The speed of adjustment of migrant self-selection: Evidence from the Panic of 1907

David Escamilla-Guerrero* University of St Andrews

Moramay Lopez-Alonso† Rice University

April 8, 2021

Abstract

This paper examines the responsiveness of migrant self-selection to short-run changes in the economic environment. Using high-frequency micro data, we estimate the selection of Mexican immigration and study labor institutions as adjustment channel of self-selection. We find that the first Mexican immigrants (1906-1908) were positively self-selected on the basis of height—a proxy for physical productivity of labor. Additionally, the US financial crisis of 1907 modified selection patterns significantly. Adjustments in migrant self-selection during and after the crisis occurred in a matter of months and were influenced by the *enganche*, a system of labor recruiting that reduced migration costs, but only for the "best" Mexicans and during "good" economic times.

Keywords: labor recruiting, migrant self-selection, Panic of 1907, Mexico
JEL Classification Numbers: F22, J61, N36, O15

Acknowledgments of DEG: I am especially grateful to my PhD supervisors Eric Schneider and Joan Rosés for their guidance and comments. I thank Fernando Pérez, León Fernández, Miguel Niño-Zarazúa, Noam Yuchtman, Chris Minns, Leah Boustan, Tim Hatton, and David Jaeger for their insightful comments. I also benefited from presenting at the Economic History Society, Economic History Association, Cliometric Society, and Labor in History & Economics conferences. This research was developed with the financial support of: the Mexican National Council for Science and Technology (2015–18) - Scholarship No. 409165; the Mexican Ministry of Education Scholarship (2015–16); the Radwan Travel and Discovery Fund (2016) - LSE; the Pre-Dissertation Exploratory Grant (2017) - Economic History Association; and the Research Fund for Graduate Students (2017) - Economic History Society. This research benefited from my fellowships at El Colégio de México (2016), Banco de México (2018), and UNU-WIDER (2018). All errors are mine.

*School of Economics and Finance, University of St Andrews, St Andrews, Scotland, UK. Corresponding author. e-mail: david.escamilla-guerrero@st-andrews.ac.uk

†Department of History, Rice University, Houston, TX, USA. e-mail: moramay@rice.edu

1. Introduction

Immigrants are not selected randomly from the sending population. To explain the selection of immigrants, previous literature focuses on systemic drivers that are fixed in the short run and tend to change slowly over time: earