one particular country such as local knowledge or networks seem to be the driving force. An increase in the demand is most pronounced among US-born individuals and this suggests that country specific cultural capital becomes productive when it is paired with some host-country-specific human or cultural capital as well. The effect of NAFTA is strong and significant in medium- and

long-term, though wage premium among trade-related occupations dissipates when we extend the temporal horizon of the analysis.

1.9 Appendix: Changes in the labor market supply of Mexican descendants after NAFTA

Throughout the analysis I focus on manufacturing workers only. What is also interesting is to see whether after the trade shock Mexicans became more or less likely to become employed in general and employed in manufacturing in particular.

To test this, I use the same data I use in the main analysis and estimate a linear probability model (LPM) using Specification (1.3) on the sample of all native men aged 16 to 65. I use an indicator of being employed, on the one hand, and of being employed in manufacturing, on the other, as outcomes. The regression results are presented in Table 1.11. In the first two columns, I estimate differential changes in probability of being employed after the shock, and in columns (3) and (4) I estimate whether Mexican descendants become more likely to be employed in manufacturing. I include the same set of controls I use when estimating employment effects in the main analysis.

I find that overall the probability of being employed after the shock for Mexican descendants decreases by about 0.6 percentage points. This decrease, however, is concentrated among low skilled individuals whose probability to be employed decreases by 1.8 percentage points, while high-skilled Mexican descendants become 2.1 percentage points more likely to be employed after the shock (see column (2)). That is, after the shock, the supply of high-skilled Mexican descendants in the labor market increases. In particular, I find that high-skilled Mexican descendants also become more likely to be employed in manufacturing sector, and this increase is again concentrated among high-skilled individuals. The probability of being employed in manufacturing for the high-skilled Mexican descendants increases by almost 6 percentage points.

These results imply that after the shock, there are more high-skilled workers endowed with the relevant-cultural capital in the manufacturing sector. This should reduce the wage premium these workers obtain after the shock as the effect of trade with Mexico. Thus, the positive wage effects I find for high-skilled Mexican descendants might be the lower bound of the real effect.

1.10 Figures and tables

Table 1.1: PRE-NAFTA SUMMARY STATISTICS OF THE SAMPLE

	The whole sample		*College graduates*	
	Mexican descendants	Other ancestry	Mexican descendants	Other ancestry
Employed in manufacturing	0.22	0.26	0.12	0.20
Weekly wage	685.47	856.38	1042.72	1301.39
Employed in high trade exposure industry	0.32	0.31	0.24	0.28
Trade-related occupation	0.06	0.16	0.33	0.45
Age	35	38	36	40
Share of immigrants in state	0.14	0.07	0.16	0.09
Share of Mexican immigrants in state	0.06	0.01	0.06	0.02
Spanish spoken at home	0.68	0.01	0.49	0.01
College graduate	0.04	0.16		
Number of observations	36,562	1,463,279	2,087	256,010

Notes: Author's calculations using a 5 % sample from the US Population Census years 1980 and 1990 provided by the IPUMS-USA. Sample consists of native male workers aged 16 to 65. Self-employed individuals are excluded. In the last two columns, only individuals with at least 15 years of education are included. 'High exposure to trade' means that industry increased its share of trade with Mexico by at least 6.7 percentage points. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production.

Table 1.2: WAGE EFFECT OF TRADE FOR WORKERS WITH MEXICAN BACKGROUND, OVERALL, BY EDUCATION AND OCCUPATION

Dep. var.:	log weekly wages					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Exposure to trade×Mexican Ancestry×Post	0.028	0.009	-0.346	-0.354*	-0.207	-0.197
	(0.254)	(0.206)	(0.277)	(0.185)	(0.241)	(0.286)
× College graduate			2.933**	2.720***		
			(1.211)	(1.001)		
× Trade-related occupation					2.170***	1.946***
					(0.472)	(0.673)
Observations	1499841	1499841	1499841	1499841	1427957	1427957
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y	Y
Shares of foreign-born workers and Mexican immigrants in each year, state and industry	N	Y	N	Y	N	Y

Notes: Results in this table show NAFTA's effect on wages of Mexican descendants. Sample consists of native male workers aged 16 to 65 employed in manufacturing, using 5% sample of the US Population Census 1980, 1990 and 2000 waves. 'Mexican Ancestry' indicates that individual is of Mexican ancestry; 'Post' is a post-liberalization time indicator; and 'Exposure to trade' measures an increase in industry trade share with Mexico after the trade liberalization. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. In the parenthesis bootstraped standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 1.3: EMPLOYMENT EFFECT OF TRADE FOR WORKERS WITH MEXICAN BACKGROUND, OVERALL, BY EDUCATION AND OCCUPATION

Dep. var.:	Indicator of being employed in industry with high exposure to trade					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Mexican Ancestry×Post	-0.011***	-0.000	-0.004	-0.005	-0.014***	-0.004
	(0.003)	(0.003)	(0.005)	(0.006)	(0.003)	(0.004)
× College graduate			0.038*	0.037*		
			(0.020)	(0.020)		
× Trade-related occupation					0.025**	0.025**
					(0.012)	(0.012)
Observations	1499841	1499841	1499841	1499841	1427957	1427957
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y	Y
Shares of foreign-born workers and Mexican immigrants in each year and state	N	Y	N	Y	No	Y

Notes: Results in this table show NAFTA's effect on the flows of Mexican descendants into sectors that increase their trade with Mexico after the agreement. Sample consists of native male workers aged 16 to 65 employed in manufacturing, using 5% sample of the US Population Census 1980, 1990 and 2000 waves. 'Mexican Ancestry' indicates that individual is of Mexican ancestry; 'Post' is a post-liberalization time indicator; and 'High exposure to trade' means that industry increased its share of trade with Mexico by at least 6.7 percentage points. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. In the parenthesis bootstraped standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 1.4: OCCUPATIONAL EFFECT OF TRADE FOR WORKERS WITH MEXICAN BACKGROUND, OVERALL AND BY EDUCATION

Dep. var.:	Indicator of being employed in a trade-related occupation			
	(1)	*(2)*	*(3)*	*(4)*
Exposure to trade×Mexican Ancestry×Post	0.140	0.140	-0.244**	-0.250*
	(0.105)	(0.110)	(0.106)	(0.130)
× College graduate			1.856**	2.145***
			(0.772)	(0.713)
Observations	1427957	1427957	1427957	1427957
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y
Shares of foreign-born workers and Mexican immigrants in each year, state and industry	N	Y	N	Y

Notes: Results in this table show NAFTA's effect on the probability of being employed in a trade-related occupation for Mexican descendants. Sample consists of native male workers aged 16 to 65 employed in manufacturing, using 5% sample of the US Population Census 1980, 1990 and 2000 waves. 'Mexican Ancestry' indicates that individual is of Mexican ancestry; 'Post' is a post-liberalization time indicator; and 'Exposure to trade' measures an increase in industry trade share with Mexico after the trade liberalization. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. In the parenthesis bootstraped standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 1.5: PLACEBO TEST, USING EXPOSURE TO TRADE WITH JAPAN

Dep. var.:	log weekly wage		Employed in a high trade exposure industry		Employed in a trade-related occupation
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Exposure to trade×Mexican×Post	-0.031	-0.352*			0.407***
	(0.183)	(0.187)			(0.084)
Mexican×Post			0.004	0.005	
			(0.005)	(0.004)	
× College graduate	-0.975*		-0.029		-1.818***
	(0.567)		(0.019)		(0.548)
× Trade-related occupation		0.260		0.003	
		(0.604)		(0.015)	
Observations	1499841	1427957	1499841	1427957	1427957
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y

Notes: Results in this table show the effect of trade increase with Japan on individuals of Mexican ancestry. 'Mexican' indicates that individual is of Mexican ancestry; 'Post' is a post-1994 indicator; and 'Exposure to trade' measures an increase in industry trade share with Japan after 1994. Columns (1) and (2), show the effect on wages of Mexican descendants; in columns (3) and (4), we observe the effect on the inflow of Mexican descendants to the industries with high exposure to trade with Japan; and in column (5) we see a change in probability of being employed in a trade-related occupation for the high-skilled Mexican descendants by exposure to trade with Japan. In the parenthesis heteroskedasticity robust standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 1.6: ROBUSTNESS TO GEOGRAPHIC CONTROLS AND EXCLUSION OF BORDER STATES

Dep. var.:	log weekly wage		Employed in a high trade exposure industry		Employed in a trade-related occupation	log weekly wage		Employed in a high trade exposure industry		Employed in a trade-related occupation
	Whole Sample					*Non-border states*				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Exposure to trade×Mexican×Post	-0.282	-0.142			-0.237**	-0.487	-0.218			-0.429**
	(0.233)	(0.242)			(0.105)	(0.418)	(0.429)			(0.167)
Mexican×Post			-0.005	-0.002				0.014	-0.003	
			(0.006)	(0.004)				(0.010)	(0.006)	
× College graduate	2.912***		0.038*		1.870**	4.638***		0.015		2.632*
	(1.092)		(0.020)		(0.890)	(1.617)		(0.038)		(1.482)
× Trade-related occupation		2.159**		0.025**			2.849		0.017	
		(0.888)		(0.012)			(1.784)		(0.024)	
Observations	1499841	1427957	1499841	1427957	1427957	1284480	1219156	1284480	1219156	1219156
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
State FE×Post	Y	Y	Y	Y	Y	N	N	N	N	N

Notes: In this table I test the robustness of the main results to the inclusion of geographic controls and estimate the effects of NAFTA using a subset of non-border states. In the columns (1) to (5), I show the robustness of the main results to the inclusion of state fixed effects interacted with post-NAFTA indicator. In columns (6) to (10), I show the results for a subset of non-border states. Sample consists of native male workers aged 16 to 65 employed in manufacturing, using 5% sample of the US Population Census 1980, 1990 and 2000 waves. 'Mexican' indicates that individual is of Mexican ancestry; 'Post' is a post-liberalization time indicator; 'Exposure to trade' measures an increase in industry trade share with Mexico after the trade liberalization; and 'High trade exposure' means that industry increased its share of trade with Mexico by at least 6.7 percentage points. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. In the parenthesis heteroskedasticity robust standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 1.7: ISOLATING CULTURAL CAPITAL FROM THE VALUE OF SPANISH SKILLS

Dep. var.:	log weekly wage		Employed in a high trade exposure industry		Employed in a trade-related occupation	log weekly wage		Employed in a high trade exposure industry		Employed in a trade-related occupation
	Whole Sample					*Descendants from Spanish-speaking countries*				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Exposure to trade×Mexican×Post	-0.362	-0.227			-0.241**	-0.595	-0.701*			-0.121
	(0.232)	(0.241)			(0.105)	(0.403)	(0.418)			(0.209)
Mexican×Post			0.007	-0.009**				0.011	-0.008	
			(0.007)	(0.004)				(0.010)	(0.006)	
× College graduate	2.998***		0.035*		1.846**	4.574***		0.067***		2.073*
	(1.088)		(0.020)		(0.889)	(1.372)		(0.025)		(1.139)
× Trade-related occupation		2.250**		0.025**			3.177**		0.029	
		(0.885)		(0.012)			(1.340)		(0.018)	
Spanish in the HH	-0.047***	-0.050***	0.021***	0.007***	0.007**					
	(0.005)	(0.005)	(0.004)	(0.002)	(0.003)					
Spanish in the HH×Post	0.025***	0.027***	-0.017***	-0.007**	0.007*					
	(0.007)	(0.007)	(0.006)	(0.004)	(0.004)					
Observations	1499841	1427957	1499841	1427957	1427957	52765	49543	52765	49543	49543
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Language controls	Y	Y	Y	Y	Y	N	N	N	N	N

Notes: In the columns (1) to (5), I show the robustness of the main results to the inclusion of language controls, these include a indicator of whether Spanish is used as a household language, and this indicator interacted with post-NAFTA indicator. In columns (6) to (10), I show the results for a subset of individuals who descend from Spanish-speaking countries. Sample consists of native male workers aged 16 to 65 employed in manufacturing, using 5% sample of the US Population Census 1980, 1990 and 2000 waves. 'Mexican' indicates that individual is of Mexican ancestry; 'Post' is a post-liberalization time indicator; 'Exposure to trade' measures an increase in industry trade share with Mexico after the trade liberalization; and 'High trade exposure' means that industry increased its share of trade with Mexico by at least 6.7 percentage points. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. 'Spanish in the HH' indicates that Spanish is the household language. In the parenthesis heteroskedasticity robust standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 1.8: EFFECT OF NAFTA ON DESCENDANTS FROM CENTRAL AMERICA

Dep. var.:	log weekly wage		Employed in a high trade exposure industry		Employed in a trade-related occupation
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Exposure to trade×Mexican×Post	-0.358	-0.223			-0.239**
	(0.232)	(0.241)			(0.105)
Mexican×Post			-0.003	-0.013***	
			(0.005)	(0.003)	
× College graduate	2.986***		0.038*		1.841**
	(1.088)		(0.020)		(0.889)
× Trade-related occupation		2.248**		0.025**	
		(0.885)		(0.012)	
Exposure to trade×Central American×Post	2.747	3.442			2.158
	(2.041)	(2.254)			(1.345)
Central American×Post			0.030	0.053*	
			(0.055)	(0.031)	
× College graduate	0.543		0.117		-0.738
	(9.707)		(0.116)		(6.765)
× Trade-related occupation		-2.164		0.047	
		(5.890)		(0.080)	
Observations	1499841	1427957	1499841	1427957	1427957
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y

Notes: Results in this table show the effect of trade increase with Mexico on individuals of Central-American ancestry, in addition to Mexican descendants. Sample consists of native male workers aged 16 to 65 employed in manufacturing, using 5% sample of the US Population Census 1980, 1990 and 2000 waves. 'Mexican' indicates that individual is of Mexican ancestry; 'Central American' indicates that individual is of Central-American ancestry; 'Post' is a post-1994 indicator; 'Exposure to trade' measures an increase in industry trade share with Mexico after 1994; and 'high trade exposure' means that industry increased its trade share with Mexico by at least 6.7 percentage points. Columns (1) and (2), show the effect on wages; in columns (3) and (4), we observe the effect on the inflow of Mexican and Central-American descendants to industries with high exposure to trade with Mexico; and in column (5) we see a change in probability of being employed in a trade-related occupation for high-skilled Mexican and Central-American descendants by exposure to trade with Mexico. In the parenthesis heteroskedasticity robust standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 1.9: EFFECT OF NAFTA ON FIRST- AND HIGHER-GENERATION MIGRANTS

Dep. var.:	log weekly wage		Employed in a high trade exposure industry		Employed in a trade-related occupation
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Exposure to trade×US-born Mexican×Post	-0.385*	-0.231			-0.295***
	(0.220)	(0.230)			(0.097)
US-born Mexican×Post			0.002	-0.008**	
			(0.005)	(0.003)	
× College graduate	3.032***		0.034*		1.860**
	(1.046)		(0.019)		(0.850)
× Trade-related occupation		2.314***		0.022*	
		(0.861)		(0.011)	
Exposure to trade×Mexico-born×Post	-0.480*	-0.320			0.024
	(0.267)	(0.288)			(0.107)
Mexico-born×Post			-0.025*	-0.014	
			(0.013)	(0.009)	
× College graduate	0.650		-0.027		0.299
	(1.690)		(0.030)		(1.152)
× Trade-related occupation		-1.737		0.005	
		(1.297)		(0.020)	
Mexico-born×Years in the US	-0.005***	-0.004***	-0.001**	0.000*	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
×Post	0.008***	0.008***	0.000	0.000	0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Observations	1674340	1593670	1674340	1593670	1593670
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y

Notes: Results in this table show how an increase in trade with Mexico affected labor market outcomes of individuals of Mexican ancestry as well as Mexican immigrants. Sample consists of male workers aged 16 to 65 employed in manufacturing, using 5% sample of the US Population Census 1980, 1990 and 2000 waves. 'US-born Mexican' is an indicator that individual is a US-born Mexican descendant, while 'Mexico-born' indicates that individual has been born in Mexico; 'Post' is a post-liberalization time indicator; 'Exposure to trade' measures an increase in industry trade share with Mexico after the trade liberalization; and 'High trade exposure' means that industry increased its share of trade with Mexico by at least 6.7 percentage points. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. In the parenthesis heteroskedasticity robust standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 1.10: LONG- AND MEDIUM-RUN EFFECT OF NAFTA ON MEXICAN DESCENDANTS

Dep. var.:	log weekly wage		Employed in a high trade exposure industry		Employed in a trade-related occupation
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Exposure to trade×Mexican×I[2000]	-0.315	-0.192			-0.233**
	(0.239)	(0.248)			(0.105)
Mexican×I[2000]			-0.004	-0.014***	
			(0.005)	(0.003)	
× College graduate	2.574**		0.038*		1.793**
	(1.100)		(0.020)		(0.889)
× Trade-related occupation		2.190**		0.025**	
		(0.902)		(0.012)	
Exposure to trade×Mexican×I[post-2005]	-0.514**	-0.017			-0.421***
	(0.252)	(0.265)			(0.116)
Mexican×I[post-2005]			0.005	-0.001	
			(0.005)	(0.004)	
× College graduate	2.419**		0.031*		1.834**
	(1.060)		(0.018)		(0.833)
× Trade-related occupation		0.664		0.003	
		(0.799)		(0.012)	
Observations	1869793	1779587	1869793	1779587	1779587
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y

Notes: Results in this table show increase in trade with Mexico affected labor market outcomes of individuals of Mexican ancestry evaluated 6 and 11 to 16 years after the implementation of NAFTA. Sample consists of native male workers aged 16 to 65 employed in manufacturing, using 5% sample of the US Population Census 1980, 1990 and 2000 waves and the ACS 2005 to 2010 waves. 'Mexican' is an indicator that individual is a US-born Mexican descendant; 'I[2001]' is the year 2001 indicator, while I[post-2005] indicates years 2005 to 2010; 'Exposure to trade' measures an increase in industry trade share with Mexico after the trade liberalization; and 'High trade exposure' means that industry increased its share of trade with Mexico by at least 6.7 percentage points. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. In the parenthesis heteroskedasticity robust standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 1.11: CHANGES IN EMPLOYMENT OF MEXICAN DESCENDANTS AFTER NAFTA

Dep. var.:	Indicator of being employed		Indicator of being employed in manufacturing	
	(1)	*(2)*	*(3)*	*(4)*
Mexican×Post	-0.006***	-0.018***	0.008***	0.001
	(0.002)	(0.002)	(0.001)	(0.001)
× College graduate		0.039***		0.058***
		(0.004)		(0.005)
Observations	9141328	9141328	9141328	9141328
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y

Notes: Changes in employment and, in particular, manufacturing employment of workers with Mexican ancestry after NAFTA's implementation. Regressions using difference-in-difference specification in columns (1) and (3) and a triple difference in columns (2) and (4). Sample consists of native male workers aged 16 to 65, using 5% sample of the US Population Census 1980, 1990 and 2000 waves. 'Mexican' is an indicator of Mexican ancestry and 'Post' is a post-liberalization indicator. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

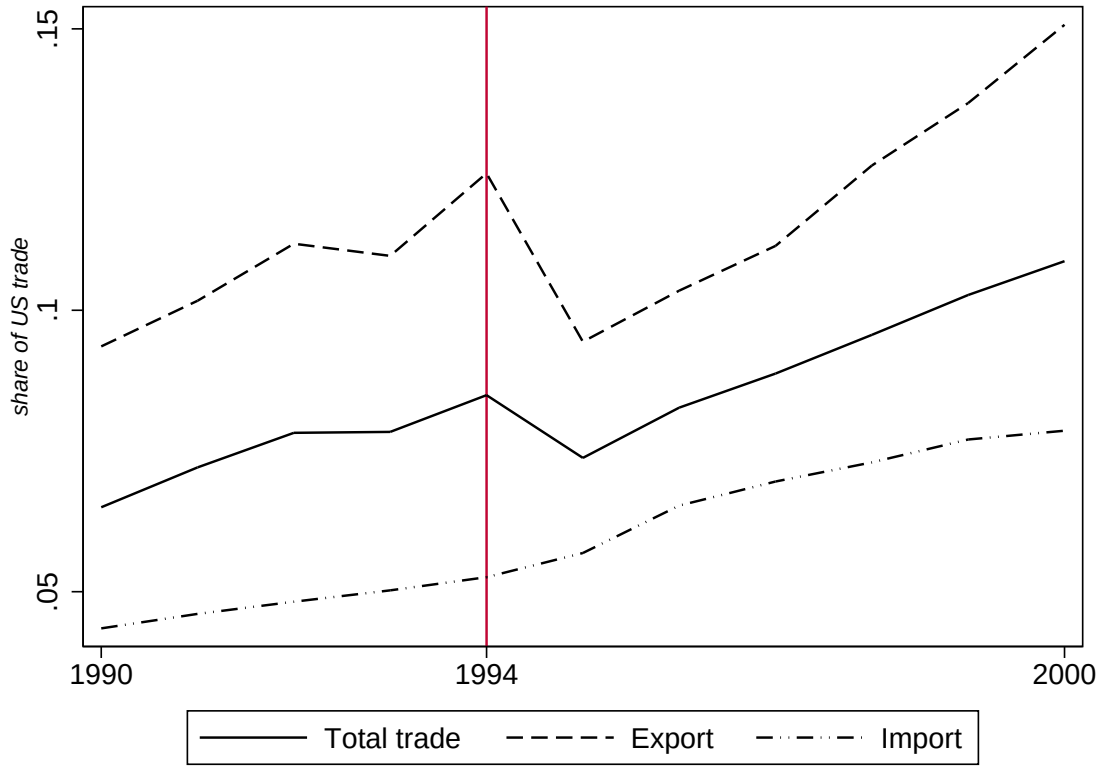

Figure 1.1: EVOLUTION OF US TRADE WITH MEXICO

Notes: Author's calculations using U.S. Manufacturing Imports and Exports, 1972-2005 data provided by Peter Schott, 2010. Vertical line marks NAFTA's implementation in the year 1994. Shares of trade flows are calculated over the average of the trade flows between the United States and all the countries that at some point become parts of the WTO or GATT. A decrease in trade with Mexico after 1994 is due to the Mexican peso crisis that coincides with NAFTA's implementation.

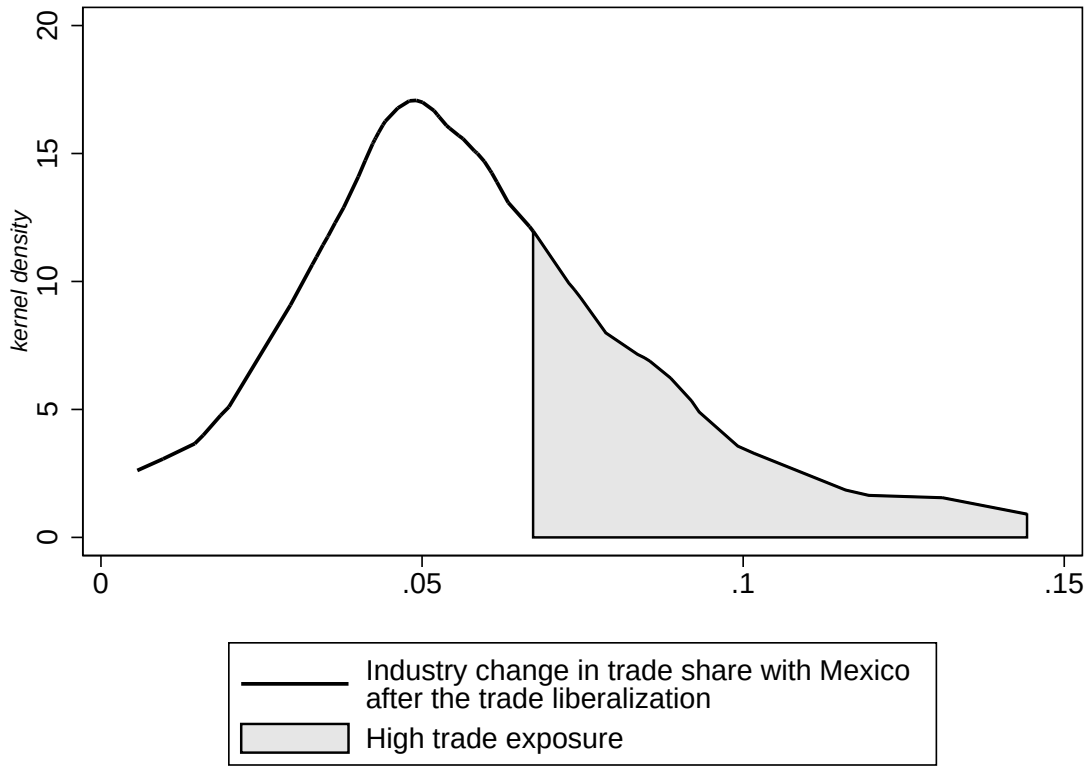

Figure 1.2: INDUSTRY INTENSIFICATION IN US-MEXICO TRADE AFTER NAFTA

Notes: Author's calculations using U.S. Manufacturing Imports and Exports, 1986-2000 data provided by Peter Schott, 2010. Figure shows distribution across industries of estimated changes in trade shares with Mexico after the trade liberalization. Shaded area marks 'high' trade exposure, that is, increase in trade share that falls above 70th percentile of the distribution. Trade exposure is orthogonal to the share of Mexicans working in each industry previous to the shock.

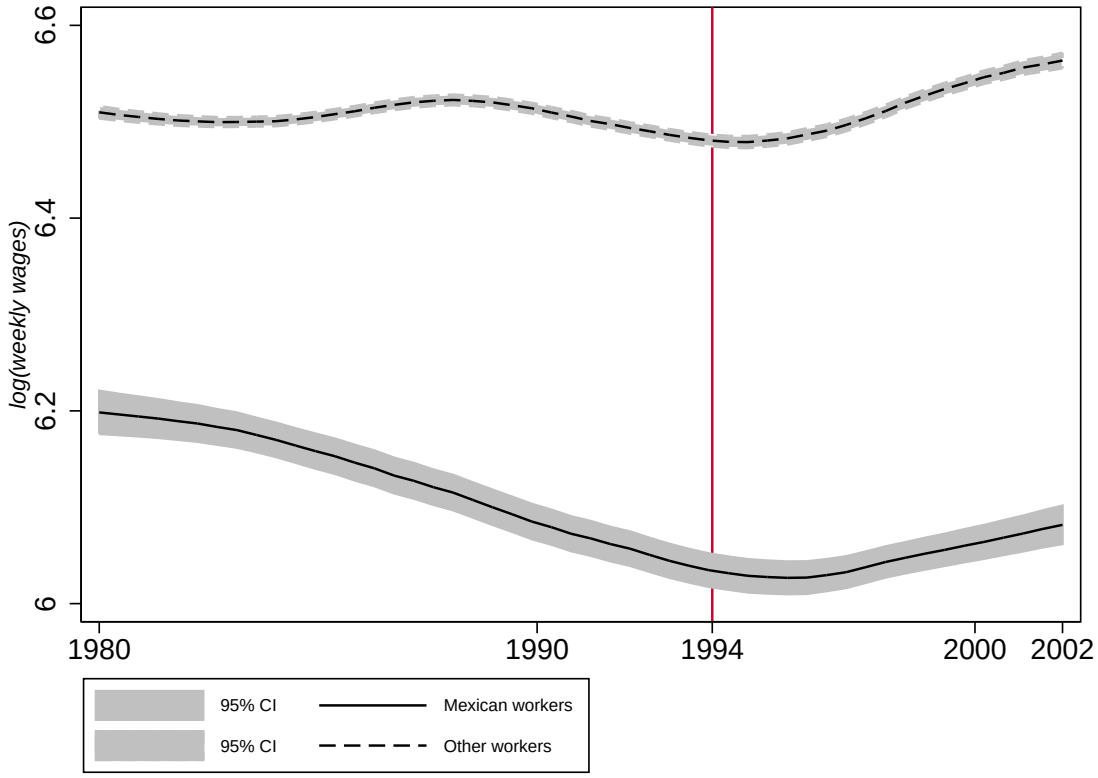

Figure 1.3: EVOLUTION OF WAGES OF MEXICANS, 1980-2002

Notes: Author's calculations using the CPS data for years 1980 to 2002 provided by IPUMS-USA. The figure shows the evolution of wages of Mexican workers versus other manufacturing workers. The plot is a result of a non-parametric regression.

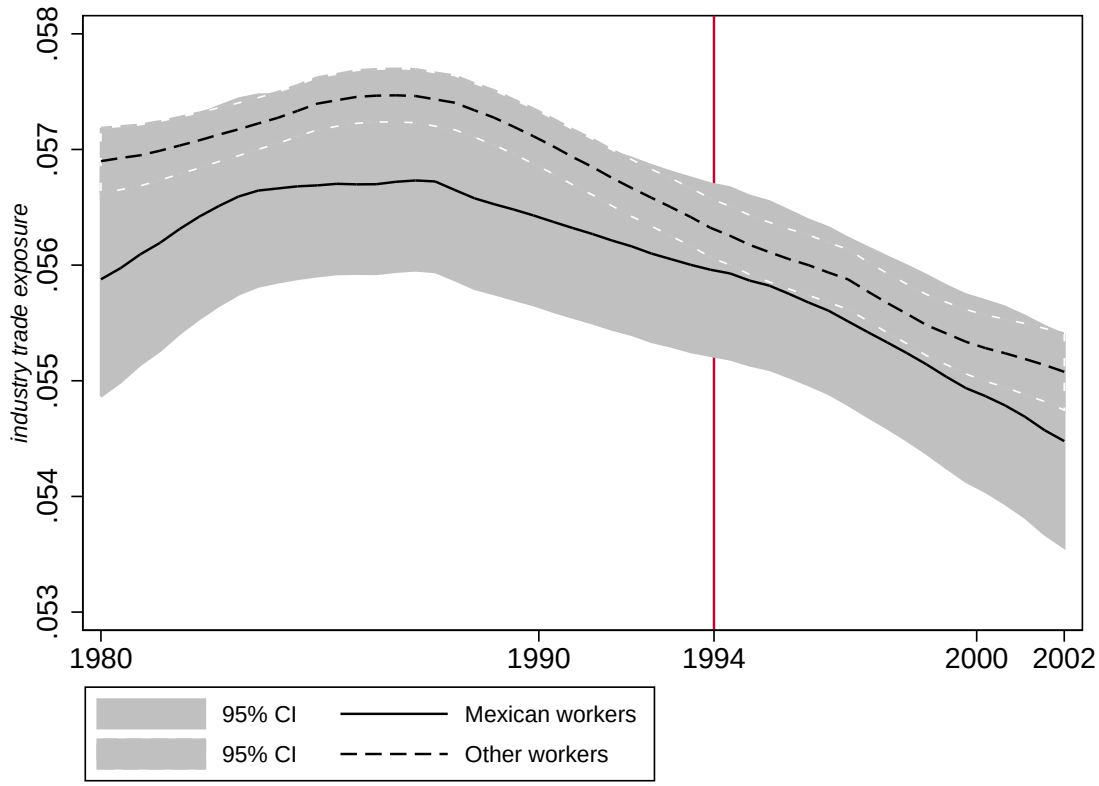

Figure 1.4: EXPOSURE TO TRADE WITH MEXICO FOR WORKERS WITH MEXICAN BACKGROUND, 1980-2002

Notes: Author's calculations using the CPS data for years 1980 to 2002 provided by IPUMS-USA. The figure displays the average exposure to trade with Mexico after NAFTA for Mexican workers versus workers with other ancestries. The plot is a result of a non-parametric regression of an industry trade exposure to trade with Mexico for a sample of manufacturing workers.

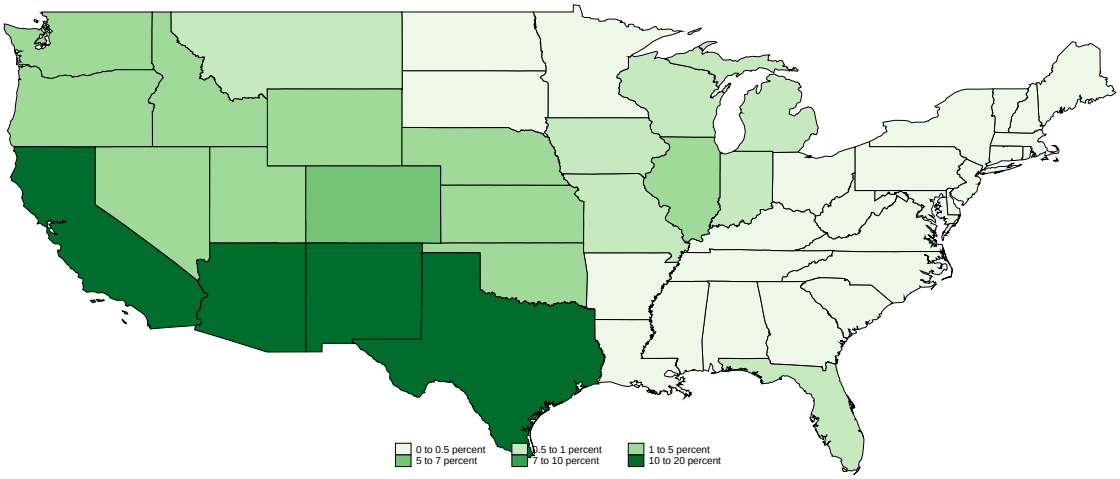

Figure 1.5: GEOGRAPHIC DISTRIBUTION OF MEXICAN DESCENDANTS IN THE UNITED STATES

Notes: Author's calculations using data from the US Census Bureau. The map shows shares of individuals with Mexican ancestry across the United States in 1980.

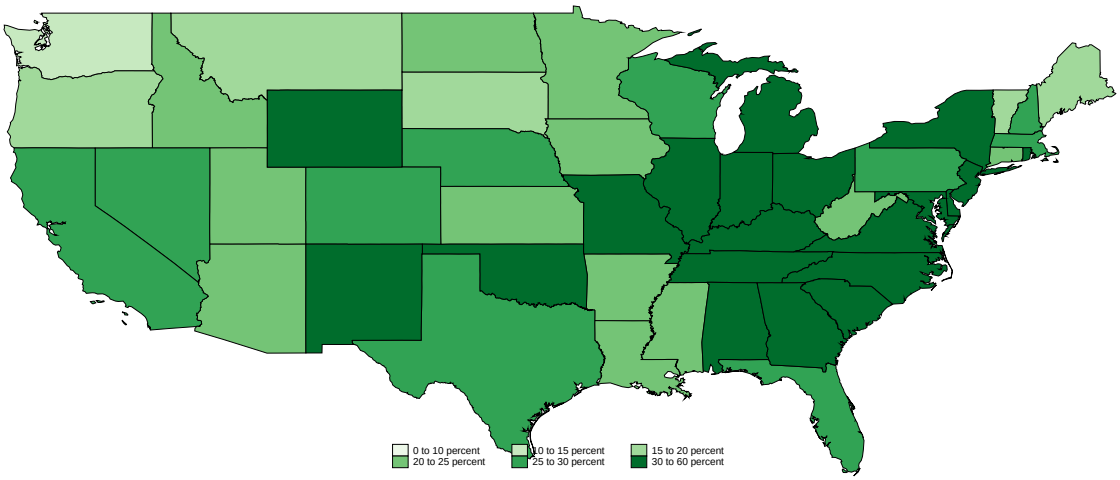

Figure 1.6: GEOGRAPHIC DISTRIBUTION OF EMPLOYMENT IN INDUSTRIES EXPOSED TO TRADE WITH MEXICO

Notes: Author's calculations using data from the US Census Bureau. Shares of individuals employed in industries that increased their trade shares with Mexico by at least 6.7 percentage points after the implementation of the NAFTA, i.e. high-exposure industries.

Chapter 2

CHINA'S ENTRY INTO THE WTO AND CHINA-SPECIFIC CULTURAL CAPITAL IN THE US LABOR MARKET

In order to make sure that the conclusions drawn in the previous chapter were not driven by any special characteristics of Mexicans in the United States or the nature of the free trade agreement, in this chapter, I focus on a different group of migrants and use an alternative trade liberalization episode to perform an analysis equivalent to that in Chapter 1. Here, I look at individuals of Chinese ancestry and use China's entry into the WTO to identify the effect of the US-China trade on the labor market returns to Chinese cultural capital in the United States.

This analysis is different from the one performed in the previous chapter in several aspects. But mainly, Chinese constitute a highly skilled immigrant group and cultural differences between the United States and China are arguably more important than the ones that exist between the United States and Mexico. I follow the same empirical strategy as the one used in the analysis of NAFTA. Whenever it is possible, I also perform same robustness checks to the baseline results.

Chapter 2 is organized as follows. In Section 2.1, I provide some background to China's accession to the WTO. In Section 2.2, I present main econometric specifica-

tions and describe the process of identifying industries' exposure to trade. Data and the descriptive statistics are presented in Section 2.3. The main results are shown in Section 2.4 and the robustness checks are presented in Section 2.5. Finally, in Section 2.6, I isolate the effect on Chinese language skills from other components of cultural capital. Section 2.7 summarizes the findings.

2.1 US-China trade: China's entry into the World Trade Organization

The trade liberalization episode considered here, China's accession into the World Trade Organization (WTO), was just another step in China's history of economic modernization. This modernization has been manifested mostly through its integration into the international market and in little over two decades it made China one of the most important players in the globalized world. While being a marginal player in the world trade during the 1980s, in the year 2000 China's share in the world trade represented 3.7 percent, increasing to 10.6 percent in 2012.

China's accession to the WTO was a lengthy process. In 1982, China became an observer of the General Agreement on Tariffs and Trade (GATT) and in 1986 formally applied to become a member. It had to wait 15 years before joining the organization on December 11th 2001. Although China underwent a whole series of reforms to widen its economic relations already before its liberalization, in order to comply with the WTO rules, it had to relax over 7,000 tariffs, quotas and other formal trade barriers. Between 1996 and 2000, average annual growth of China's trade was about 11 percent; between 2000 and 2005, it increased to about 25 percent. Currently China is the second largest trade partner of the United States after Canada and one of the most important players in the international market.

The US-China trade volumes more than doubled between 2000 and 2005, increasing from about 116,203 million US dollars in 2000, to 250,992 million in 2005 (inflation adjusted).[1] Figure 2.1 shows the evolution of trade between the United States and China before and after the agreement. Trade between the two countries had been on an increasing trend already before the agreement, due to China's internal reforms, subse-

[1] Statistics provided by the US Census bureau.

quent gains in efficiency, and its considerable effort to open up to the international trade. Trade acceleration after the accession to the WTO, however is remarkable. In the year 2000, share of China's imports in the US trade was about 10 percent, it went up to 16 percent in 2005 and 26 percent in 2012.[2]

Using China's entry into the WTO as a policy experiment for my analysis has several advantages, but also some disadvantages. On a positive side, China's joining the WTO was a major step for its becoming a major player in the international market in general, and one of the most important trade partners of the United States in particular. This generated an important increase in the US-China trade volumes, which can be used to estimate the effect of trade with China on the labor market returns to Chinese cultural capital in the United States. This remarkable increase in trade with China, which is so useful for this analysis, also had some important effects on the labor market in general. In particular, the spectacular increase in imports from China generated competition in the importing industries especially among low-skilled workers (Autor et al., 2013, 2014). My identification technique, however, estimates the differential effect of trade on Chinese workers over and above the general effects of trade. Another disadvantage of using this experiment is the fact that the US trade with China was already increasing since the 1990s. Therefore, if trade with China indeed affects the returns to China-specific cultural capital, then some of the gains to Chinese workers might have been already realized before 2001. In other words, anticipation effect might be important in this analysis. But given that the entry still constituted an important shock to trade between the two countries, I would still expect to find some effect on the labor market returns to Chinese cultural capital, even if it would have to be interpreted as a lower bound of the true effect.

2.2 Econometric specification: triple difference approach

To estimate the effect of trade intensification between the United States and China on the labor market returns to Chinese cultural capital, I use the same econometric specification used to estimate the effect of the US-Mexico trade on the returns to Mexico-specific cultural capital. I use a triple difference specification to estimate the effect of trade

[2] 'Of the 34 categories of manufactured goods imported by the US, China was among the top 5 suppliers in 9 categories in 1995, up from 1 category in 1990 and none in 1985.' citing Feenstra et al. (1998).

with China on the wages and occupations of workers endowed with Chinese cultural capital. To estimate the effect of trade intensification with China on the movement of Chinese workers in and out the industries most affected by trade with China, I use a difference-in-difference specification. This allows me to estimate a differential change in employment of Chinese workers in industries most affected by the increase of trade with China after the shock relative to workers with other ethnic background. First of all, however, I identify to which extent different industries are affected by the trade liberalization of China.

Identifying industry's exposure to the trade with China

To identify the degree to which each manufacturing industry was affected by China's entry into the WTO, for every industry, I estimate by how much its trade share with China deviated from a trend after the trade liberalization. To do so, I use data on the US trade that spans years 1996 to 2005 from the US Census Bureau.[3] Specification (2.1) used for this purpose, is equivalent to the one used in the analysis of NAFTA, including the data and the number of years before and after the liberalization used in the estimation:

$$TradeShare_{jt}^{CH} = \sum_{j=1}^{65} \theta_{0j} Ind_j + \sum_{j=1}^{65} \theta_{1j} Ind_j \cdot Post_t + \delta_t + \gamma ShareChinese_j \cdot t + u_{jt} \quad (2.1)$$

where $TradeShare_{jt}^{CH}$ is a US share of trade with China over the total trade with WTO-member countries in industry j and year t. As before, Ind_j is an industry j indicator and $Post_t$ indicates whether year t is in the post-entry period, i.e. 2002 or later.[4] δ_t represents a set of year dummies. I also control for each industry employment share of Chinese workers before the shock, to net out a possible effect these workers might have on the ex-post trade with China. $ShareChinese_j \cdot t$ is the share of workers with Chinese background, either first- or higher-generations in each industry in 2000 interacted with time trend.

Coefficient θ_{1j} measures how much industry j changed its trade share with China relative to the trend after the trade shock (net of any possible effects of Chinese workers

[3] This is the same data used in Chapter 1, it was put together by Robert Feenstra and Peter Schott (Feenstra, 1996, 1997; Feenstra et al., 2002). 2005 is the last year covered by the data I use.

[4] I use year 2002 as a cut, since entry was done in 2001 December 11, at the very end of the year.

in the industry before China entered the WTO). It is estimated for all 65 manufacturing industries matched from the Population Census to the trade data. These industries are also the same industries used in the analysis of NAFTA. I take the estimated coefficient θ_{1j} for every industry j and define it as an industry trade exposure measure. Figure 2.2 shows the distribution of the estimated industrial exposure to trade with China. The average of the distribution is around 6 percentage-point increase, which represents about 50 percent increase in Chinese trade share. The distribution spans values between -1.5 and 19 percentage point changes.

On the basis of this distribution, I define a subset of industries as having *high trade exposure*. For these industries, trade exposure lies above the 70th percentile of the trade intensification distribution, and it is represented as a shadowed area in Figure 2.2. All industries that increased their trade share with China by at least 7 percentage points are defined as high-exposure industries.

I further use trade exposure measure to estimate the effect of China's liberalization on wages and occupations of Chinese workers in the United States, on the one hand. And, on the other, I use high-trade-exposure indicator to test whether workers with Chinese background become more or less likely to be employed in industries with high-exposure to trade with China.

Triple difference specification: wage and occupational effects

The triple difference Specification (2.2) used to estimate wage and occupation effects of the US-China trade on Chinese workers is equivalent to Specification (1.2) used in the analysis of NAFTA. It is formulated as follows:

$$y_{ijst} = \beta_0 + \beta_1 \textbf{Chinese}_i \cdot \textbf{TradeExp}_j \cdot \textbf{Post}_t + \beta_2 Chinese_i \cdot Post_t + \beta_3 Chinese_i \cdot TradeExp_j$$

$$+\beta_4 TradeExp_j \cdot Post_t + \beta_5 Chinese_i + \beta_6 TradeExp_j + \delta_t + \lambda_s + \gamma X_{ijst} + u_{ijst} \qquad (2.2)$$

y_{ijst} is either individual log weekly wage in the wage regressions or an individual indicator of being employed in a trade-related occupation in the occupational regressions.[5] The subscripts refer to individual i, industry j, state s and year t. On the right-hand side of Equation (2.2), $Chinese_i$ indicates that individual i has Chinese background,

[5] As in Chapter 1, wages are winsorized at 1 percent and adjusted for inflation.

i.e. he is either a first-generation Chinese immigrant or claims having Chinese ancestry; $TradeExp_j$ measures industry j's exposure to trade intensification with China after the country joined the WTO (in particular, the percentage point increase in trade share with China after 2001); and $Post_t$ is a post-liberalization indicator, that indicates years after 2001. δ_t and λ_s are the time and state fixed effects and X_{ijst} is a set of controls that comprises individual, industry and state characteristics. Individual controls include age (up to a cubic form), years of education, years in the United States and its square, English proficiency, race, Hispanic indicator and family controls, such as marital status and number of children. Returns to education are allowed to vary in time and by industry exposure to trade with China.[6] Following the same reasoning as in Chapter 1, in a subset of baseline regressions, I include shares of immigrants and of Chinese immigrants in particular in every state, year and industry (when applicable) as additional covariates.

The coefficient of interest is β_1. In the wage regressions, it gives us a differential increase in wages of Chinese workers after the shock by industry's exposure to trade with China; and in the occupational regressions, this coefficient measures a differential change in probability of being employed in a trade-related occupation for workers with Chinese background by exposure to trade with China. Positive β_1 in the occupational regressions would indicate that the more industry is exposed to trade with China the higher becomes the probability that Chinese workers will be employed in trade-related occupations. Similarly, in the wage regressions positive β_1 would mean that differential wage growth of Chinese workers is higher in industries more exposed to trade with China.

Difference-in-difference specification: employment effects

Now, to identify the effect of an intensified trade between the United States and China on the probability of being employed in the industries most affected by this trade, I use a difference-in-difference specification. Equation (2.3) is equivalent to Specification (1.3) in Chapter 1, but now trade intensification and ancestry refer to intensification in trade

[6]Returns to education may vary by industry, e.g. they might be higher in industries producing more skill-intensive goods, and lower in others. If trade with China is characterized by skill-intensity of traded goods, we would expect returns to education to vary by trade exposure.

with China and Chinese ancestry, respectively.

$$HighTradeExp_{ist}^{CH} = \alpha_0 + \alpha_1 \textbf{Chinese}_i \cdot \textbf{Post}_t + \alpha_2 Chinese_i + \delta_t + \lambda_s + \gamma X_{ist} + u_{ist} \quad (2.3)$$

$HighTradeExp_{ist}^{CH}$ is an individual indicator of being employed in an industry highly exposed to trade intensification with China. The subscripts indicate individual i, industry s and year t.

The coefficient of interest is α_1. It measures a change in probability of being employed in a high-exposure industry for workers with Chinese background relative to workers with other ethnic backgrounds. Controls used in this specification include age and education, as well as education interacted with post-liberalization indicator to allow the returns to education to change after the increase in trade with China. Years in the United States and its square are controlled for. I also control for family characteristics, such as marital status and number of children, and other demographics, such as race. In short, all controls included in the triple difference specification excluding industry characteristics are also used in the employment regressions.

2.3 Data and the pre-liberalization sample description

For the analysis of China's accession to the WTO, I use the 1 percent sample from the 2000 US Population Census, and the American Community Survey (ACS) for the years 2001 to 2005. The ACS program began producing data in 2000, but in the first (pilot) year this sample was considerably smaller than in the subsequent surveys. For this reason, I substitute the 2000 ACS sample by a comparable data from the Census. In 2005 the survey was fully implemented and the sample size reached 1 percent of population.

Just as in case of the analysis of NAFTA, I include in my sample men aged 16 to 65 employed in manufacturing, but now I also include foreign-born workers with at least 5 years tenure in the United States who arrived to the United States before China entered the WTO. I exclude recent immigrants from the sample, for two reasons. First, I want to control for any labor market outcomes associated with the migration decision, recent migrants are likely to be going through the adjustment to the host country and I don't want this to confound the results. Second, I want to control for the endogenous flow of

workers from China to the Unites States triggered by China's liberalization.

The total sample consists of 405,184 individuals. 1 percent of them are either Chinese immigrants or individuals with Chinese ancestry –throughout the paper I refer to them as workers with Chinese background or Chinese descendants, despite including first-generation immigrants–.[7]

Table 2.1 displays some descriptive statistics for individuals with Chinese background and the rest of workers in the sample. In the first two columns, statistics for the whole sample are shown; in the last two columns, averages for the subsample of college graduates are presented. Chinese workers outperform the rest of the workers in the sample in terms of wages and education. 62 percent of workers with Chinese background are college graduates, while the share of college graduates in the rest of the sample is 20 percent. Wages of Chinese workers are about 340 dollars higher than in the rest of the sample. Workers with Chinese background are similar to the rest of the workers in terms of age, probability to work in manufacturing and probability to be employed in a trade-related occupation. Though when we focus on the high-skilled individuals, Chinese descendants are about half as likely to be employed in trade-related occupations as other natives. Chinese workers are more likely to work in industries with ex-post high exposure to trade with China, probably reflecting anticipation effect of the trade liberalization.

In general, workers with Chinese background seem to be better off than natives in a number of aspects, quite the opposite of what we observed for Mexican descendants in Chapter 1. These crucial differences between the two groups make their comparison ever more interesting. And the fact that the results are strikingly consistent across both groups, contributes to their validity.

[7]In this analysis I also use a Current Population Survey (CPS, March supplement) to analyze the pre-trends in wages and individual exposure to trade with China. The main data only covers two pre-liberalization years, by using ancestry question from the CPS' waves 1994 to 2010, I am able to see the evolution of wages and individual exposure to trade before the shock. For the main analysis I still use data from the ACS, because of a larger sample size and comparability of the data to the Population Census.

2.4 The effect of China's entry into the WTO on wages, employment and occupation of Chinese workers

In this section, I will describe and interpret the baseline results from the analysis of the effect of China's entry into the WTO on wages, employment and occupations of individuals with Chinese ethnic background. Before presenting the regression results, I want to draw attention to the evolution of wages and exposure to trade with China for Chinese and non-Chinese manufacturing workers. In Figures 2.3 and 2.4, I plot the results from a non-parametric regressions of log weekly wages and trade exposure on years separately for Chinese and non-Chinese workers employed in manufacturing. Using the CPS data allows me to track workers with Chinese ancestry back to 1994, when the question on ancestry was included in the survey.

In Figure 2.3, I show evolution of wages of individuals with Chinese ancestry before and after China's accession to the WTO. In general, in every point in time Chinese descendants earn higher wages than workers without Chinese ancestry. Between 1994 and 2001, wages of workers with Chinese background follow an upward trend, fairly similar to that of the rest of workers in the sample. After 2001 wages of workers with no Chinese ancestry stagnate, while those of Chinese descendants continue to increase, widening the gap between the two groups.

Figure 2.4 displays the evolution of employment of Chinese and non-Chinese workers by the ex-post exposure to trade with China. The first thing to point out in this figure is that throughout the period considered Chinese descendants tend to be employed in industries more exposed to trade with China. This gap is closing over the time as Chinese workers move towards industries that were less exposed to trade with China. Average exposure to trade with China is stable and around 5.5 percentage-point increase for non-Chinese workers, both before and after 2001.

At first glance, it does not seem that China's entry into the WTO affected wages and employment of Chinese workers significantly. Nevertheless, these figures do not take into account heterogeneous effects discussed in the previous sections nor the fact that Chinese and non-Chinese workers might not be fully comparable as a group. Therefore, I now move towards regression analysis of wages, employment and occupations of Chinese workers.

2.4.1 Wage effect

Results from the wage regressions, using Specification (2.2), are presented in Table 2.2. Columns (1) and (2) show overall wage effects of China's entry into the WTO; columns (3) and (4) display heterogeneous effects by education; and those in columns (5) and (6) are heterogeneous wage effects by occupations. In columns (1), (3) and (5), I present the baseline results; while in columns (2), (4) and (6), I control for the shares of foreign-born populations and, in particular, shares of Chinese workers in each state, year and industry.

Overall effects in the first two columns are small and insignificant. But just as it was a case in the analysis of NAFTA, these small overall results mask strong heterogeneity. From columns (3) and (4), we can see that high skilled Chinese workers appear to benefit significantly from trade intensification with China. While the coefficients are negative, small and insignificant for the low-skilled workers, those for the high-skilled ones are positive, large and significant. Heterogeneity by occupation does not seem to be important in the case of Chinese workers, though the absence of wage premium among trade-related occupations is consistent with stronger occupational effects observed among Chinese workers discussed in the following sub-sections. Inclusion of immigration controls into the regression does not affect the results. While using immigration controls does not fully take care of a possibly endogenous inflow of migrants into the country, especially Chinese migrants, the fact that the baseline results are barely affected by the inclusion of these controls is encouraging.

Back-of-the-envelope calculations show that a 1 percentage-point increase in an industry trade share with China is associated with 2 percent faster wage growth. Similar to what has been found in the analysis of NAFTA. High-skilled Chinese descendants that work in an industry that experienced larger than a median increase in trade shares with China benefit from about 10 percent faster wage growth in the post-liberalization period. Overall, trade intensification with China seems to affect positively wages of the high-skilled Chinese workers in the United States.

2.4.2 Employment effect

The effect of US trade with China on flows of Chinese workers in and out of industries exposed to trade with China is estimated using Equation (2.3). The results are presented

in Table 2.3. Results in the first two columns show the overall employment effects, while in the rest of the table heterogeneous effects are displayed. All controls used in the employment regressions are the same as those used in the wage regressions, excluding industry-level characteristics.

None of the coefficients is statistically significant. I don't observe large inflows of Chinese workers to the industries that were highly exposed to trade with China. The overall effect is positive but insignificant; the effect for highly skilled Chinese workers is negative, but again insignificant. There seems to be no heterogeneity by occupations. All-in-all, employment effects for Chinese workers are not statistically different from zero.

2.4.3 Occupational effect

Finally, I present the results from the occupational regressions in which I estimate the effect of intensification in US-China trade due to China's entry into the WTO on probability of Chinese workers to be employed in trade-related occupations. These effects are estimated by the means of linear probability model, using triple difference Specification (2.2). In this case the outcome is an indicator of being employed in a trade-related occupation. The estimation results are presented in Table 2.4.

The pattern of the results is similar to what we observe in the wage regressions. However, the effect on occupations seems to be stronger than either on wages or employment of Chinese workers. Indeed, the more industry trades with China the more likely the Chinese descendants are to be employed in trade related occupations. This significant positive effect includes a strong heterogeneity by worker skill level. While the low-skilled Chinese descendants are not affected, the effect on the high-skilled ones is large and highly significant. So the high-skilled group becomes substantially more likely to be employed in a trade-related occupation as the industry they are employed in engages in trade with China.

The magnitude of these coefficients implies 18 percentage point increase in the probability of being employed in a trade-related occupation for Chinese descendants employed in industries that increased their trade with China by an average amount. The baseline probability for high-skilled Chinese workers of being employed in such occupations before the liberalization shock was 24 percent.

2.5 Robustness checks

In this section, I test the robustness of the baseline results presented in the previous section. In particular, I run two robustness checks similar to those performed in the analysis of NAFTA. I start by analyzing how trade increase with Japan over the same time period affected Chinese descendants. Then I add geographic controls to the baseline regressions to test whether the results could be driven by differential changes in wages, employment and the occupational distribution in different states. Finally, I present results from 2SLS regressions in which I instrument industry exposure to US-China trade with an intensification in EU-China trade over the same time period.

2.5.1 Placebo test: trade with Japan and Chinese workers

What if Chinese descendants or immigrant population in general are simply more efficient at facilitating international trade? It is plausible that Chinese workers possess skills that are productive in reducing trade barriers. In this case, we would expect to observe Chinese workers to be positively affected by trade with countries other than China. In order to be consistent with the analysis performed in Chapter 1, I estimate an increase in US-Japan trade between 1995 and 2005. I use data from Feenstra and Shott and a modified version of Specification (2.1), in which outcome variable is industry share of trade with Japan, while the right-hand-side of the equation is identical to Specification (2.1).[8] I thus define trade intensification with Japan and then run wage, employment and occupational regressions to see whether trade with Japan also has a positive effect on the returns to skills Chinese descendants are endowed with.

Results from this test are presented in Table 2.5. The results for wages are presented in columns (1) and (2); the estimated employment effects are shown in columns (3) and (4); and finally the occupational effect is displayed in column (5). In general, the results from this test differ substantially from the baseline analysis. Some coefficients are large and some are significant, but the pattern is the opposite of what we would expect if Chinese descendants experienced an increase in labor demand as a result of trade with Japan. First of all, there seems to be a positive effect on the wage growth of low-skilled workers and those not employed in trade related occupations. While the effect is not

[8] Feenstra (1996, 1997) and Feenstra et al. (2002).

significant for the low-skilled Chinese workers it is significant for those employed in occupations unrelated to the trade activity. There also appears to exist an outflow of Chinese workers from the industries that start trading intensively with Japan around the period of Chinese liberalization. The effect on the high-skilled Chinese workers and those employed in the trade-related occupations is zero. They neither benefit nor are harmed by trade intensification with Japan. They become relatively less likely to be employed in the trade-related occupations (see column (5)).[9]

Overall, unlike what we observe when we analyze the effect of trade with China, we find that high-skilled workers with Chinese background are not differentially affected by the trade with Japan. And if anything they leave occupations related to trade activity, if industry they are employed in trades more intensively with Japan.

Therefore, we can conclude that it is trade with individual country of origin or ancestral country what increases returns to one's cultural capital, rather than conjecture that migrants might have a comparative advantage in establishing trade links, for instance. Chinese descendants are affected by trade with China, but not trade with Japan, similarly to what we observed in case of NAFTA and Mexico-specific cultural capital.

2.5.2 Sensitivity to geographic controls

In this section, I test the robustness of the baseline results to the inclusion of geographic controls in the regression. Immigrants –first- and second-generations– tend to cluster geographically. Moreover, it has been argued that the effect of trade is also likely to be different in different states depending, for instance, on the reliance of the regional economy on industries most affected by the trade shock (Autor et al., 2013). Therefore, it could be that workers with Chinese background tend to live and work in states most exposed to trade with China, thus appear to be differentially affected by the shock.

In Figure 2.5 geographic distribution of individuals with Chinese ethnic background is shown. The map plots population shares of Chinese descendants in each state before China's liberalization, in the year 2000. Different tones on the map indicate that there is indeed some clustering of Chinese workers. However, the concentration pattern of Chinese population is less evident than what we observe in the case of Mexican descen-

[9]Remember that to calculate the effect on the high-skilled individuals, the differential effect on the high-skilled group must be added to the main effect. Similar strategy must be applied when calculating the effect for the group of workers employed in the trade-related occupations.

dants. Chinese workers seem to localize along the costs and on north-east of the United States. While on average, state's share of Chinese population is about 0.65 percent, the median is at 0.3 percent. Only seven states have population shares of Chinese workers higher than 1 percent.[10]

When it comes to state ex-ante exposure to trade with China, map in Figure 2.6 shows employment shares in ex-post high-trade-exposure industries before China's accession to the WTO. Most exposed states seem to be the ones of the west of the United States, in addition to California and Nevada. In general, the patterns do not seem to overlap too much, though there seems to be some degree of correlation.

In this section, I address this potential confounding dynamic by including in the baseline regression a set of interactions between state fixed effects and post-liberalization indicators. These controls allow not only for different levels of wages, employment in exposed industries and in trade-related occupations in each state, but also for differential changes in these outcomes in each state. The results are presented in Table 2.6. The inclusion of the geographic controls does not affect the baseline results. The only exception, though it is not statistically significant, is that the negative employment coefficient for Chinese workers employed in the trade-related occupations is now reduced. However, neither the baseline coefficient nor the coefficient presented in column (4) from Table 2.6 are significant, therefore we cannot make any meaningful interpretations of these shifts in coefficients.

Overall, geographic controls do not seem to affect the results. The results from the baseline estimations do not appear to be driven by any differential changes in state wages, shares of employment exposed industries or shares of employment in the trade-related occupations.

2.5.3 Instrumental variable regressions

In this subsection, I use instrumental variable strategy to deal with potential issue of endogeneity of exposure to trade with China. Unlike in case with Mexico, high-skilled Chinese descendants were more likely to be employed in high-exposure industries already before the trade shock. It is possible that those Chinese descendants were the

[10]Those are California (3.1), Hawaii (8.1), Maryland (1.1), Massachusetts (1.5), New Jersey (1.2), New York (2.3) and Washington (1.2).

ones that drove the ex-post trade exposure of the industry by exploiting the already established trade-relationship with China. If that was the case, then we would expect the baseline results to be upward biased. To deal with this issue, I follow the strategy used by Autor et al. (2013). I use trade intensification between China and European Union as a source of exogenous variation and use it as an instrument for exposure to trade with China by US industries.

For this test, I use data from UN COMTRADE on trade flows, imports and exports, between European Union and China over the same time period. Then, I interact the EU trade exposure with Chinese-ancestry indicator, and the post-shock dummy. I instrument all the interactions with exposure to trade with interactions using the EU trade exposure. The idea is the following, while the trade shock was the same –China's liberalization was directed towards all WTO members–, it is unlikely that concentration of highly-skilled Chinese descendants in certain industries in the United States would drive the exposure to trade with China for European industries.

The results from the 2SLS regressions are presented in Table 2.7. Wage effects are presented in columns (1) and (2), while results for occupations are shown in column (3). Only wage and occupation results are estimated, since for employment results difference-in-difference specification is used, and there are no interactions with exposure to trade with China. In the first column, the coefficients are much smaller than in the baseline and not significant. Actually, now the effect on low skilled workers is positive though statistically not different from zero. The results in columns (2) and (3) are more intriguing. In the baseline, the coefficient for the trade-related occupations was negative, but relatively small and insignificant (see columns (5) and (6) of Table 2.2). In 2SLS regression, this coefficient is still insignificant, but much larger, while the estimated wage effect among non-trade-related occupations is large and highly significant. By summing up the triple interaction term with the differential effect on individuals in trade-related occupations, we can see that actually the effect for them is also positive, though smaller than for other occupations.

The effect on occupations is large and highly significant, just as what we observe in the baseline regressions from Table 2.4, but now it is even larger. The pattern of coefficients in columns (2) and (3), suggest the following dynamics: as more Chinese workers shift towards trade-related occupations, the stronger is the attenuation effect on wages among those occupations, while Chinese descendants in other occupations still

experience a positive wage returns to their cultural capital.

Since we are dealing with triple difference specifications, there multiple, potentially endogenous variables and multiple instruments. All the first stages are highly significant, while the F-statistics are shown at the bottom of the table.

Though the pattern of some coefficients changes when I instrument for trade exposure, overall the results suggest that trade intensification with China due to China's accession to the WTO differentially and positively affected individuals with Chinese background.

2.6 Chinese language skills and trade with China

One important informal barrier to trade between firms in the United States and China may lie in communication, e.g. linguistic differences. Linguistic distance between English and Chinese is huge and such barriers may indeed hinder coordination between trading partners. Though Chinese is a third most spoken language in the United States, it is almost uniquely spoken within the Chinese community. At the same time, English teaching in China seems to be a little better than precarious: while about 300m people in China either are learning or have learned English, many are not able to actually communicate using the language. Hence, the linguistic barrier does seem to be relevant when it comes to trade between China and the United States.

In this section, following the strategy used in Section 1.7.1, I use the information on the language spoken at home to proxy for individual Chinese proficiency. To the baseline Specifications (2.2) and (2.3), I add controls for whether Chinese is spoken at home and it's interaction with the post-liberalization indicator. Thus, I am able to estimate labor market returns to Chinese before and after the shock within manufacturing sector.[11]

The results from this test are presented in Table 2.8. Wage results are shown in the first two columns; in columns (3) and (4) employment results are displayed; and in column (5) results on occupations are presented. First thing to notice is that even when we control for individual Chinese language skills, the effect on Chinese workers is still positive and significant, and actually not significantly different from the baseline

[11] Remember that my sample only includes manufacturing workers.

results. This suggests that there are other elements of cultural capital that increase in value in the US labor market when US intensifies trade relationship with China. These could be knowledge of local institutions, or networks. The coefficients on the language controls are mostly insignificant. It seems that Chinese-speakers earn higher wages before the shock (see column(2)), but are less likely to be employed in the trade-related occupations (column (5)).[12]

Overall, while language is an important aspect of individual culture, it seems that also other factors matter. Inclusion of the language controls does not affect the main coefficients meaning that other aspects of individual cultural capital, such as knowledge of local institutions or networks, might also be appreciating in the labor market.

2.7 Summary

In this chapter, I examined the effect of trade increase with China on the labor market returns to Chinese cultural capital in the United States. I find that trade intensification with China indeed affects wages and occupations of Chinese workers in the United States, but this effect is concentrated among highly skilled individuals. In particular, highly skilled workers with Chinese background –either first-generation immigrants or US-born Chinese descendants– experience a relatively faster wage growth and become relatively more likely to be employed in trade-related occupations after China's accession to the WTO. These effects are large and highly significant. They are also very robust to inclusion of number of controls, including exhaustive controls for changes in returns to education after the trade shock and differential returns in the most affected industries.

I run three robustness checks. On the one hand, as a sort of placebo test, I test whether Chinese workers are affected by trade with countries other than China. In particular, I look whether an increase in trade with Japan affects workers with Chinese background. I find that the results are very different from what I obtain in the baseline.

[12]These small and insignificant coefficients, however, mask a strong heterogeneity across industries. If I allow returns to Chinese to vary between industries highly exposed to trade with China and those that are not, I find that while Chinese speakers in the non-exposed industries tend to earn lower wages. The opposite is true for the exposed industries. In Table 2.8 I only show the results for equations in which I allow returns to Chinese to change in time. I do so to make this test comparable to the one performed on Mexican descendants in Section 1.7.1

Trade with Japan does not significantly affect labor market outcomes of low-skilled Chinese workers, while wage, employment and occupational effects for the high-skilled workers are zero. In addition, I add to the baseline regressions a set of interactions between state fixed effects and post-entry indicators and thus I control for differential changes in wages, employment and occupational patterns in the states. I find that these controls barely affect the main results, contributing to their validity. In the third robustness test, I use intensification in trade between European Union and China as an instrument for exposure to trade with China of US industries. I still find that trade with China affects positively and differentially workers with Chinese background.

Finally, in order to isolate the effect on Chinese language skill from other elements that constitute cultural capital, I include controls for individual Chinese skills. I find that not only the inclusion of these controls does not affect the main results, but the coefficients on the language regressors are not significant and quite small. These small coefficients, however, mask heterogeneity in underlying returns to Chinese. While speaking Chinese within the household is associated with lower wages in industries not affected by the China's liberalization, the opposite is true for industries that increase their trade with China after the shock.

Overall, the results suggest that trade with China positively affected the labor market returns to China-specific cultural capital.

2.8 Appendix: Changes in the labor market supply of Chinese workers after China's accession to the WTO

In this section, I look how employment of workers with Chinese background changed after the shock. The sample in the main analysis is composed by manufacturing workers, thus we cannot appreciate how employment in manufacturing changed after the trade shock. This is what I do in this section. Using the same data I use in the main analysis, but now including in the sample all individuals aged 16 to 65, I estimate how the probability of being employed in general and employed in manufacturing changed after China's trade liberalization. For estimation, I use Specification (2.3), and as outcomes I use an indicator of being employed and another for being employed in manufacturing. I use the same set of controls used in the estimation of employment effects in the main analysis.

The results are presented in Table 2.9. In the columns (1) and (2), I estimate a change in probability of being employed, while in columns (3) and (4) I look at probability of being employed in manufacturing. In columns (2) and (4), I allow for heterogeneity by education. I find that Chinese descendants are not any more or less likely to be employed after the trade shock. The coefficients in columns (1) and (2) are rather small and not significant. However, I do find that high-skilled Chinese workers become more likely to be employed in manufacturing after China's accession to the WTO. The supply of high-skilled Chinese workers in manufacturing increases by about 1.8 percentage points, after the trade shock. This suggest that the wage effect from trade with China found among high-skilled Chinese workers is likely to be a lower bound of the real effect, since as more workers with the relevant set of skilled become available in the market, the lower should be the wage premium for this set of skills.

2.9 Figures and tables

Table 2.1: PRE-LIBERALIZATION SUMMARY STATISTICS OF THE SAMPLE

	The whole sample		*College graduates*	
	Chinese background	Other ancestry	Chinese background	Other ancestry
Employed in manufacturing	0.20	0.21	0.22	0.16
Weekly wage	1249.33	909.96	1635.94	1528.89
Employed in high trade exposure industry	0.49	0.31	0.55	0.37
Trade-related occupation	0.17	0.15	0.24	0.42
Age	41	41	40	42
Share of immigrants in state	0.25	0.12	0.25	0.14
Share of Chinese immigrants in state	0.01	0.00	0.01	0.00
Chinese spoken at home	0.70	0.00	0.73	0.00
College graduate	0.62	0.20		
Number of observations	3,299	401,885	2,204	90,531

Notes: Author's calculations using a 1% sample of the 2000 US Population Census and the ACS samples for the years 2001 to 2005 provided by the IPUMS-USA. Sample consists of male workers aged 16 to 65, I exclude foreign-born individuals who either arrived to the US after 2001 or were in the US for less than 5 years. Self-employed individuals are excluded. In columns (3) and (4), only individuals with at least 15 years of education are included. 'High exposure to trade' means that industry increased its share of trade with China by at least 6 percentage points. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production.

Table 2.2: WAGE EFFECT OF TRADE FOR WORKERS WITH CHINESE BACKGROUND, OVERALL, BY EDUCATION AND OCCUPATION

Dep. var.:	log weekly wages					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Exposure to trade×Chinese Background×Post	0.081	0.170	-0.406	-0.280	0.052	0.124
	(0.429)	(0.390)	(1.015)	(1.106)	(0.377)	(0.486)
× College graduate			2.249**	2.224*		
			(1.023)	(1.171)		
× Trade-related occupation					-0.667	-0.572
					(1.397)	(1.497)
Observations	405184	405184	405184	405184	405184	405184
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y	Y
Shares of foreign-born workers and Chinese immigrants in each year, state and industry	N	Y	N	Y	N	Y

Notes: Results in this table show the effect of China's entry into the WTO on wages of individuals with Chinese background, that is either first- or higher-generation Chinese immigrants. Sample consists of male manufacturing workers aged 16 to 65, using a 1% sample of the 2000 US Population Census and the ACS samples for the years 2001 to 2005 provided by the IPUMS-USA. 'Chinese background' indicates that individual is either born in China or is of Chinese descent; 'Post' is the post-2001 indicator; and 'Exposure to trade' measures an increase in industry trade share with China after it joined the WTO. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. In the parenthesis bootstraped standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.3: EMPLOYMENT EFFECT OF TRADE FOR WORKERS WITH CHINESE BACKGROUND, OVERALL, BY EDUCATION AND OCCUPATION

Dep. var.:	Indicator of being employed in industry with high exposure to trade					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Chinese Background×Post	0.015	0.014	0.006	0.005	0.022	0.019
	(0.012)	(0.012)	(0.029)	(0.029)	(0.015)	(0.015)
× College graduate			-0.058	-0.058		
			(0.037)	(0.037)		
× Trade-related occupation					-0.003	-0.003
					(0.035)	(0.035)
Observations	405184	405184	405184	405184	405184	405184
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y	Y
Shares of foreign-born workers and Chinese immigrants in each year and state	N	Y	N	Y	N	Y

Notes: Results in this table show the effect of China's entry into the WTO on the flows of Chinese workers into the sectors that increase their trade with China after the liberalization.Sample consists of male manufacturing workers aged 16 to 65, using a 1% sample of the 2000 US Population Census and the ACS samples for the years 2001 to 2005 provided by the IPUMS-USA. 'Chinese background' indicates that individual is either born in China or is of Chinese descent; 'Post' is the post-2001 indicator; and 'High exposure to trade' means that industry increased its share of trade with China by at least 7 percentage points after the liberalization. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. In the parenthesis bootstraped standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.4: OCCUPATIONAL EFFECT OF TRADE FOR WORKERS WITH CHINESE BACKGROUND, OVERALL AND BY EDUCATION

Dep. var.:	Indicator of being employed in a trade-related occupation			
	(1)	*(2)*	*(3)*	*(4)*
Exposure to trade×Chinese Background×Post	1.028***	1.029***	0.185	0.153
	(0.295)	(0.205)	(0.294)	(0.270)
× College graduate			2.806***	2.837***
			(0.428)	(0.472)
Observations	405184	405184	405184	405184
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y
Shares of foreign-born workers and Chinese immigrants in each year, state and industry	N	Y	N	Y

Notes: Results in this table show the effect of China's entry into the WTO on the probability to work in a trade-related occupation for Chinese workers after the liberalization.Sample consists of male manufacturing workers aged 16 to 65, using a 1% sample of the 2000 US Population Census and the ACS samples for the years 2001 to 2005 provided by the IPUMS-USA. 'Chinese background' indicates that individual is either born in China or is of Chinese descent; 'Post' is the post-2001 indicator; and 'Exposure to trade' measures an increase in industry trade share with China after it joined the WTO. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. In the parenthesis bootstraped standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.5: PLACEBO TEST, USING EXPOSURE TO TRADE WITH JAPAN

Dep. var.:	log weekly wage		Employed in a high trade exposure industry		Employed in a trade-related occupation
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Exposure to trade×Chinese×Post	2.252	2.418***			0.238
	(1.431)	(0.878)			(0.549)
Chinese×Post			-0.027	-0.036***	
			(0.029)	(0.013)	
× College graduate	-2.832*		0.0237		-3.774***
	(1.685)		(0.032)		(0.905)
× Trade-related occupation		-2.179		0.034	
		(2.286)		(0.026)	
Observations	405184	405184	405184	405184	405184
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y

Notes: Results in this table show the effect of trade increase with Japan on individuals with Chinese background. Sample consists of male manufacturing workers aged 16 to 65, using a 1% sample of the 2000 US Population Census and the ACS samples for the years 2001 to 2005 provided by the IPUMS-USA. 'Chinese' indicates that individual is either of Chinese descent or was born in China; 'Post' is the post-2001 indicator; and 'Exposure to trade' measures an increase in industry trade share with Japan after 2001. 'High exposure to trade' means that industry exposure to trade with Japan is above the 70th percentile of the exposure distribution. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. Columns (1) and (2), show the effect on wages of Chinese descendants; in columns (3) and (4), we observe the effect on the inflow of Chinese workers to the industries with high exposure to trade with Japan; and in column (5), we see a change in probability of being employed in a trade-related occupation for the high-skilled Chinese descendants by exposure to trade with Japan. In the parenthesis heteroskedasticity robust standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.6: ROBUSTNESS OF GEOGRAPHIC CONTROLS

Dep. var.:	log weekly wage		Employed in a high trade exposure industry		Employed in a trade-related occupation
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Exposure to trade×Chinese×Post	-0.371	0.051			0.180
	(0.974)	(0.550)			(0.420)
Chinese×Post			0.005	0.020	
			(0.029)	(0.015)	
× College graduate	2.190*		-0.057		2.779***
	(1.148)		(0.037)		(0.611)
× Trade-related occupation		-0.658		-0.003	
		(1.482)		(0.035)	
Observations	405184	405184	405184	405184	405184
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y
State FE×Post	Y	Y	Y	Y	Y

Notes: In this table, I demonstrate the robustness of the main results to the inclusion of state fixed effects interacted with the post-2001 indicator. Sample consists of male manufacturing workers aged 16 to 65, using a 1% sample of the 2000 US Population Census and the ACS samples for the years 2001 to 2005 provided by the IPUMS-USA. 'Chinese' indicates that individual is either of Chinese descent or was born in China; 'Post' is the post-2001 indicator; and 'Exposure to trade' measures an increase in industry trade share with China after 2001. 'High exposure to trade' means that industry increased its trade with China by at least 7 percentage points. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. Columns (1) and (2), show the effect on wages of Chinese descendants; in columns (3) and (4), we observe the effect on the inflow of Chinese workers to the industries with high exposure to trade with China; and in column (5), we see a change in probability of being employed in a trade-related occupation for the high-skilled Chinese descendants by exposure to trade with China. In the parenthesis heteroskedasticity robust standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.7: INSTRUMENTING FOR EXPOSURE TO TRADE WITH CHINA

Dep. var.:	log weekly wage		Employed in a trade-related occupation
	(1)	*(2)*	*(3)*
Exposure to trade×Chinese×Post	0.701	3.764***	-0.113
	(1.907)	(0.872)	(0.719)
× College graduate	0.196		3.638***
	(2.024)		(0.875)
× Trade-related occupation		-2.959	
		(1.833)	
Observations	405184	405184	405184
Wald F-statitic	37.40	2960.55	37.39
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y

Notes: In this table, I present the results from the 2SLS regressions where I instrument trade exposure with China show with trade increase in trade between China and EU. Sample consists of male manufacturing workers aged 16 to 65, using a 1% sample of the 2000 US Population Census and the ACS samples for the years 2001 to 2005 provided by the IPUMS-USA. 'Chinese' indicates that individual is either of Chinese descent or was born in China; 'Post' is the post-2001 indicator; and 'Exposure to trade' measures an increase in industry trade share with China after 2001 and it is instrumented by trade increase between the EU and China over the same time period. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. Columns (1) and (2), show the effect on wages of Chinese descendants and in column (3), we see a change in probability of being employed in a trade-related occupation for the high-skilled Chinese descendants by exposure to trade with China. In the parenthesis heteroskedasticity robust standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.8: ISOLATING CULTURAL CAPITAL FROM THE VALUE OF CHINESE SKILLS

Dep. var.:	log weekly wage		Employed in a high trade exposure industry		Employed in a trade-related occupation
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Exposure to trade×Chinese×Post	-0.381	0.051			0.231
	(0.973)	(0.550)			(0.423)
Chinese×Post			-0.015	-0.000	
			(0.036)	(0.022)	
× College graduate	2.219*		-0.060		2.772***
	(1.148)		(0.037)		(0.611)
× Trade-related occupation		-0.698		-0.001	
		(1.474)		(0.035)	
Chinese spoken in the HH	0.023	0.052*	0.005	-0.015	-0.055***
	(0.031)	(0.031)	(0.025)	(0.019)	(0.020)
Chinese spoken in the HH×Post	-0.053	-0.062	0.031	0.031	-0.001
	(0.039)	(0.039)	(0.032)	(0.024)	(0.026)
Observations	405184	405184	405184	405184	405184
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y	Y
Language controls	Y	Y	Y	Y	Y

Notes: In this table, I show the robustness of the main results to the inclusion of language controls, these include a indicator of whether Chinese is used as a household language, and this indicator interacted with the post-2001 indicator. Sample consists of male manufacturing workers aged 16 to 65, using a 1% sample of the 2000 US Population Census and the ACS samples for the years 2001 to 2005 provided by the IPUMS-USA. 'Chinese' indicates that individual is either of Chinese descent or was born in China; 'Post' is the post-2001 indicator; and 'Exposure to trade' measures an increase in industry trade share with China after 2001. 'High exposure to trade' means that industry increased its trade with China by at least 7 percentage points. 'Trade-related occupations' refer to managerial and sales jobs, excluding low-skilled categories, such as door-to-door salesmen, cashiers, and managers in agricultural production. 'Chinese spoken in the HH' is an indicator that Chinese is individual's household language. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. Columns (1) and (2), show the effect on wages of Chinese descendants; in columns (3) and (4), we observe the effect on the inflow of Chinese workers to the industries with high exposure to trade with China; and in column (5), we see a change in probability of being employed in a trade-related occupation for the high-skilled Chinese descendants by exposure to trade with China. In the parenthesis heteroskedasticity robust standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.9: CHANGES IN EMPLOYMENT OF CHINESE DESCENDANTS AFTER CHINA'S ACCESSION TO THE WTO

Dep. var.:	Indicator of being employed		Indicator of being employed in manufacturing	
	(1)	*(2)*	*(3)*	*(4)*
Chinese×Post	-0.006	-0.006	0.001	-0.010*
	(0.005)	(0.007)	(0.004)	(0.005)
× College graduate		0.004		0.028***
		(0.009)		(0.008)
Observations	3218251	3218251	3218251	3218251
Intermediate interactions; changes in returns to education; state and year FEs; demographic controls	Y	Y	Y	Y

Notes: Changes in employment and, in particular, manufacturing employment of workers with Chinese background after China's entry into the WTO. Sample consists of male individual aged 16 to 65, using a 1% sample of the 2000 US Population Census and the ACS samples for the years 2001 to 2005 provided by the IPUMS-USA. 'Chinese' indicates that individual is either of Chinese descent or was born in China and 'Post' is the post-2001 indicator. 'Demographic controls' include controls for marital status, race, number of children, English proficiency, and disability, student and Hispanic indicators. Columns (1) and (2), show the differential change in probability of being employed for Chinese descendants, while columns (3) and (4) display a differential change probability of being employed in manufacturing for Chinese descendants. Difference-in-difference specification is used in columns (1) and (3) and a triple difference in columns (2) and (4). In the parenthesis heteroskedasticity robust standard errors are shown. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

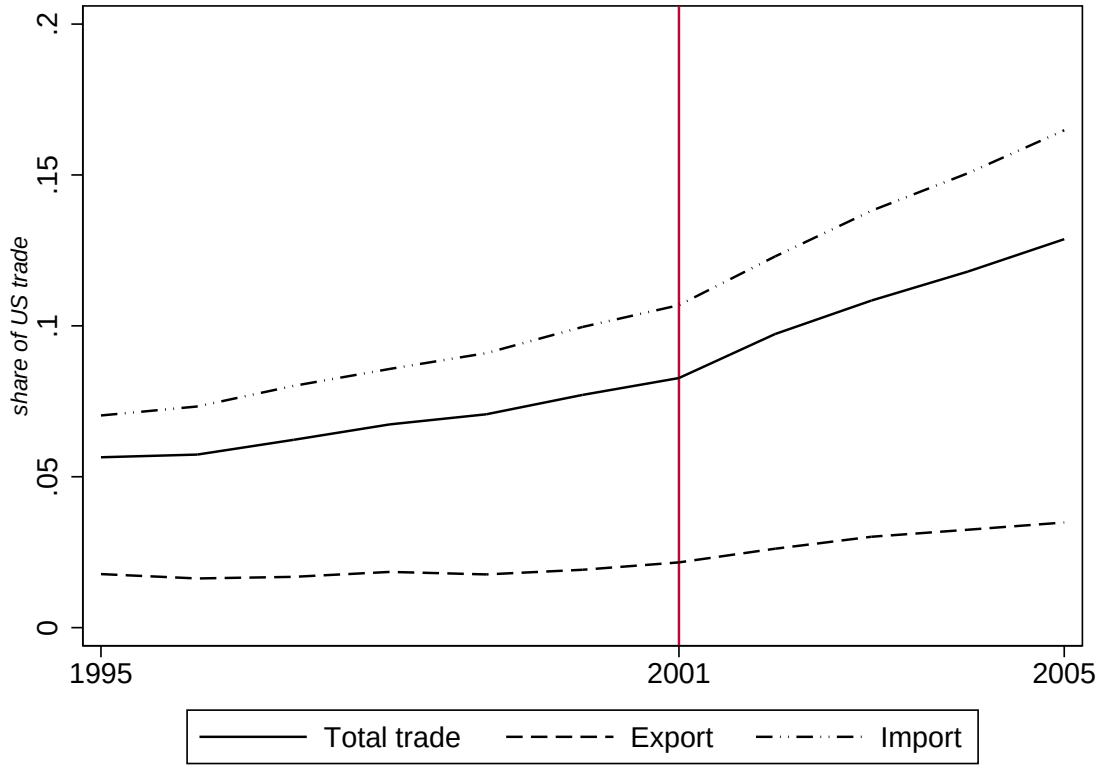

Figure 2.1: EVOLUTION OF US TRADE WITH CHINA

Notes: Author's calculations using U.S. Manufacturing Imports and Exports, 1995-2005 data provided by Peter Schott, 2010. Vertical line marks China's accession to the WTO. Shares of trade flows are calculated over the average of the trade flows between the United States and all the countries that at some point become parts of the WTO or GATT.

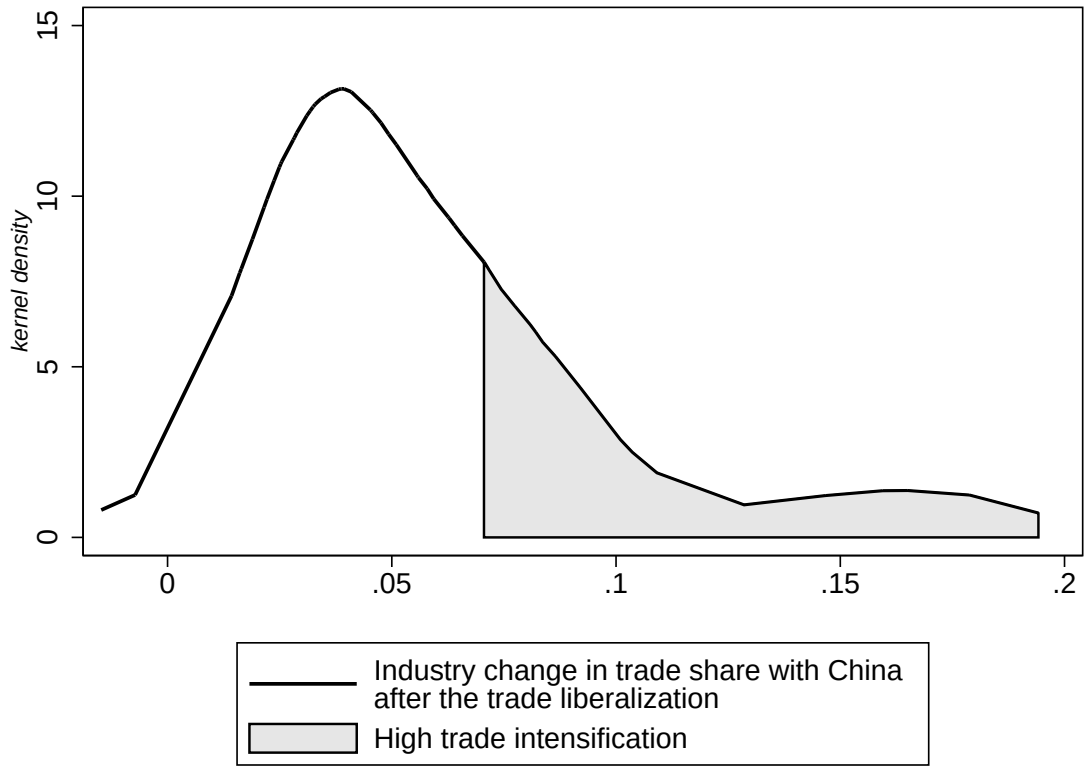

Figure 2.2: INDUSTRY INTENSIFICATION IN US-CHINA TRADE AFTER THE CHINA'S ACCESSION TO THE WTO

Notes: Author's calculations using U.S. Manufacturing Imports and Exports, 1995-2005 data provided by Peter Schott, 2010. Figure shows distribution across industries of estimated changes in trade shares with China after the trade liberalization. Shaded area marks 'high' trade exposure, that is, increase in trade share that falls above 70th percentile of the distribution. Trade exposure is orthogonal to the share of Chines working in each industry previous to the shock.

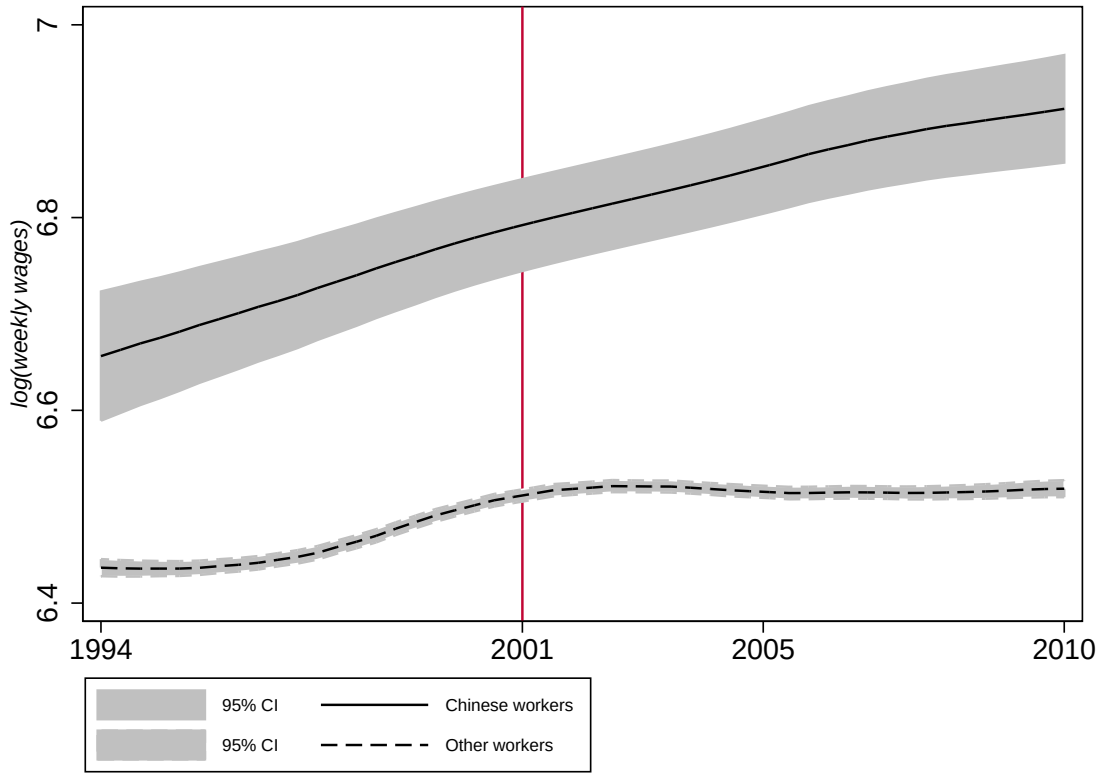

Figure 2.3: EVOLUTION OF WAGES FOR WORKERS WITH CHINESE BACKGROUND, 1994-2010

Notes: Author's calculations using the CPS data for years 1994 to 2010 provided by IPUMS-USA. The figure shows the evolution of wages of high-skilled Chinese workers versus other workers in industries exposed to trade with China. Wages are net of the effect of age and education. The plot if a result of a non-parametric regression.

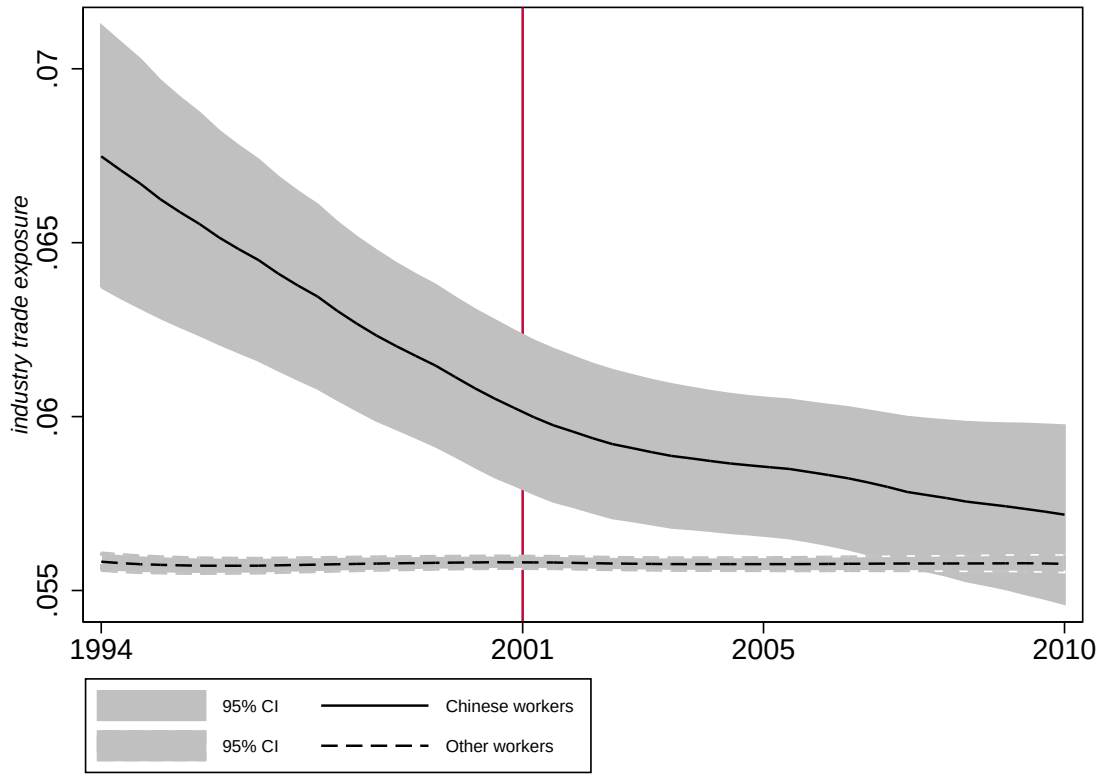

Figure 2.4: EXPOSURE TO TRADE WITH CHINA FOR WORKERS WITH CHINESE BACKGROUND, 1994-2010

Notes: Author's calculations using the CPS data for years 1994 to 2010 provided by IPUMS-USA. The figure displays the average exposure to trade with China after its accession to the WTO for skilled Chinese workers versus workers with other ancestries. The plot is a result of a non-parametric regression of an industry trade exposure to trade with Mexico for a sample of high-skilled Chinese manufacturing workers. The result is net of a age and education effect.

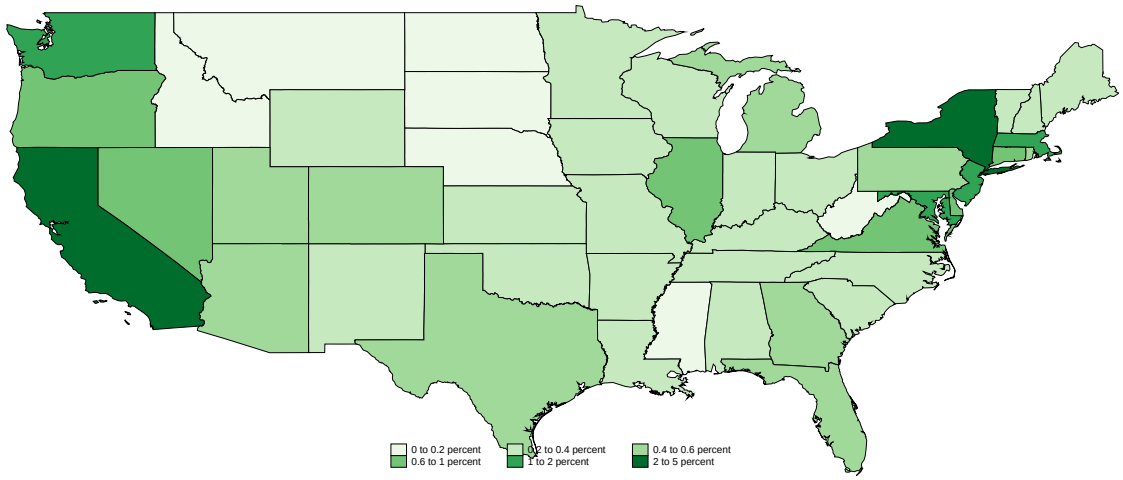

Figure 2.5: GEOGRAPHIC DISTRIBUTION OF CHINESE DESCENDANTS ACROSS THE UNITED STATES

Notes: Author's calculations using data from the US Census Bureau. Distribution of shares of first- or higher-generation Chinese immigrants across the United States in 2000, before China's accession to the WTO.

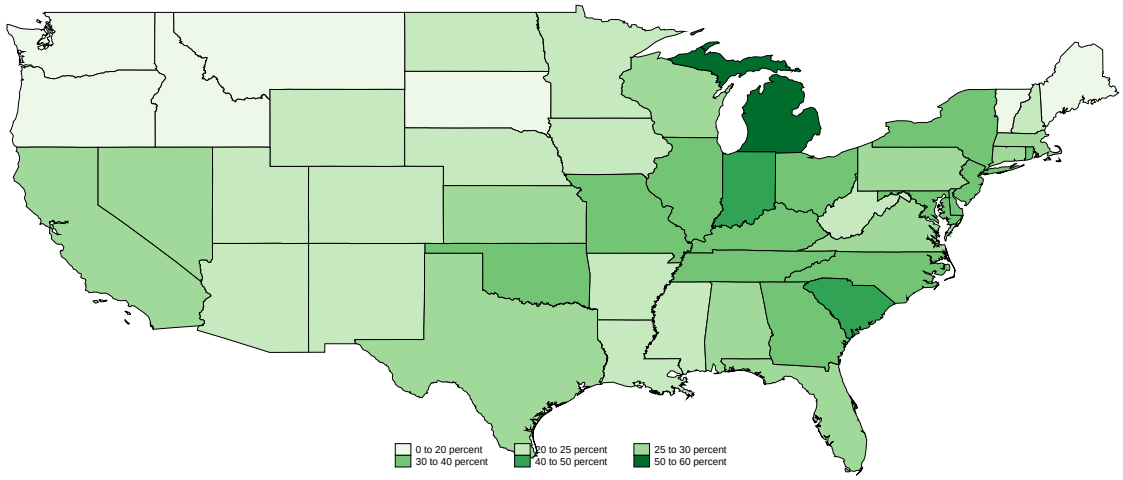

Figure 2.6: GEOGRAPHIC DISTRIBUTION OF EMPLOYMENT IN INDUSTRIES EXPOSED TO TRADE WITH CHINA

Notes: Author's calculations using data from the US Census Bureau. Shares of employment in industries highly exposed to trade increase with China, that is industries that increased their shares of trade with China by at least 7 percentage points.

Chapter 3

COMPARATIVE ANALYSIS: MEXICAN AND CHINESE CULTURAL CAPITALS IN THE US LABOR MARKET

In Chapters 1 and 2, I discussed how intensification in the US trade with Mexico and China affected labor market outcomes of Mexican and Chinese descendants in the United States, respectively. Thus I intent to shed light on the labor marker returns to immigrant cultural capital when the host country engages in trade with immigrants' country of origin. So far I performed the two analysis separately, in this chapter I point out differences and similarities between the two cases, in terms of both the design and the results obtained in each case.

3.1 Samples and design

3.1.1 US trade relationship with Mexico and China

Both Mexico and China are important trade partners of the United States. Trade volumes between the United States and these two countries have been increasing since mid-1980s when both countries started their unilateral liberalization efforts. Mexico joined GATT

in 1986, while China applied to join in the same year.

Figure 3.1 shows the evolution of US trade with the two countries between 1985 and 2005. During this period, both trade liberalization episodes –NAFTA and China's accession to the WTO– occur. Before NAFTA, between 1985 and 1994, US trade shares with both countries follow a similar increasing time trend. Trade shares with Mexico are higher than those for China. For Mexico the picture changes in 1994 when two events occur. On the one hand, in 1994, Mexico is hit by the currency crisis that was caused by Mexican government's sudden devaluation of Mexican peso against dollar, which in turn led to a drop in US exports to Mexico (see Figure 1.1). On the other, in the same year NAFTA is implemented. US-Mexico trade quickly recovers its pre-1994 levels. Thereafter it increases at a faster pace. After 2000, trade shares with Mexico stagnate around 11 percent, reaching 12 percent in 2010.

In case of trade with China, trade shares increase steadily between 1987 and 2001, when they reach 8 percent of the overall US trade. Between 2001 and 2005, trade with China accelerates reaching 12 percent share in 2005 and overshooting trade shares with Mexico in 2003. China reached 14 percent trade share in 2010 despite international crisis that started in 2007.

All-in-all, both countries are important trade partners for the United States. In 2014, China was US second largest trade partner, while Mexico held a third place. Also in terms of goods traded, trade in manufacturing represents a bulk of the overall trade for both countries, with special mention to the trade in intermediate goods.

3.1.2 Mexican and Chinese populations in the United States and sample selection

China and Mexico are also important source countries for the migrant labor force in the United States. In Figure 3.2 the evolution of shares of Mexican and Chinese immigrants over the total US population between 1960 and 2010 is displayed. Changes in migrant flows from the two countries are quite similar when looking over the whole time period, though in levels Mexicans represent a much higher share in the overall immigration. The flow of Mexican immigrants starts increasing in 1970s with a dramatic increase in the

years between 1990 and 2000.[1] China has been sending immigrants since 1960s with an increase in the flow later on, starting in 1980s. Mexico has been the top immigrant sending country in the United States since 1980, when it overshoot Italy. China entered the top ten in 1990s and in 2000 it reached the top five. That is to say, both Mexico and China have been important immigrant source countries for the United States, and both have considerable ethnic community in the country. Mexican community, however, is much larger and is strongly clustered along the US-Mexico border.

In terms of their characteristics, the two groups are very different. Mexicans in the United States are overly low skilled, and there exists a substantial wage gap between Mexican descendants (born in the United States) and other natives even when we compare equally skilled individuals, see Table 1.1. Chinese, on a contrary, are a group which is mostly high skilled. Workers with Chinese ethnic background –either first- or high-generation Chinese immigrants– earn higher wages than comparatively skilled workers from other ethnic backgrounds, see Table 2.1.

When running the analyses in Chapters 1 and 2, these very differences in group characteristics contribute to the credibility of the results. It seems plausible to assume that the effects of trade found in Mexican and Chinese analyses were not driven by some special group characteristics. However, the analyses are not fully comparable in terms of their samples. Given the size of the Chinese population in the United States, I am forced to pool the first- and higher-generation Chinese immigrants into a unique sample, while in the case of Mexican descendants I am able to focus on US-born individuals only. Throughout the analyses, I take steps to bring these samples closer together. So in case of the analysis of China's accession to the WTO, I only include in the sample those immigrants that have been at least 5 years in the United States. In addition, I include in the regression the number of years a foreign-born individual has been living in the United States, as well as its square. Thus, I intent to make the two samples as comparable as possible.

[1] This inflow of Mexican immigrants is the main reason why I control for the shares of Mexican immigrants in the baseline results.

3.1.3 Comparison of the data used in Mexican and Chinese analysis

For the analysis of NAFTA, I use decennial census data from the US Population Census, that samples 5 in 100 households. Starting in 2000, US Census Bureau started conducting the American Community Survey, an annual survey that has been sampling 1 in 100 household since year 2005. I use this data in the analysis of China's accession to the WTO.[2] Therefore, the data used in the analysis of China is higher frequency and is drawn closer to the trade shock. Thus in the case of China, we are looking at a shorter term effects than those observed in the case of Mexico, where we analyze the changes in wages, employment and occupations 6 years after the NAFTA's implementation.

The trade data source is the same for both analyses. In both cases when estimating an increase in trade shares with each country, I limit the sample to 5 years prior to the trade shock and 5 years after it.[3]

3.2 Comparison of the results

The results obtained in the analysis of China's liberalization are highly consistent with what I also obtained in the analysis of NAFTA. In the analysis of NAFTA, I find that highly skilled Mexican descendants experience higher wage growth the more their industry trades with Mexico. Wage effect on the high-skilled Mexican descendants is large and significant. Same is true when we look at the effect of China's accession to the WTO on wages of Chinese descendants, which in this case also include first-generation migrants. The two effects are comparable in magnitude, though the significance is higher for the analysis of Mexico (see Tables 1.2 and 2.2).

In addition, I find that individuals employed in trade-related occupations also experience faster wage growth, if industry they are employed in trades more with Mexico after the shock. This is not so for Chinese workers, for them there is no heterogeneity by occupation. Nevertheless, when we look at the effect of trade with China on the probability of being employed in a trade-related occupation, I find that the effect is much stronger for the Chinese workers. It is more significant and about one point larger

[2]Except for the 1st year of survey, I substitute the 2000 survey by the 1 percent of the 2000 US Population sample.

[3]In case of China data only goes until 2005, since the original series end in this year, thus in this case the sample is limited to 4 years after the shock.

than that for Mexican descendants (see Tables 1.4 and 2.4). In both cases, the effect is concentrated among high-skilled individuals, just as it is the case for the wage effect.

It is interesting to point out this difference in the pattern of the wage and occupational effects across the two analyses. The wage premium specific to individuals endowed with the relevant cultural capital among trade-related occupations is likely to dissipate as more and more individuals endowed with this capital shift towards employment in these occupations. We observe this shift among both high-skilled Mexicans and Chinese descendants. However, given that this inflow towards trade-related occupations is much stronger among Chinese than among Mexicans, we could expect the wage premium to dissipate faster for the Chinese workers. The observed wage effects are consistent with this dynamics. The reason why the occupational effect should be stronger among Chinese than among Mexican group might be that high-skilled Mexican descendants are relatively more scarce than high-skilled Chinese workers. Almost 60 percent of workers with Chinese background in my sample are college graduates, compared to about 4 percents among Mexican descendants.

Finally, when it comes to employment effect, we only observe inflow of high-skilled Mexicans towards industries exposed to trade with Mexico. We don't observe any employment effect among Chinese workers as a result of trade intensification with China. One of the possible explanations is that in the case of the analysis of China the effects are observed closer to the liberalization episode, that is, they are shorter term effects. It is plausible that wage effect should be attenuated on a longer term as more workers with the relevant cultural capital flow towards affected industries, attracted by the wage premium generated by trade with their countries of origin. That is, with time, we would expect to observe less effect on wages and more effect on individual employment, as long as the supply of workers with relevant set of skills is not constrained. Therefore, the pattern in employment effects observed across the two analyses is consistent with them being medium- versus short-term effects in the analysis of Mexico- and China-specific cultural capital, respectively.

Overall, the results are highly consistent across both analyses and they are very robust to a number of specifications. When analyzing channels and mechanisms, in both analyses I check whether an in increase in trade with a country with cultural capital unrelated to Mexico or China affects Mexican and Chinese individuals. I find that it is not the case. I also find that the baseline results from both analyses are robust to inclu-

sion of geographic and language controls.[4] I find that there exist differences in terms of returns to language skills across the two analyses. While trade with Mexico appears to increase returns to Spanish within manufacturing after the shock, in the case of returns to the Chinese language skills, there are no changes in these returns in time. When I allow these returns to be different across industries, I do find that speaking Chinese is associated with lower wages if individual is employed in industry relatively little exposed to trade with China, but the opposite is true if industry individual is employed in trades with China a lot. Thus language is important in both cases, Mexican and Chinese, though the pattern of the results is different in both analyses.

In conclusion, Part I provides evidence that, as a result of intensification of trade relations with countries of origin, the labor market demand for cultural capital that immigrants from these countries bring to the United States increases. The fact that this increase is concentrated among high-skilled and US-born workers has some interesting implications for inequality and assimilation debates. For one thing, within group inequality increases as all the benefits of trade accrue to the high-skilled workers, while low-skilled individuals are either not affected or hurt by it. In addition, assimilation and education seem to be crucial in order to benefit from trade relations with the country of origin.

[4]Some of the tests I only perform on Mexicans. For instance, I estimate the effect in the non-border regions, because many industries cluster there and so does the Mexican community. Such test would have limited relevance in the Chinese analysis. I also estimate the effect of NAFTA on Mexicans relative to descendants from other Spanish-speaking countries, this kind of test cannot be performed in the case of China's accession to the WTO, because Chinese is almost exclusively spoken within Chinese community. Finally, while it is straight-forward to find communities with cultural capital related to Mexican, it is not the case for Chinese cultural capital.

3.3 Figures

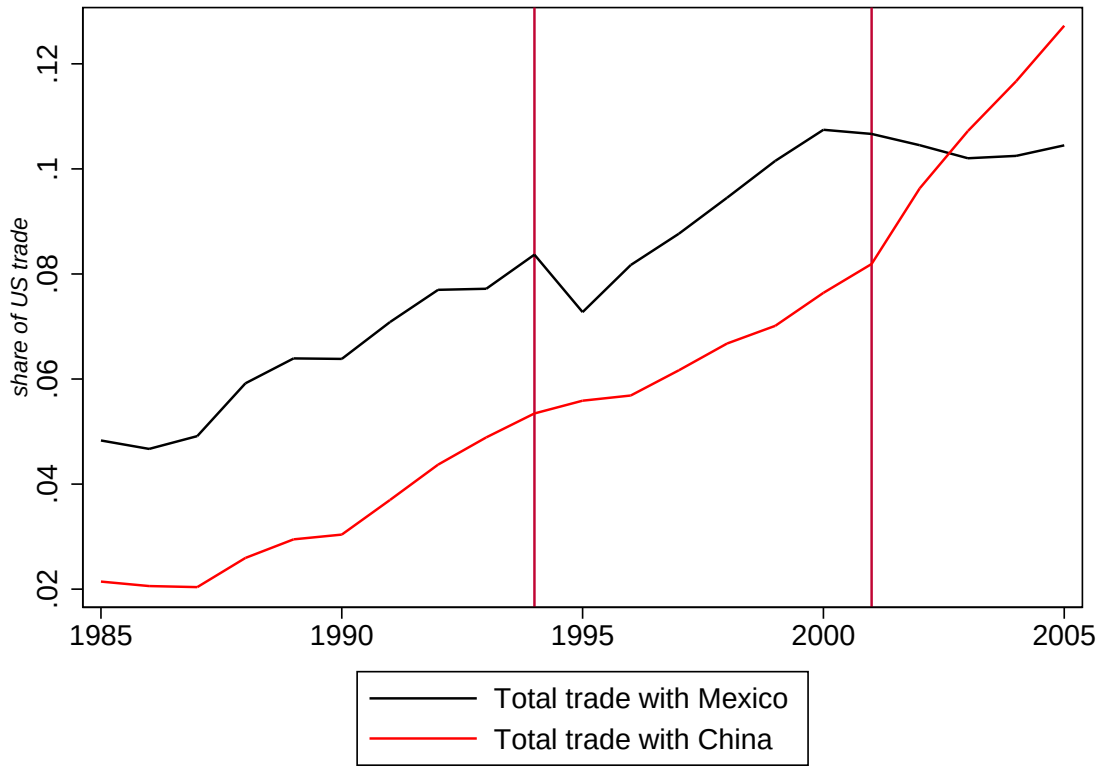

Figure 3.1: US TRADE SHARES WITH MEXICO AND CHINA, 1985-2005

Notes: Author's calculations using data from the US Census Bureau. Shares of trade are calculated as US total trade volumes, exports plus imports, over the total trade volume of US with the rest of the world. Vertical line in 1994 marks NAFTA's implementation. While the 2001 line, marks China's accession to the WTO.

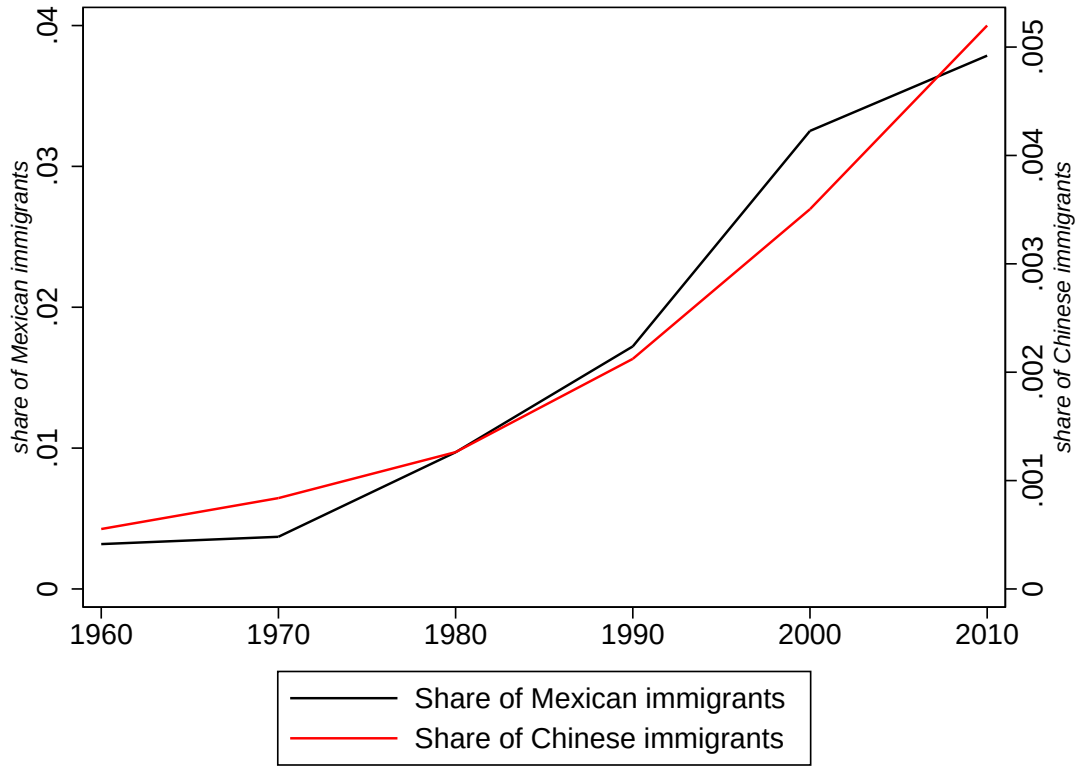

Figure 3.2: SHARE OF MEXICAN AND CHINESE IMMIGRANTS OVER THE TOTAL OF US POPULATION, 1960-2010

Notes: Author's calculations using data from the US Census Bureau. Shares of Mexican and Chinese immigrants in the US population. Shares of Chinese immigration are much lower than those for Mexican immigrants, for this reason and in order to be able to appreciate year-to-year change in shares, two y-scales are used. Left axis show shares of Mexican immigrants, while right axis show shares of Chinese immigrants.

Part II

Immigrant Assimilation and Networks

Chapter 4

ETHNIC NETWORK QUALITY AND EDUCATION

4.1 Introduction

In the past decades, the immigration debate has largely revolved around issues of cultural and labor market assimilation. A wide literature analyses patterns in the labor market adjustment, as well as educational investment of immigrants (Borjas 1994; Card et al. 1998; Gang and Zimmermann 2000; Algan et al. 2010, just to cite a few). There exist large differences in assimilation between and within immigrant groups, which frequently have been attributed to observable and unobservable differences between these groups. For instance, differences in the immigrant selection process and the heterogeneity in ability which comes with it. As of late, in a pursuit of an integrated and skilled immigrant population, immigration policy in many developed counties has shifted towards screening and selecting the 'right' type of migrant to be allowed into the country.

In this chapter, I focus on immigrants' incentives to assimilate and to acquire education. In particular, I develop a simple theoretical framework that shows that even when there is no unobserved heterogeneity between native and immigrant groups, inability by the migrants to reveal their true productivity to employers may lead to network formation, which in turn crowds out incentives to assimilate. This implies that rather than 'selecting' across immigrant groups, improving information between employers and employees (i.e. reducing informational asymmetry) and/or reducing costs of assim-

ilation should lead to fewer networks being formed, and more assimilation.

Immigrant assimilation is a multidimensional process. Immigrants may catch up in terms of education, employment, wages, or acquire values, customs and behaviors specific to the host country. I show the intricate relationship that exists between these different dimensions and point out the importance of networks and their quality when it comes to shaping individual incentives to assimilate and to acquire education.[1]

I contribute to different strands of literature. On the one hand, my work speaks to the research on networks, in particular, immigrant and minority networks. Frequently, these appear to prevent intergenerational mobility and slow down occupational upgrading (Bowles et al., 2014; Mookherjee et al., 2010). Nevertheless, they also can work as mechanisms of group protection against labor market shocks and discrimination. Networks have been documented to be crucial for occupational upgrading among members of at least some disadvantaged groups (Munshi, 2003; Munshi and Rosenzweig, 2006; Munshi, 2011). In the theoretical framework described in this chapter, networks can be both beneficial and detrimental, and the key factor that defines their effect on education and assimilation is network quality.

This chapter also relates to the literature on individual identity and labor market performance. Number of papers document an existance of a link between (broadly defined) individual identity and their wages, employment and occupations. Many find that integrating or assimilating into the dominant culture is associated with better labor market outcomes, though a causal link is hard to establish (Mason, 2004; Constant and Zimmermann, 2008; Battu and Zenou, 2010; Casey and Dustmann, 2010; Duncan and Trejo, 2011a).

Here, I integrate education and assimilation decisions, and networks of heterogeneous qualities into a theoretical framework that sheds light on their role when it comes to investments in education and assimilation, and helps explain differences in education and assimilation patterns across and within immigrant groups. The model illustrates how ethnic networks might be formed even when individuals have no preferences towards own identity, no peer pressure exists and when non-assimilation into the main-

[1]Constant and Zimmermann (2008) define a multidimensional measure of immigrant identity, that incorporate various markers of assimilation as well as self-revealed preferences. Their approach differs from the one adopted in this chapter. Immigrant labor market characteristics, socialization, identification with host-country values, among other constitute different facets of assimilation which need not to go hand-in-hand with each other.

stream might lead to worse labor market outcomes. That is, I show that purely economic considerations of cost and benefit can drive immigrant workers together into ethnic networks, even when doing so has apparent labor market costs.

I create a simple disclosure game that analyzes cultural assimilation and educational decisions in the presence of immigrant networks of heterogeneous qualities, in the context of a labor market with imperfect information. I treat assimilation as a costly technology that allows immigrants to become closer to the native population, and thus reveal their productivity to employers. I show that differences in ability to disclose one's productivity can lead to underinvestment in education and/or lower cultural assimilation. I analyze the effect of network quality on incentives to invest in education and study how this is related to assimilation. The model suggests that low-quality networks reduce individuals' incentives to acquire education and to assimilate, but as network quality increases, the incentives to acquire education also increase. High-quality networks, however, crowd out incentives for cultural assimilation as these networks provide immigrants with an alternative to the 'dominant' labor market. When an immigrant network is of low quality, the association between assimilation and education is perfect: no individual acquires education without assimilating, nor assimilates without acquiring education. This is because, low-quality networks can only provide immigrants with low-skill jobs in which returns to education are zero. Thus those whose ability is high enough, will both assimilate and get education, while the rest of individuals in the group become part of a network. If, however, network quality is high, that is, it can provide migrants with skilled jobs, then incentives to acquire education will not be affected but assimilation will be unnecessary.

This model provides me with a series of testable predictions about the patterns in education and assimilation of immigrant groups, conditional on network quality. When it comes to low-quality networks, the model predictions are consistent with dynamics observed by Duncan and Trejo (2011b), who show that Mexican Americans that are more likely to assimilate in terms of labor market outcomes, are also more likely to assimilate culturally. In order to bring the model to the data in a systematic way, I use United States census data and test whether we indeed observe the relations predicted by the model in the data. I use data from the 1970 and 1980 US Population Census waves and test my predictions using the samples of both second- and first-generation immigrants. All the correlations predicted by the model appear in the data. First, low-quality networks are

negatively related to education, but as quality increases this negative association dissipates. Second, assimilation is positively related to education, but this correlation is even stronger when network quality is low, and it becomes weaker as network quality increases.

Taking this evidence as validating my model, I show how the same forces of the model predict network creation of endogenous quality when immigrant workers suffer from a penalty in the dominant labor market. In my framework, the assimilation decision or the decision to become part of a network is in no way driven by preference for own identity or group pressure. On the contrary, the underlying assumption in my model is that immigrants do not have preference for either own identity or assimilation, and that there is no group pressure that could drive the formation of migrant networks. Individuals assimilate to be able to reveal their productivity. I rely on two main assumptions: i) informational asymmetry is more relevant between groups, i.e. it is easier for individuals from the same group to observe each other's ability; and ii) assimilation is a mechanism that brings two groups closer, i.e. assimilated immigrants become indistinguishable from the natives. These forces, however, can generate persistence in immigrant identity, networks, and further lack of assimilation.

The remainder of this chapter is organized as follows. I develop the model of networks, education and assimilation in Section 4.2. In the following Section 4.3, I present the empirical specification I use to test the model using the US Population Census data. In the same section, I discuss the measures of network quality and size, as well as assimilation markers, which I then use in the analysis. In Section 4.4, I present my main data sources and describe the samples of interest. In the next Section 4.5, I show the results from the main empirical analysis, as well as those from robustness checks. In Section 4.6, I discuss the implication of the model for network quality determination in a dynamic setting. Finally, Section 4.7 concludes.

4.2 Heterogeneous networks, education and assimilation

In this section, I develop a simple model of ability disclosure in the context of labor markets with imperfect information to help explain differences in levels of cultural as well as labor market assimilation, between and within immigrant groups. In particular, I show how immigrant networks shape incentives to acquire education and to assimilate

culturally. Network quality has a crucial role in predicting assimilation patterns as well as explaining individual educational decisions.

4.2.1 Model set-up

Consider a population with a continuum of individuals. Each individual is endowed with a level of ability a, which is distributed according to a distribution function $f(a)$, over a unitary support. Each worker lives one period and in the beginning of the period she has to decide whether to acquire education (e) at a cost c or not. Education costs the same to all workers. There are two levels of education (low and high), so that $e_i = \{0, 1\}$. Workers' ability and education are perfectly observable.

From the labor demand side, there are two sectors in the economy: Agriculture (A) and Banking (B). Each of the two sectors use labor as a factor of production. Firms in each of the sectors act competitively and pay their employees their marginal productivity, which depends on their intrinsic ability as well as their level of education. Technology used in sector B is relatively more skill-intensive. That is, while workers productivity in sector A is solely determined by their ability, productivity in sector B depends on both ability and education. Returns to ability for low-education workers are the same in both sectors, but sector B also has positive returns to education. The technology used in both sectors is such that the wage structure in this labor market can be summarized by equation (4.1).

$$w_i(e, a, s) = (1 + \beta e_i s_i^B) a_i \tag{4.1}$$

where s^B takes value 1 if an individual is employed in sector B (0 otherwise). That is, a worker's wage is determined by her ability a, education e, and sector of employment s^B. Wages of all workers employed in Agriculture are equal to their ability ($w_i^A = a_i$). Returns to ability of low-education workers in Banking are also unitary. But wages of educated workers in Banking are $w_i^B = (1 + \beta)a_i$, where $\beta > 0$ represents positive returns to education in sector B. In other words, ability and education act as complements in sector B.

The economy is large enough to absorb all the workers that seek a job. Workers on the other hand must decide which sector to work for and whether to acquire education

or not. Since there are no returns to education in sector A, only uneducated workers will seek employment in this sector. Workers who do not invest in education are indifferent between being employed in sector A or B. All individuals who decide to acquire education will find employment in sector B. Thus, sector B will employ both educated and uneducated workers. Given that education is costly, only workers whose ability is high enough will incur the cost of education. In particular, all workers i such that $a_i \geq c/\beta$ will acquire education and work in sector B, while the rest of the workers will split between employment in sectors A and B.

Now, consider that the population is divided in two subgroups: Natives (N) and Migrants (M). Natives represent the 'dominant' group in the population. Both groups are identical in their ability distribution, but belonging to a dominant group means that there exist no cultural barriers that might entail asymmetric information between firms and workers, and therefore potential employees can reveal their ability costlessly to the firms. Migrants, however, come from different cultural and institutional backgrounds, which implies that in order to reveal their ability to the employers they need to assimilate culturally. Assimilation means that an immigrant can become 'indistinguishable' from a native, but this is costly, and the cost of assimilation is K. If migrant workers do not assimilate, firms cannot observe their ability and pay these workers the minimum wage ($\underline{w}$), which is institutionally determined. The payoff structure of the migrant workers will be as follows: i) non-assimilated workers will receive the minimum wage $\underline{w}$; ii) low education assimilated workers will get $a_i - K$; and iii) highly educated assimilated workers will obtain $(1 + \beta)a_i - c - K$. While native workers in the beginning of the period have to decide whether to invest in education, migrants also have to decide whether to assimilate or not. The fact that both education and assimilation are costly leads to positive selection of individuals into both education and assimilation. If the minimum wage is low enough not to crowd out incentives to assimilate, then migrants' incentives to acquire education will not be affected by the fact that their ability is not observable.[2]. In equilibrium, migrants whose ability falls in the interval $[\underline{w} + K, c/\beta]$ will assimilate but not acquire education, those with lower ability will neither assimilate

[2]For this to be true the minimum wage must be low enough, in particular, is must be that $\underline{w} < c/\beta - K$. If minimum wage is higher than this threshold then assimilation and education will go hand-in-hand. Low minimum wage is consistent with a situation in which wages are set endogenously equal to the forms' expectations of workers' productivity conditional on educational investment and assimilation decision. For discussion on equilibrium minimum wages refer to the Appendix A.

nor acquire education, and those with ability above threshold c/β will both assimilate and acquire education.

Thus, the fact that migrants' ability is not observable to the firms will not necessary lead to lower educational investment for individuals from group M. Migrant payoffs, however, will be lower than these of similar native workers because in addition to the cost of education they also have to incur the cost of assimilation. Overall, when no networks are present, the following pattern will be observed. The lowest ability individuals will neither assimilate nor get education. The middle ability types will assimilate without acquiring education, and only individuals with the highest ability will invest in both assimilation and education. In a dynamic framework, the non-assimilated individuals will become building blocks of a potential migrant network. Notice that average ability of the non-assimilated migrants will in part be determined by the cost of assimilation K, the higher is the cost of assimilation the higher the average ability of the non-assimilated workers, and the higher the potential quality of the future network. I will defer the discussion on the network formation to Section 4.6, and for now focus on a case in which network quality is determined exogenously.

4.2.2 The role of migrant networks

Migrant individuals can find a job in the main labor market described in the previous section, or though a 'network' which is formed by individuals from their own group. Getting a job through a network has the advantage of allowing migrants to costlessly reveal their productivity to employers, thus providing individuals belonging to group M with an alternative to assimilation or the minimum wage. Not all jobs, however, can be acquired through the network. In particular, an individual network can either span jobs in sector A or B, but not both. Henceforth I will refer to the network spanning agriculture jobs as a low-quality network, and I will call high-quality a network that can provide jobs in the Banking sector. A low-, as opposed to high-quality, network differentially affects migrants' incentives to assimilate and to acquire education.

Low-quality networks

A low quality network means that migrants' investment in education will only be rewarded if cultural assimilation takes place, but now a non-assimilated worker can either

get a job on the main labor market and obtain a minimum wage $\underline{w}$, or get a job through the network and receive a wage $w_i^{net} = a_i$. Either way, there are no incentives for a non-assimilated individual to acquire education, nor for an educated worker not to assimilate. Similarly, for workers with low education there are no incentives to assimilate since they can reveal their ability within their network without having to pay the cost of assimilation. Thus, when network quality is low, for migrant workers education will go hand-in-hand with assimilation. Assuming that $\underline{w}$ is low enough –and in equilibrium it should be–, migrant workers' payoffs will be:

$$\text{Payoffs}_i = \begin{cases} \underline{w} & \text{no assimilation, main market} \\ a_i & \text{no assimilation, low education, network} \\ (1+\beta)a_i - c - K & \text{assimilation, high education, network} \end{cases}$$

This payoff function implies that only individuals whose ability is above $(c+K)/\beta$ will assimilate and acquire education. In the no-network case, the ability threshold for acquiring education was c/β. Therefore, low-quality networks increase the threshold for education investment. Since in the low-network case education and assimilation go hand-in-hand, these networks crowd out both incentives to assimilate and to acquire education among individuals belonging to the migrant group.

High-quality networks

What happens when a network spans jobs in the skilled sector? Wages in the Banking sector are determined by both individual intrinsic ability and level of education. Low education workers can either work for the minimum wage in the main sector, or reveal their ability within their network. High education workers can also work for the minimum wage outside the network, or reap the benefits of education through employment within the network. That is, both high- and low-education workers can costlessly reveal their ability through the network and high-education workers can also get full returns to education. Thus, a high-quality network completely crowds out incentives to assimilate. Therefore, the migrant payoffs within equilibrium path will be:

$$\text{Payoffs}_i = \begin{cases} \underline{w} & \text{no assimilation, main market} \\ a_i & \text{no assimilation, low education, network} \\ (1+\beta)a_i - c & \text{no assimilation, high education, network} \end{cases}$$

Since there are positive returns to education within high-quality networks, incentives to acquire education do not change when the high-quality network is present, relative to the no-network situation.

4.2.3 Testable predictions

The model discussed above generates a large set of testable pre dictions, some of which are well established in the literature. For instance, there is positive selection into both education and assimilation for the members of the migrant group. Both assimilation and education, in a way, increase returns to ability. On the one hand, by assimilating, higher ability types are revealing their productivity to the employers and are able to separate themselves from the lower ability ones. Education, on the other hand, enhances individual intrinsic productivity. Assimilation and education costs generate positive selection into assimilation and education.

More interesting, however, are the predictions regarding the role of migrant networks, and the fact that the effect of networks may vary by network quality. In particular, the model suggests that while high quality networks crowd out incentives to assimilate culturally, they do not affect incentives to acquire education. Thus, investment in education should be the same for the dominant and the migrant groups when there are no networks or when the network is high quality.[3] If network quality is low, the individual decision to assimilate culturally will go together with the decision to acquire education and, vice versa. This is consistent with the observation by **?**, who show that in the United States most successful Mexican descendants assimilate in the mainstream and stop identifying themselves as being of Mexican origin, that is they assimilate culturally. For low-skilled Mexican descendants, however, there seems to be much more persistence in their identity as Mexicans.[4]

The model also generates predictions as to the wage structure of the migrant group, as well as assimilation patterns within and between groups. These predictions will be covered in the Appendix B.

[3]Notice that though high-quality networks do not affect decisions to get education, they do increase individual payoffs.

[4]Keep in mind that Mexicans represent one of the most disadvantaged groups in the United States, and Mexican networks usually span low-skilled jobs.

4.3 Bringing the model to the data

The model discussed in the previous section emphasizes on the importance of network quality when analyzing individual incentives to assimilate and to acquire education. In particular, I find that when network quality is low there exists a strong link between the decision to assimilate and the decision to acquire education. Without assimilating, individuals will not acquire education because low skill networks do not reward education and in the main market non-assimilated migrants can only receive the minimum wage. Nor are there incentives to assimilate without getting education, because networks represent a costless alternative to assimilation when it comes to revealing individual ability. There is no such association, however, when network quality is high. Skilled migrants can reap positive returns to their education within their network, thus we should observe more investment in education when network quality is high as opposed to when it is low.

In this section, I define an econometric specification designed to put the main predictions of the model to the test. It is not a straight-forward task. In the model, workers belonging to the migrant group might have no network at all, or their network might be either low or high quality. The reality is much more complex, and some adjustments must be made when applying the model to the data. There are networks of different sizes, some of them too small to be able to provide an alternative to the main labor market for all migrants. Moreover, network quality is not necessary binary, rather there is a whole spectrum of network qualities. Therefore, when designing the empirical specification, I convert the binary model into a continuous one. In particular, I proxy network presence by estimated network size. The situation when networks are very small can approximate that of no network at all; while the larger the network, the closer we become to the case when migrant individuals do have a network as a potential alternative to the main labor market. Moreover, since it is not only the presence or size of the network that matters but its quality, I distinguish between low- and high-quality networks by interacting network size with its 'quality' measure, which is also continuous. When it comes to assimilation, I am restricted to use different assimilation markers that suggest cultural assimilation but not an increase in human capital. The details on the particulars of estimating network size, quality, and choice of assimilation markers will be discussed later in this section. Finally, unlike in the model, in the data the population consists of a number of different groups. It is still possible to separate them into natives

and migrants, but now migrants do not form a unique group, instead there are different migrant groups and they all differ in size, quality, as well as other characteristics. My analysis is concentrated on individuals who are either foreign-born or second-generation immigrants.

Keeping in mind the adjustments discussed above, I design an econometric model that allows me to test the model using individual data. Equation (4.2) allows in one regression to test: i) whether low-quality networks are associated with lower investment in education, while high network quality, on the contrary, is associated with higher educational investments; and ii) whether assimilation is associated with education when network quality is low.

$$educ_{ijs} = \beta_0 + \beta_1 NetSize_{ijs} \times NetQual_{ijs} \times Assim_i + \beta_2 NetSize_{ijs} \times Assim_i$$

$$+\beta_3 NetSize_{ijs} \times NetQual_{ijs} + \beta_4 Assim_i + \beta_5 NetSize_{ijs} + \gamma X_i + \delta_j + u_{ijs} \quad (4.2)$$

The outcome variable, $educ_{ijs}$, is an individual educational investment, measured in years of education. The subscripts refer to individual i, country of origin j and state s. I define networks at source country-state level, so as to capture cultural affinity as well as geographic proximity between individuals of the same immigrant group. $NetSize_{ijs}$ is potential network size for every individual from immigrant group j and state s, it is calculated as a number of all other people from the same source country residing in the same state, divided by the state population:

$$NetSize_{ijs} \equiv (\frac{N_s^j - 1}{N_s}) \times 100$$

N_s^j represents the number of individuals from immigrant group j in state s, and N_s is state population. In other words, it is roughly a share of individuals from group j in a state. Rather than telling us how large is the ethnic network of every individual in the sample, $NetSize$ gives us individual *potential* network size.

$NetQual_{ijs}$ depicts the quality of the network, and it is also computed excluding individual i. I measure network quality in terms of wages and occupational distribution of every source country and state. To define network quality in terms of wages, I take average wages of all individuals from the same group and state, and adjust them by

average state wages:

$$NetQual_{ijs}(wage) \equiv \frac{\sum_{l=-i}^{N_s^j} w_l/(N_s^j - 1)}{\overline{w}^s}$$

$\overline{w}^s$ is the average wage in state s. Network quality in terms of occupations is computed as a relative probability of being employed in a high-skilled occupation for every immigrant group and state, adjusting for the overall probability of being employed in high-skilled occupation in each state:

$$NetQual_{ijs}(occ) \equiv \frac{\sum_{l=-i}^{N_s^j} I[\textit{skilled occ}]_l/(N_s^j - 1)}{\overline{I[\textit{skilled occ}]}^s}$$

where $I[\textit{skilled occ}]$ is an indicator of being employed in a skilled occupation.[5] In other words, for relatively large immigrant groups, network quality measures relative wages and relative probability of being employed in a skilled occupation for individuals from the migrant group j.[6]

I use intermarriage with a native and linguistic assimilation as markers for cultural assimilation ($Assim$). For intermarriage, I define an indicator variable that takes on value 1 if migrant is married to a native, and 0 otherwise. Of course, this assimilation measure will only be available for a subsample of married individuals. Arguably, it will be more relevant for the second-generation immigrants. On the one hand, their marriage decision is taken in the host country, while first-generation immigrants might arrive to the host country already having a partner. On the other hand, the degree of intermarriage is much higher for the second-generation immigrants, this suggests that rather than intermarriage being an assimilation marker, marrying within the immigrant group will be a clear indicator of non-assimilation.[7] As to linguistic assimilation, I will use two different measures. For a part of my sample, I will have information on individual's

[5] An occupation is defined as skilled if the share of college graduates employed in it is above the median of college graduates across occupations.

[6] We cannot talk about relative wages or relative probability of being employed in a high-skilled occupation because every time we compute it we exclude one individual from the computation and this exclusion may be important if the immigrant group is composed by only few individuals.

[7] Notice that the fact that some first-generation immigrants might marry in their country of origin introduces noise in this assimilation measure. This noise can be reduced to some extent, if we focus on immigrants that arrived to the country at younger ages. As I will discuss in the following section, in a part of my analysis I will be able to focus on such group.

Table 4.1: PREDICTED SIGNS SUMMARIZED

$\beta_5 < 0$	Negative effect of low quality network on education
$\beta_4 > 0$	Captures positive selection into both education and assimilation
$\beta_3 > 0$	Higher network quality is associated with more investment in education
$\beta_2 > 0$	In presence of low-quality networks, education and assimilation go hand-in-hand
$\beta_1 < 0$	As network quality increases, association between

mother tongue, while for another subsample, I observe individual's English proficiency. I define two indicator variables, one takes on value 1 if English is individual's mother tongue, and 0 otherwise; another takes on value 1 if migrant speaks English very well, and 0 otherwise.

Finally, X_i refers to a set of individual controls such as age, gender and years since migration (when available). It is important to note that since there are multiple immigrant groups in this setting, they may differ in various parameters.[8] In order to avoid confounding differences in group-specific parameters with differences in network quality, I also include source-country fixed effects, δ_j, in a subset of regressions.

Equation (4.2) is a variation of a triple difference specification, and it allows us to estimate the association between education, and low- and high-quality networks. By integrating interactions with assimilation markers into the model, I also test for the association between education and assimilation for different levels of the network quality.

If the model has some predictive power, we would expect $\beta_5 < 0$. When not interacted with $NetQual$, $NetSize$ proxies for the presence of low quality network, and the model predicts that low quality networks should crowd out individual incentives to acquire education. Thus, the association between low-quality networks and education should be negative. As network quality increases, the negative association between migrant network and education should dissipate, therefore I expect the coefficient on the interaction term to be positive, $\beta_3 > 0$. The model also predicts a positive association between assimilation and education when no networks are present: some individuals

[8]One obvious example, is the cost of cultural assimilation. Cultural distance between the host and the home country of immigrants will make it more or less difficult to assimilate and thus will affect assimilation patterns between immigrant groups.

will assimilate without acquiring education, but all those that acquire education will be assimilated, hence $\beta_4 > 0$. When there is a network and its quality is low, this association is expected to be even stronger since there will be no assimilation without education: $\beta_2 > 0$. Finally, the model predicts that high quality networks should completely crowd out incentives to assimilate and thus we should not observe any assimilation when network quality is high. Empirically, this is not plausible, but we would expect the correlation between education and assimilation to be weaker when network quality is high, thus the coefficient on the triple interaction (β_1) should be negative. Whether the overall correlation between assimilation and education is positive or negative when network quality is high is uncertain (i.e. $\beta_1 + \beta_2 \lesseqgtr 0$) and will depend on what jobs the network spans. For instance, if a network spans only very high-skilled jobs then some middle ability types would like to assimilate without acquiring education, generating a negative association between assimilation and education when a high-quality network is present. The expected pattern of coefficients is summarized in Table 4.1.

4.4 Data and sample description

I am interested in studying the association between migrant network quality and education, as well as the association between assimilation and education, conditional on network quality. I need data with sufficient variation in network qualities and sizes. Moreover, I am mostly interested in second-generation migrants. In the model, individuals make a decision about their education and assimilation, conditional on the quality of their ethnic network. This context is most likely to be replicated in the case of second-generation migrants, mostly because first-generation migrants might migrate to the country having already made their educational investment in the country of origin.

Thus, my main dataset is the 1 percent 1970 Form 2 Metro Sample of the US Census. I use the 1970 census since this is the last census year in which individuals were explicitly asked about their parents' country of birth. When both parents were born outside the United States, only father's country of birth was recorded, hence I use father's country of birth to assign country of origin to the second-generation individuals in the sample.[9] I focus on second-generation individuals aged at least 23 to make sure that

[9]If, however, father's country of birth is missing, as might happen in single parent households, I use mother's country of birth instead.

most of the individuals in the sample are old enough to have completed their education, or are close to completing it.

In the robustness checks, I also run the analysis using a sample of first-generation migrants. The choice of assimilation markers in this wave of the Census is restricted to being married to a US-born individual, and having English as a mother tongue. The latter reflects parents' rather than individual effort to assimilate. For this reason, I also use the 1 percent sample of the 1980 US Population Census, that provides me with information on individual English skills. In particular, for those individuals who speak at home languages other than English, I observe how well they are able to communicate in English. This sample is also used in robustness checks. For this wave, however, I cannot identify second-generation immigrants (except for those individuals who still live in the same household with their parents), so I I focus on the foreign-born population, excluding recently arrived migrants.[10] In addition, in the 1980 sample I observe the year foreign-born individuals arrived in the country, so I can exclude from the sample those individuals who were too old to make investments in education, that is those who were older than 30 when they arrived to the United States.[11]

I run the analysis using three different samples: second-generation immigrants from 1970, first-generation immigrants from 1970, and first-generation immigrants from 1980. Table 4.2 displays descriptive statistics of the three samples. As described in the previous section, network size reflects the population share from a given country of origin in a state. When computing it I pool the first- and second-generation individuals together: in 1970, the size of Italian network in the state of New York was 10.8. This means that 10.8 percent of individuals in New York were either first-generation immigrants from Italy or had at least one parent born in Italy. As we can see from the table, the average network size in 1970 was between 3 and 4 percent. In the 1980 sample, network size falls dramatically. This is due to the fact that in 1980, I cannot distinguish second-generation migrants from other natives, thus network size is computed using immigrants only, potentially underestimating network size. There is quite a lot of variation in the network sizes in my sample.

When it comes to quality we observe two things: on the one hand, network qual-

[10] By 'recent' migrants I refer to those who lived in the the United States for at most 5 years.

[11] Notice that I include all individuals who are older than 23 when computing network size and quality, but when running the regressions I exclude those who were older than 30 when they arrived to the United States because they will be adding noise to the results.

ity measured in wages seems to be lower on average than that measured in terms of high-skilled occupations. There seems to be more variation in the occupational measure. Figure 4.1 shows the distribution of the two measures of network quality for the pooled 1970 sample and the immigrant sample from the 1980 Census. Wages earned by individuals from the migrant group, that is first- and second-generation migrants, are about 40 percent lower than native wages. However, there exists substantial variation in this measure even within groups. So the Lebanese in Washington DC and West Virginia earn the same wages as natives, while in Maryland their wages are about 50 percent higher than those of natives, but in Massachusetts their average wage is just about half what natives earn.

To illustrate the kind of variation I will be exploiting in the analysis, in Figures 4.2 to 4.4, I map the population size and network quality for one of the largest migrant groups of the United States at the moment, Italians, onto the map of the United States. Figure 4.2 shows the distribution of the Italian population across the United States in 1970 and 1980. In 1970, Italians were mostly clustered in the North-East, but also in California and Florida. In 1980, the same pattern is evident, but in paler tones since only first-generation immigrants are included. In terms of occupation and wages, as can be observed from Figures 4.3 and 4.4, there exists quite a lot of variation across states, quality measures, and years. So for instance, while the Italian network quality in Kentucky is high in 1970, in terms of both measures, in 1980, Kentucky moves towards the lower tail of the quality distribution. Italians are just one example, but such variation can be observed also for the rest of the immigrant groups.

In terms of assimilation markers, about 90 percent of the sample of married second-generation immigrants are married to a native. This number decreases to about 40 percent when we consider first-generation migrants, both in the 1970s and 1980s. As to linguistic assimilation, 29 percent of the second-generation immigrants (whose country of origin is non-English-speaking) have English as a mother tongue. This marker, however, has no sensible interpretation for the first-generation migrants. In 1980, we have another measure of linguistic assimilation ('English proficiency'). It is an indicator that an individual speaks very good English, or only speaks English. About 60 percent of the migrants in the sample speak very good English.

Finally, individuals in the second-generation sample have about 11 years of schooling, on average. Among 1970 immigrants, average schooling is about 9 years, and in

1980 immigrants have about 12 years of education on average.

The sample size varies quite a lot. In 1970, we have 69 immigrant groups in the sample and a total of 2,282 networks. This amounts to 165,055 individuals in the sample of second-generation immigrants, and 86,481 individuals in the immigrant sample. In 1980 the number of immigrant groups increases to 105 countries of origin and 2,392 networks.[12] The number of individuals in the sample, however, is much smaller, 41,780 observations. This is due to the fact that we exclude migrants who arrived to the United States aged 31 and older.

All-in-all there is quite a lot of variation in network size and quality measures, as well as assimilation patters. In the following section I proceed to a systematic analysis of these differences.

4.5 Results

In Table 4.3, I present the results from Specification (4.2) on the sample of second-generation individuals from the 1970 wave of the US Population Census. The outcome variable is years of education, and in columns (1) to (4) I use the two measures of network quality –wage- and occupation-based– and two markers of cultural assimilation –intermarriage and linguistic assimilation–. In columns (1) and (2), I use intermarriage as an assimilation marker; and in columns (3) and (4), I use linguistic assimilation. As to network quality, in columns (1) and (3) I use wage-based measure of network quality, while in columns (2) and (4), I use occupation-based network quality measure. As controls I include age, up to a cubic form, and gender.

The coefficients presented in the table are β_1 to β_5 from Equation (4.2). The coefficient on *network size* (β_5) represents the association between low quality networks and education, with respect to the situation when no network is present. Since low-quality networks crowd out incentives to assimilate, this coefficients is expected to be negative. From Table 4.3 we can see that it is indeed negative and highly significant in all of the specifications. The coefficient on network size oscillates around 1 and 1.5 in the baseline regressions. This represents almost 30 percent of the standard deviation of education in the sample, and it means that one-percentage-point increase in network

[12] Some immigrant groups are quite small so we only observe them in several states.

size is associated with up to 1.5 years less of schooling. As network quality increases, however, this negative effect dissipates, as we can see from the positive and significant coefficients on network size interacted with its quality (β_3). The coefficients on these interactions are positive and significant. The magnitude of the coefficients varies between 1.2 and 2.2. High quality networks should not distort educational decisions and thus as network becomes large its quality should increase substantially to offset the effect of a low quality network. In particular, in order to cancel out the negative effect of low quality, an increase in the network quality should be of an order of 3 to 4 standard deviations. As to the relation between cultural assimilation and education, the model predicts that when no networks are present, there exists positive selection into both education and assimilation. So the coefficient on assimilation markers (β_4), such as an indicator that individual spouse is US-born or that individual mother tongue is English, should be positive. From the third row in Table 4.3 we can see that the coefficients are positive and mostly significant, except for specifications in columns (1). When the network quality is low, the association between assimilation and education should become even stronger. The coefficient on the interaction between network size and the assimilation markers (β_2) is indeed positive and significant when intermarriage is used to indicate cultural assimilation. When linguistic assimilation is used coefficients are still positive but not significant. [13] Finally, the association between education and assimilation should become weaker when network quality is high. This should be reflected in negative coefficients on the triple interaction between network size, its quality and the assimilation marker (β_1) in the last four rows in Table 4.3. The coefficients are all negative and significant when intermarriage is used as a measure of cultural assimilation.

The coefficients in Table 4.3 are estimated using variation in the network quality that comes from country of origin and state. However, the selection process in terms of productivity as well as a number of other characteristics that drives immigration from different source countries may confound my results. For this reason, in Table 4.4 I re-estimate all the specifications, but now in addition to gender and age controls, I add country-of-origin fixed effects.[14] By doing so, I estimate all the coefficients us-

[13] When interpreting these results it is important to keep in mind that having English as a mother tongue doesn't really reflect individual decision to assimilate. Rather it is contingent on parent's effort to use a language which is not their own as a household language. In the robustness checks when using 1980s sample and individual English proficiency as assimilation marker the results become highly significant.

[14] Remember that the 'country of origin' in this context refers to the country of birth of individual's

ing within country of origin variation, that is exploiting state-level variation in network quality and their size. The table is organized in the same way as the previous one: using intermarriage as an assimilation markers in the first two columns, and in the last two using linguistic assimilation. Then in columns (1) and (3), wage-based network quality measure is used, while in columns (2) and (4), I use occupation-based measure. When country-of-origin fixed effects are included, the coefficients drop by about 50 percent, but most of then still remain highly significant and the coefficient pattern is the same as predicted by the model.

As a robustness to the specifications used in Tables 4.3 and 4.4, I run an alternative set of regressions which are identical in all aspects except for the fact that, instead of years of education, I use an indicator of having at least a high-school degree. The results are presented in Tables 4.7 and 4.8. All of the coefficients in the table are consistent in sign and significance with those presented in the main Tables 4.3 and 4.4.

Overall, all of the estimates are consistent with the model's predictions, and most of them are highly significant. Though, as expected, country-of-origin fixed effects matter for magnitude, they do not affect the direction of the associations estimated, and they barely affect their significance. The results in Tables 4.3 and 4.4 point towards the importance of network quality in shaping individual decisions to assimilate and to acquire education. While low-quality networks are associated with lower investment in education, high-quality ones offset this effect. Moreover, the results show that the correlation between cultural assimilation and education gets stronger when low-quality networks are present, but this again is offset by an increasing quality of the networks.

4.5.1 Robustness checks: alternative samples

In this subsection, I present the results from the analysis on the two alternative samples: first-generation immigrants from 1970 and first-generation immigrants from the 1980 census. While the former includes all the foreign-born individuals that appear in my main database, the latter includes immigrants that in the year 1980 had been in the United States for at least 5 years and who were at most 30 at the moment of their arrival to the United States.

The results from these alternative analyses are presented in Table 4.5 and 4.6. Re-

parents.

gressions in the columns (1) and (2) are run using the 1970s sample, while those in columns (3) to (6) use the migrant sample from the 1980s. For the first sample, I use the two measures of network quality, but I only have one assimilation marker, intermarriage. It makes little sense to use mother tongue as assimilation marker since these are foreign born individuals. In 1980, however, I observe individual English skill and use an indicator that an individual speaks very good English as an assimilation marker, in columns (5) and (6). Just as before, when using linguistic assimilation as a marker, I drop from the sample migrants from other English-speaking countries. In Table 4.5 I present baseline results, that only include controls for wage and gender, while in Table 4.6 I include country-of-origin fixed effects.

As we can see from the tables, with only few exceptions, all the coefficients are significant and of the expected sign. The results for the 1970s sample fluctuate somewhat more, probably due to the fact that I cannot avoid noise that comes with the inclusion of individuals that were too old to make the investment in schooling when they arrived to the United States. Nonetheless, most of the coefficients are still significant and of the expected sign. When using the 1980 sample, the pattern is also the same and highly significant. Now the measure of linguistic assimilation is English proficiency, which is more convenient since an individual is at least partially responsible for it. When using this marker, all the coefficients become of the expected sign, and mostly they are highly significant. Results are stronger when I use 1980s sample, but in any case all of samples and specifications generate coefficients consistent with the model's predictions. When country-of-origin fixed effects are included in the regression, the coefficients again drop in magnitude, but they remain significant.

Just as in Section 4.5, I run the same regressions using a high-school indicator as the outcome variable. The results from this test are presented in Tables 4.9 and 4.10. These results also pass the robustness test.

On the whole, the coefficient pattern is consistent with the model described in Section 4.2. Although the results presented here do not have causal interpretations, they suggest that a non-trivial association between cultural assimilation, education and migrant networks, which is robust and highly significant.

4.6 Extension to the model: network formation

So far I have showed how heterogeneous qualities of immigrant network shape immigrants' incentives to invest in education and to assimilate culturally. The implications of the model go further than just illustrating the multidimensionality of immigrant assimilation or the importance of immigrant networks and their quality when it comes to assimilation and investments in education. The model introduced in Section 4.2 also has interesting dynamic implications for network formation, and through that for immigrant assimilation patterns.

Consider now a model with two periods. In the first period, individuals from two different countries arrive to the host country, e.g. the United States. Before their arrival the US population was homogeneous. After the arrival of the newcomers, the US population becomes heterogeneous, composed by the dominant native group and the migrant group that in itself is formed by two subgroups coming from two different countries of origin. No networks are present because there were no migrants in the United States before the arrival of these two groups. Let's say that the newcomers are Irish and Italians. The ability distribution in all groups, natives, Irish and Italians, is exactly the same. But the cost of assimilation (K) is different for the two migrant groups. On the one hand, the Irish speak English, they also come from a similar legal background and share similar values with the native US population. On the other, Italians do not speak English and differ in many dimensions from the native population. That is, the cultural distance that separates Irish and US natives is much smaller than the one between Italians and natives ($K^{Italian} > K^{Irish}$).

Migrants have to face the labor market described in Section 4.2, that is, they either assimilate to reveal their ability to the employers or they work for the minimum wage as unskilled labor. Given that assimilation is more costly for Italians than for Irish, the ability threshold for the former will be higher, leading to a stronger positive selection into assimilation for this group. This also means that the average ability of non-assimilated Italians will be higher than that of non-assimilated Irishmen. In the second period, non-assimilated individuals become the building blocks for the ethnic network, while those that assimilated become indistinguishable from natives. The network will be expected to be larger and higher-quality in the case of the Italian migrant group, since there were more non-assimilated individuals in the first period, and their average ability was also

higher. The higher quality Italian network will introduce very different incentives to assimilate and acquire education for second-generation immigrants or immigrants that arrive in the second period. In particular, the higher quality Italian network will lead to less assimilation but more education when compared to the Irish, which will increase the differences in the network quality even further.

Thus the model predicts that asymmetric information between employers and migrants, or for that matter any labor marker penalty that could as well derive from discriminatory attitudes, may lead to network formation. Differences in the costs of assimilation or labor market penalties will determine quality and size of the networks that are formed. Groups that are initially identical in their ability distribution may end up having very different networks, both in terms of their size and quality, and an ex-post ability distribution that will only reinforce the differences. Different network qualities will distort individual incentives to assimilate and to acquire education, thus generating the differences in assimilation patterns that we observe in the data.

4.7 Conclusions

In this chapter, I develop a model of immigrant assimilation and educational investments in the presence of heterogeneous networks. When immigrants are unable to costlessly reveal their ability to employers, immigrant networks are likely to be formed. In that case, network quality will shape individual incentives to assimilate culturally and to acquire education. While low-quality networks crowd out individuals incentives to both acquire education and assimilate, this is not the case for high-quality networks. High-quality networks crowd out individual incentives to assimilate, but not to acquire education. There is a one-to-one relationship between assimilation and education when network quality is low, but this relationship fails when network quality is high.

Using data on first- and second-generation immigrants in the United States in 1970 and 1980, I seek to test the correlations that the model predicts. Using various definitions of network quality, different assimilation markers and three different samples, I show that all the relationships between networks, their quality, assimilation and education predicted in by the model appear in the data. In particular, I find that low-quality networks are associated with lower investment in education, but this effect is offset by network quality. We also observe a positive correlation between assimilation and educa-

tion, potentially driven by positive selection in ability into both. This association is even stronger when network quality is low, but it falls when it is high. The causal association between network quality and education, and assimilation remains to be tested.

The model also has some implications regarding network formation. Asymmetric information leads to network formation, while their quality is determined by the cost of assimilation. Groups ex-ante identical in terms of ability grow more and more different in terms of cultural assimilation and education, driven by the forces generated by the network.

4.8 Appendix A: Endogenous minimum wages

Throughout the paper, I assumed the wages to be exogenously established by the government at some level $\underline{w}$, which is low enough not to crowd out incentives to acquire education and to assimilate, at least to some extent. In this section, I will show that such wages belong to an equilibrium in which employers pay the workers who cannot reveal their ability, their expected productivity conditional on worker's decision to assimilate and to acquire education.

When networks are present, establishing equilibrium minimum wages is straightforward. When firms observe a migrant worker looking for a job they know i) that the worker is not assimilated; ii) that the worker is not looking for a job within his network. Since the cost of revealing productivity is zero within the network, firms will deduce that the minimum wage they are offering is higher then workers productivity, $\underline{w} = E[a_i|\underline{w} \geq a_i]$, which will make the firms revise their minimum wage to a lower level. This kind of revision will happen as long as there are any non-assimilated migrant workers looking for a job in the dominant sector until the minimum wage is zero.[15] Therefore, the assumption made in Section 4.2 about minimum wage, $\underline{w}$, being low enough not to crowd out incentives to assimilate or/and to acquire education is within the equilibrium. Having $\underline{w} = 0$ implies that there will be no non-assimilated migrant workers in the dominant labor market. When network quality is low, all workers with $a_i < (c + K)/\beta$ will find employment within their network, and all those workers with ability above this threshold will assimilate, acquire education and work for the dominant sector. When network quality is high, no migrant worker will look for employment outside their network. All those workers whose ability is higher than c/β will also invest in education.

Now let's consider a situation in which no networks are present. If this is the case, workers can either reveal their ability by assimilating at a cost K or receive the minimum wage, $\underline{w}$. Firms, either observe or not individual productivity, and thus deduce what decision has been taken. If individual is assimilated, he gets paid its marginal productivity, a_i; if individual is not assimilated, then firms know that $\underline{w} \geq a_i - K$. Firms

[15] Notice that this is driven by the assumption that the cost of revealing individual productivity within their network is zero together with the assumption that networks are large enough to absorb all workers that wish to work within their network. If any of these assumptions fails, equilibrium will support some positive minimum wage to be paid to non-assimilated workers.

will be willing to pay such worker a wage $\underline{w}$ such that $\underline{w} = E[a_i|\underline{w} \geq a_i - K]$. For the sake of simplicity, let's assume that individual intrinsic ability is distributed uniformly between 0 and 1. Then the equilibrium minimum wage that the firms will be willing to pay to a worker from the migrant group will be $\underline{w} = K$.That is, when no networks are present, equilibrium supports positive minimum wages.

Given that in practice, there are multiple migrant groups with different costs of assimilation, this equilibrium wage will be different for workers coming from different ethnic groups, $\underline{w}^K$. In particular, a minimum wage for workers with high costs of assimilation this wage is predicted to be higher. Firms might not be able to pay different wages as a function of worker's ethnic background, since this goes against anti-discrimination practices, and a unique minimum wage is likely to be established, $\underline{\underline{w}}$. In this case, firms will only higher if $\underline{w}^K \leq \underline{\underline{w}}$. Migrants' incentives to assimilate in this case become stronger, all those with $a_i \geq K$ will assimilate. This implies more assimilation for groups with low costs of assimilation.

All-in-all, in Section 4.2 I described equilibrium when it comes to assimilation and education decisions assuming low exogenous minimum wages, in this section I showed that these wages are consistent with an equilibrium in which minimum wages are established endogenously, equal to firm's expectation about worker's productivity.

4.9 Appendix B: Additional predictions of the model

The model also generated some additional predictions as to the wage distribution conditional on network quality as well as workers' welfare, if we assume that individual payoffs represent their welfare. All these will be discussed in this section.

Higher network quality implies higher average wages when compared to low network case. This is driven by fact that low networks crowd out individual incentives to acquire education that increases returns to individual intrinsic ability. Thus average returns to ability in low-quality network case will be lower than compared with the high-quality network case. When compared to the no-network case, average wages in presence of the high-quality network are the same. In the no-network case, however, there are some workers that benefit from positive minimum wages, since they receive a wage that is higher than their productivity. On the other hand, higher ability receivers of the minimum wages are likely to be worse off as their wage will be lower than their expected productivity. In terms of variance, networks generate large wage variance because when no network is present a whole subset of individuals (those with $a_i < \underline{w} + K$) will receive a constant minimum wage.

In order to draw any conclusions as to migrant workers' welfare, we have to include costs workers incur into when they assimilate or when they acquire education. For example, unless individual network is high quality average welfare of migrant worker is lower than that of the native group, since in order to reveal their identity migrants need to incur costs of assimilation. But even when high-quality networks are present some individuals (those with $a_i < K$) benefit from the minimum wages that firms offer when no networks are present.

High quality networks bring higher welfare to individuals from the migrant group when compared to the low quality networks, which mostly benefit middle ability types, specifically those whose ability lies between K and $(c + K)/\beta$ thresholds.

Overall, for most of the ability types networks are welfare enhancing, with only exception of ability types that are below K threshold. But high-quality networks are even more so, since they do not crowd out incentives to acquire education the way low-quality networks do.

4.10 Figures and tables

Table 4.2: DESCRIPTIVE STATISTICS

	2nd Generation Immigrants	1st Generation Immigrants	
	1970	*1970*	*1980*
Network size	3.66	3.11	1.431
	(3.77)	(3.45)	(1.89)
Network quality:	0.569	0.567	0.526
relative wages	(0.115)	(0.132)	(0.181)
Network quality:	1.04	0.989	0.784
skilled employment	(0.172)	(0.226)	(0.456)
Assimilation:	0.906	0.383	0.442
US-born spouse	(0.291)	(0.486)	(0.497)
Assimilation:	0.290	-	-
English as a mother tongue	(0.454)		
Assimilation:	-	-	0.614
English proficiency			(0.487)
Years of education	10.98	9.15	11.77
	(3.349)	(4.540)	(4.755)
Number of networks	2282	2282	2392
Number of observations	165055	86481	41780

Notes: 'Network size' : share of individuals from the same country of origin in every in a state, adjusted to state population. 'Network quality' is measured in two ways: i) in terms of average weekly wages of individuals from a certain country of origin in a given state, or ii) as a share of individuals from a given country of origin in high-skilled occupations. Both measures are adjusted to the state averages. Statistics for 'English as a mother tongue' and 'English proficiency' exclude individuals whose origin is an English-speaking country. Standard deviations in parentheses.

Table 4.3: NETWORKS, ASSIMILATION AND INDIVIDUAL EDUCATIONAL INVESTMENT FOR 2ND GENERATION IMMIGRANTS

	2nd generation immigrants, 1970			
Dep. var.:	Years of education			
Assimilation marker:	*US-born spouse*		*English as mother tongue*	
Network quality measured in:	*Wages*	*Skilled occupations*	*Wages*	*Skilled occupations*
	(1)	*(2)*	*(3)*	*(4)*
Network size [β_5]	-1.438***	-1.504***	-0.890*	-1.133***
	(0.494)	(0.254)	(0.448)	(0.283)
Network size×Network quality [β_3]	2.216**	1.546***	1.351*	1.173***
	(0.847)	(0.275)	(0.754)	(0.307)
Assimilation [β_4]	0.252	0.342**	0.705***	0.895***
	(0.162)	(0.131)	(0.139)	(0.159)
Network size×Assimilation [β_2]	0.609***	0.463***	0.386	0.460
	(0.159)	(0.142)	(0.362)	(0.314)
Network size×Network quality×Assimilation [β_1]	-0.960***	-0.483***	-0.571	-0.511
	(0.275)	(0.171)	(0.619)	(0.320)
Observations	120634	120634	142264	142264
Controls	Y	Y	Y	Y

Notes: Controls include gender and age up to a cubic form. 'Network size' is individual's potential network size, 'Network quality' is either measured in terms of wages or occupations of individuals from a given country of origin. 'Assimilation' can either be an indicator that individual spouse is a US-born individual, or that individual's mother tongue is English. Sample used in regressions in the first two columns is composed of married second-generation immigrants, sample in columns (3) and (4) is composed by second-generation immigrants whose country of origin is not an English-speaking country. Standard errors in parentheses. Clustered on country of origin level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.4: NETWORKS, ASSIMILATION AND INDIVIDUAL EDUCATIONAL INVESTMENT FOR 2ND GENERATION IMMIGRANTS, WITHIN COUNTRY OF ORIGIN ESTIMATION

	2nd generation immigrants, 1970			
Dep. var.:	Years of education			
Assimilation marker:	*US-born spouse*		*English as mother tongue*	
Network quality measured in:	*Wages*	*Skilled occupations*	*Wages*	*Skilled occupations*
	(1)	*(2)*	*(3)*	*(4)*
Network size [β_5]	-0.640**	-0.470***	-0.437**	-0.200
	(0.253)	(0.157)	(0.175)	(0.207)
Network size×Network quality [β_3]	0.907**	0.397**	0.613**	0.125
	(0.445)	(0.179)	(0.300)	(0.234)
Assimilation [β_4]	0.154	0.250***	0.482***	0.542***
	(0.093)	(0.090)	(0.108)	(0.120)
Network size×Assimilation [β_2]	0.187	0.267***	0.095	0.018
	(0.121)	(0.064)	(0.135)	(0.149)
Network size×Network quality×Assimilation [β_1]	-0.252	-0.263***	-0.114	0.002
	(0.210)	(0.080)	(0.236)	(0.145)
Observations	120634	120634	142264	142264
Controls	Y	Y	Y	Y
Country of origin FE	Y	Y	Y	Y

Notes: In this tables, results from fixed effect estimation are presented, in particular, ancestral country fixed effects are included in the regression. Controls include gender and age up to a cubic form. 'Network size' is individual's potential network size, 'Network quality' is either measured in terms of wages or occupations of individuals from a given country of origin. 'Assimilation' can either be an indicator that individual spouse is a US-born individual, or that individual's mother tongue is English. Sample used in regressions in the first two columns is composed of married second-generation immigrants, sample in columns (3) and (4) is composed by second-generation immigrants whose country of origin is not an English-speaking country. Standard errors in parentheses. Clustered on country of origin level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.5: NETWORKS, ASSIMILATION AND INDIVIDUAL EDUCATIONAL INVESTMENT FOR 1ST GENERATION IMMIGRANTS IN 1970 AND 1980

Sample:	**1st generation immigrants, 1970**		**1st generation immigrants, 1980**			
Dep. var.:	Years of education					
Assimilation marker:	*US-born spouse*				*English proficiency*	
Network quality measured in:	*Wages*	*Skilled occupations*	*Wages*	*Skilled occupations*	*Wages*	*Skilled occupations*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Network size [β_5]	-1.221**	-1.838***	-4.444***	-1.566***	-3.170***	-1.200***
	(0.522)	(0.364)	(0.582)	(0.141)	(0.427)	(0.138)
Network size×Network quality [β_3])	1.658*	1.803***	7.833***	1.822***	5.534***	1.482***
	(0.921)	(0.428)	(1.245)	(0.377)	(0.834)	(0.196)
Assimilation [β_4]	1.221***	1.104***	0.511**	0.520*	3.005***	3.101***
	(0.223)	(0.262)	(0.255)	(0.275)	(0.311)	(0.309)
Network size×Assimilation [β_2]	-0.0568	0.238	1.258	0.214**	0.675*	0.185**
	(0.285)	(0.313)	(0.779)	(0.093)	(0.373)	(0.087)
Network size×Network quality×Assimilation [β_1]	0.239	-0.210	-2.391	-0.274	-1.258*	-0.393**
	(0.527)	(0.364)	(1.646)	(0.262)	(0.737)	(0.156)
Observations	57939	57939	31264	31264	36371	36371
Controls	Y	Y	Y	Y	Y	Y

Notes: Controls include gender and age up to a cubic form. 'Network size' is individual's potential network size, 'Network quality' is either measured in terms of wages or occupations of individuals from a given country of origin. 'Assimilation' can either be an indicator that individual spouse is a US-born individual, or that individual's mother tongue is English. Sample used in regressions in the first two columns is composed of married first-generation immigrants in 1% sample of 1970 census, sample in columns (3) and (4) is composed by first-generation immigrants from 1980 census, and in columns (5) and (6) I include individuals whose country of origin is not an English-speaking country from 1980 census. Standard errors in parentheses. Clustered on country of origin level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.6: NETWORKS, ASSIMILATION AND INDIVIDUAL EDUCATIONAL INVESTMENT FOR 1ST GENERATION IMMIGRANTS IN 1970 AND 1980, WITHIN COUNTRY OF ORIGIN ESTIMATION

Sample:	**1st generation immigrants, 1970**		**1st generation immigrants, 1980**			
Dep. var.:	Years of education					
Assimilation marker:	*US-born spouse*				*English proficiency*	
Network quality measured in:	*Wages*	*Skilled occupations*	*Wages*	*Skilled occupations*	*Wages*	*Skilled occupations*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Network size [β_5]	-0.152	-0.568***	-1.332***	-0.374*	-1.029***	-0.235
	(0.164)	(0.183)	(0.423)	(0.221)	(0.184)	(0.151)
Network size×Network quality [β_3])	-0.0394	0.461**	2.228***	0.201	1.873***	0.180
	(0.275)	(0.209)	(0.726)	(0.277)	(0.363)	(0.190)
Assimilation [β_4]	0.728***	0.817***	0.317	0.409*	2.574***	2.607***
	(0.199)	(0.181)	(0.222)	(0.222)	(0.177)	(0.173)
Network size×Assimilation [β_2]	-0.284*	0.368	0.623	0.346***	0.660***	0.277***
	(0.148)	(0.228)	(0.639)	(0.074)	(0.214)	(0.053)
Network size×Network quality×Assimilation [β_1]	0.637**	-0.352	-0.974	-0.518**	-1.145**	-0.340***
	(0.279)	(0.264)	(1.435)	(0.220)	(0.448)	(0.056)
Observations	57939	57939	31264	31264	36371	36371
Controls	Y	Y	Y	Y	Y	Y
Country of origin FE	Y	Y	Y	Y	Y	Y

Notes: Controls include gender and age up to a cubic form. 'Network size' is individual's potential network size, 'Network quality' is either measured in terms of wages or occupations of individuals from a given country of origin. 'Assimilation' can either be an indicator that individual spouse is a US-born individual, or that individual's mother tongue is English. Sample used in regressions in the first two columns is composed of married first-generation immigrants in 1% sample of 1970 census, sample in columns (3) and (4) is composed by first-generation immigrants from 1980 census, and in columns (5) and (6) I include individuals whose country of origin is not an English-speaking country from 1980 census. Standard errors in parentheses. Clustered on country of origin level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.7: NETWORKS, ASSIMILATION AND INDIVIDUAL EDUCATIONAL INVESTMENT FOR 2ND GENERATION IMMIGRANTS

	2nd generation immigrants, 1970			
Dep. var.:	High-school graduate indicator			
Assimilation marker:	*US-born spouse*		*English as mother tongue*	
Network quality measured in:	*Wages*	*Skilled occupations*	*Wages*	*Skilled occupations*
	(1)	*(2)*	*(3)*	*(4)*
Network size [β_5]	-0.133***	-0.164***	-0.0947**	-0.133***
	(0.038)	(0.022)	(0.042)	(0.027)
Network size×Network quality [β_3]	0.196***	0.166***	0.139*	0.136***
	(0.066)	(0.024)	(0.071)	(0.030)
Assimilation [β_4]	0.0242	0.0245*	0.0819***	0.102***
	(0.019)	(0.013)	(0.017)	(0.018)
Network size×Assimilation [β_2]	0.0405***	0.0297**	0.0360	0.0551*
	(0.011)	(0.013)	(0.029)	(0.029)
Network size×Network quality×Assimilation [β_1]	-0.0597***	-0.0294*	-0.0472	-0.0587**
	(0.018)	(0.016)	(0.051)	(0.028)
Observations	120634	120634	142264	142264
Controls	Y	Y	Y	Y

Notes: Controls include gender and age up to a cubic form. 'Network size' is individual's potential network size, 'Network quality' is either measured in terms of wages or occupations of individuals from a given country of origin. 'Assimilation' can either be an indicator that individual spouse is a US-born individual, or that individual's mother tongue is English. Sample used in regressions in the first two columns is composed of married second-generation immigrants, sample in columns (3) and (4) is composed by second-generation immigrants whose country of origin is not an English-speaking country. Standard errors in parentheses. Clustered on country of origin level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.8: NETWORKS, ASSIMILATION AND INDIVIDUAL EDUCATIONAL INVESTMENT FOR 2ND GENERATION IMMIGRANTS, WITHIN COUNTRY OF ORIGIN ESTIMATION

	2nd generation immigrants, 1970			
Dep. var.:	High-school graduate indicator			
Assimilation marker:	*US-born spouse*		*English as mother tongue*	
Network quality measured in:	*Wages*	*Skilled occupations*	*Wages*	*Skilled occupations*
	(1)	*(2)*	*(3)*	*(4)*
Network size [β_5]	-0.0372***	-0.0521***	-0.0397***	-0.0394*
	(0.010)	(0.018)	(0.010)	(0.022)
Network size×Network quality [β_3]	0.0390**	0.0422**	0.0481***	0.0305
	(0.019)	(0.020)	(0.017)	(0.025)
Assimilation [β_4]	0.0146	0.0186*	0.0539***	0.0647***
	(0.011)	(0.010)	(0.012)	(0.015)
Network size×Assimilation [β_2]	-0.00638	0.0129**	0.00828	0.0183
	(0.004)	(0.006)	(0.009)	(0.018)
Network size×Network quality×Assimilation [β_1]	0.0182***	-0.0109	-0.00404	-0.0151
	(0.007)	(0.007)	(0.018)	(0.018)
Observations	120634	120634	142264	142264
Controls	Y	Y	Y	Y
Country of origin FE	Y	Y	Y	Y

Notes: In this tables, results from fixed effect estimation are presented, in particular, ancestral country fixed effects are included in the regression. Controls include gender and age up to a cubic form. 'Network size' is individual's potential network size, 'Network quality' is either measured in terms of wages or occupations of individuals from a given country of origin. 'Assimilation' can either be an indicator that individual spouse is a US-born individual, or that individual's mother tongue is English. Sample used in regressions in the first two columns is composed of married second-generation immigrants, sample in columns (3) and (4) is composed by second-generation immigrants whose country of origin is not an English-speaking country. Standard errors in parentheses. Clustered on country of origin level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.9: NETWORKS, ASSIMILATION AND INDIVIDUAL EDUCATIONAL INVESTMENT FOR 1ST GENERATION IMMIGRANTS IN 1970 AND 1980

Sample:	**1st generation immigrants, 1970**		**1st generation immigrants, 1980**			
Dep. var.:	High-school graduate indicator					
Assimilation marker:	*US-born spouse*				*English proficiency*	
Network quality measured in:	*Wages*	*Skilled occupations*	*Wages*	*Skilled occupations*	*Wages*	*Skilled occupations*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Network size [β_5]	-0.118***	-0.149***	-0.418***	-0.147***	-0.300***	-0.113***
	(0.040)	(0.030)	(0.053)	(0.012)	(0.056)	(0.014)
Network size×Network quality [β_3]	0.168**	0.145***	0.742***	0.176***	0.528***	0.145***
	(0.074)	(0.034)	(0.115)	(0.033)	(0.115)	(0.017)
Assimilation [β_4]	0.138***	0.131***	0.0967***	0.0959***	0.297***	0.306***
	(0.023)	(0.028)	(0.022)	(0.024)	(0.028)	(0.028)
Network size×Assimilation [β_2]	0.0128	0.0161	0.111*	0.0126*	0.0805**	0.0211***
	(0.036)	(0.027)	(0.064)	(0.007)	(0.038)	(0.008)
Network size×Network quality×Assimilation [β_1]	-0.0198	-0.0184	-0.219	-0.0170	-0.151*	-0.0418***
	(0.065)	(0.031)	(0.138)	(0.023)	(0.077)	(0.012)
Observations	57939	57939	31264	31264	36371	36371
Controls	Y	Y	Y	Y	Y	Y

Notes: Controls include gender and age up to a cubic form. 'Network size' is individual's potential network size, 'Network quality' is either measured in terms of wages or occupations of individuals from a given country of origin. 'Assimilation' can either be an indicator that individual spouse is a US-born individual, or that individual's mother tongue is English. Sample used in regressions in the first two columns is composed of married first-generation immigrants in 1% sample of 1970 census, sample in columns (3) and (4) is composed by first-generation immigrants from 1980 census, and in columns (5) and (6) I include individuals whose country of origin is not an English-speaking country from 1980 census. Standard errors in parentheses. Clustered on country of origin level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.10: NETWORKS, ASSIMILATION AND INDIVIDUAL EDUCATIONAL INVESTMENT FOR 1ST GENERATION IMMIGRANTS IN 1970 AND 1980, WITHIN COUNTRY OF ORIGIN ESTIMATION

Sample:	**1st generation immigrants, 1970**		**1st generation immigrants, 1980**			
Dep. var.:	High-school graduate indicator					
Assimilation marker:	*US-born spouse*				*English proficiency*	
Network quality measured in:	*Wages*	*Skilled occupations*	*Wages*	*Skilled occupations*	*Wages*	*Skilled occupations*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Network size [β_5]	-0.0188**	-0.0396***	-0.130**	-0.0382*	-0.0977**	-0.0293
	(0.008)	(0.011)	(0.062)	(0.021)	(0.044)	(0.018)
Network size×Network quality [β_3]	0.00539	0.0278**	0.225*	0.0302	0.177**	0.0318
	(0.014)	(0.012)	(0.114)	(0.026)	(0.078)	(0.020)
Assimilation [β_4]	0.0891***	0.0946***	0.0616***	0.0694***	0.253***	0.257***
	(0.018)	(0.018)	(0.021)	(0.022)	(0.016)	(0.016)
Network size×Assimilation [β_2]	-0.0209**	0.0211	0.0668	0.0309***	0.0756***	0.0313***
	(0.009)	(0.017)	(0.062)	(0.008)	(0.027)	(0.006)
Network size×Network quality×Assimilation [β_1]	0.0413**	-0.0226	-0.110	-0.0440*	-0.130**	-0.0384***
	(0.016)	(0.019)	(0.139)	(0.024)	(0.058)	(0.008)
Observations	57939	57939	31264	31264	36371	36371
Controls	Y	Y	Y	Y	Y	Y
Country of origin FE	Y	Y	Y	Y	Y	Y

Notes: Controls include gender and age up to a cubic form. 'Network size' is individual's potential network size, 'Network quality' is either measured in terms of wages or occupations of individuals from a given country of origin. 'Assimilation' can either be an indicator that individual spouse is a US-born individual, or that individual's mother tongue is English. Sample used in regressions in the first two columns is composed of married first-generation immigrants in 1% sample of 1970 census, sample in columns (3) and (4) is composed by first-generation immigrants from 1980 census, and in columns (5) and (6) I include individuals whose country of origin is not an English-speaking country from 1980 census. Standard errors in parentheses. Clustered on country of origin level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

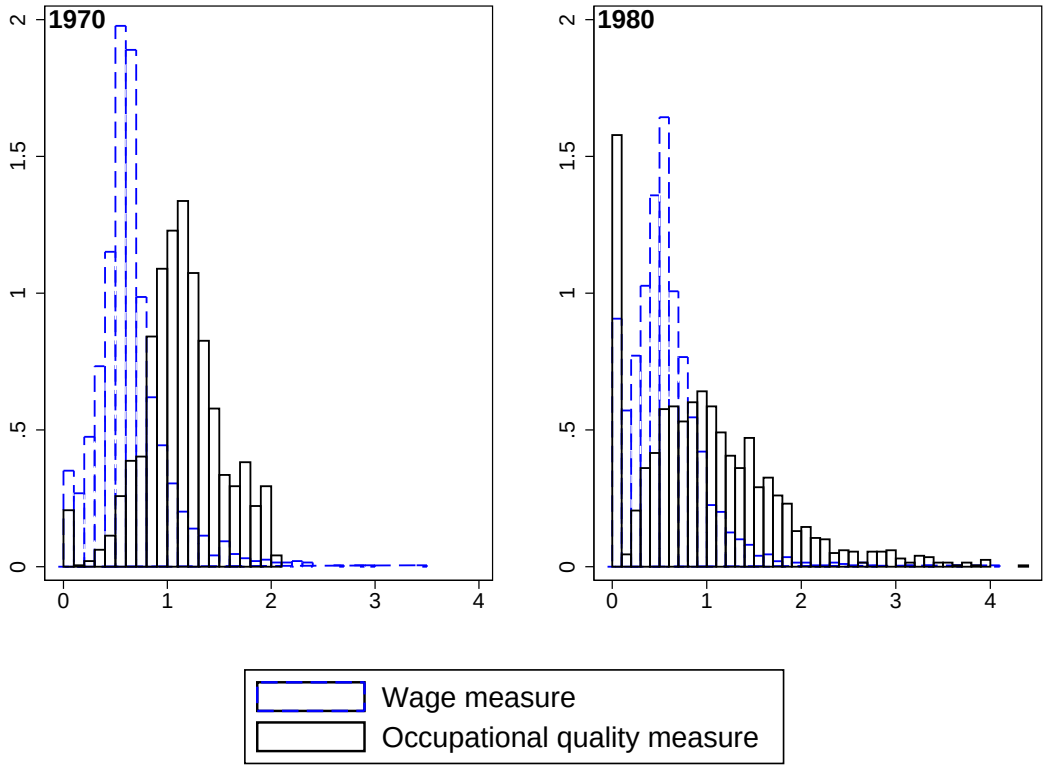

Figure 4.1: DISTRIBUTION OF IMMIGRANT NETWORK QUALITY MEASURED IN TERMS OF WAGES AND OCCUPATIONS

Notes: Author's calculations using data from the US Census Bureau. Network quality measure based on wages is computed as wages of individuals from a group relative to the state average. Network quality measure based on occupations is a relative probability of being employed in skilled occupation. Network quality is computed on a country of origin and state level.

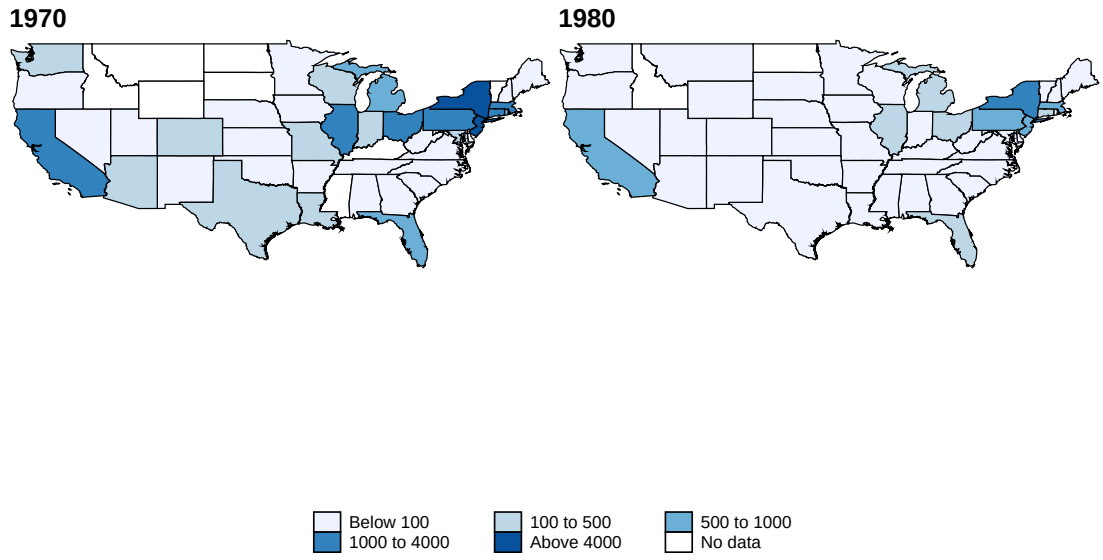

Figure 4.2: DISTRIBUTION OF ITALIAN POPULATION ACROSS STATES

Notes: Author's calculations using data from the US Census Bureau, 1 percent sample of the 1970 and 1980 US Population Census. Size of Italian population in every state. States with no data, are states with no Italian population.

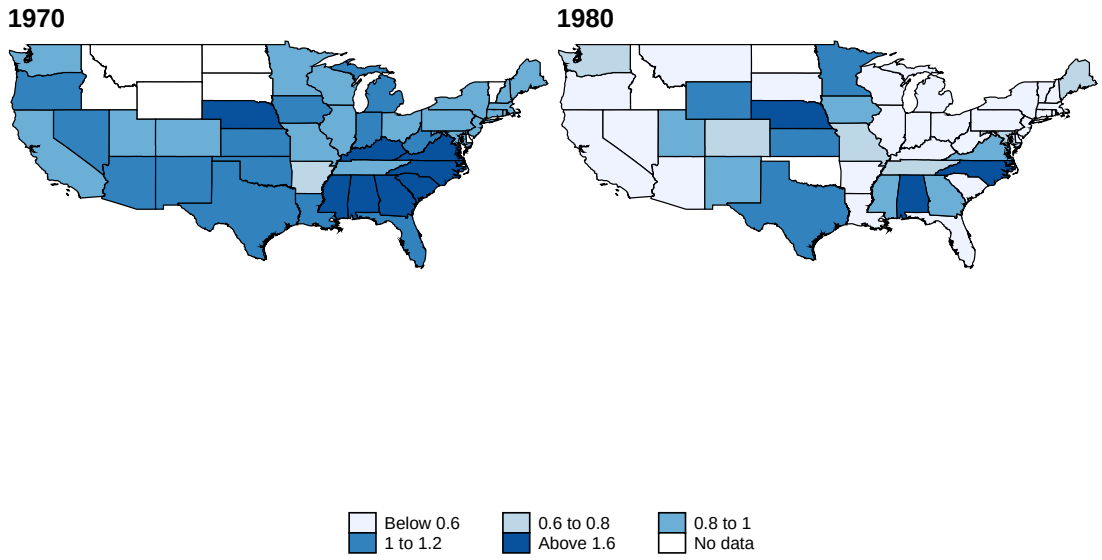

Figure 4.3: GEOGRAPHIC DISTRIBUTION OF ITALIAN NETWORK QUALITY ACROSS STATES, OCCUPATIONAL MEASURE

Notes: Author's calculations using data from the US Census Bureau, 1 percent sample of the 1970 and 1980 US Population Census. Probability of being employed in a skilled occupation for individuals of Italian origin relative to the rest of population. States with no data, are states with no Italian population.

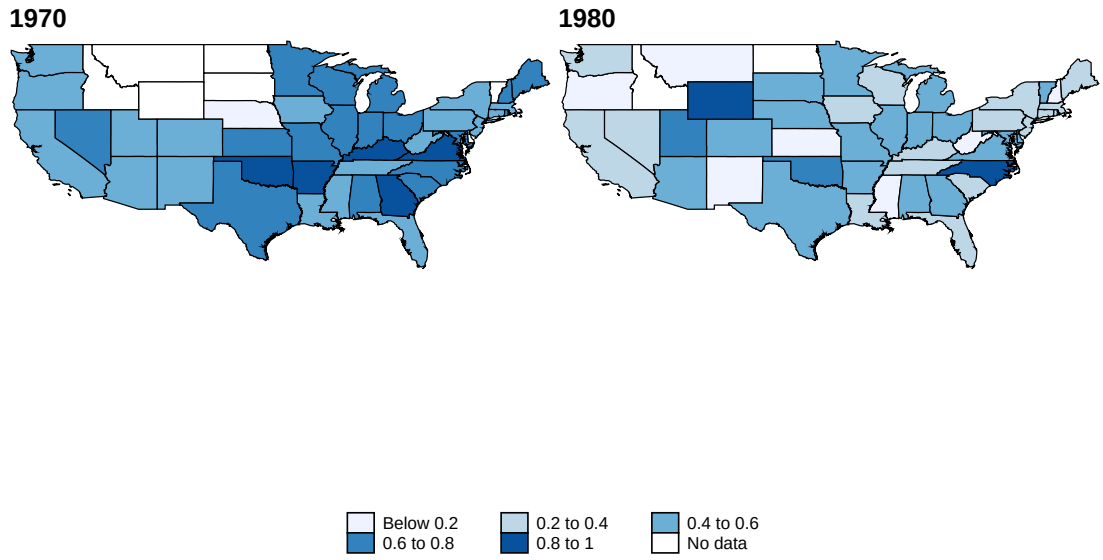

Figure 4.4: GEOGRAPHIC DISTRIBUTION OF ITALIAN NETWORK QUALITY ACROSS STATES, RELATIVE WAGES

Notes: Author's calculations using data from the US Census Bureau, 1 percent sample of the 1970 and 1980 US Population Census. Wages of individuals of Italian origin relative to the state average wage. States with no data, are states with no Italian population.

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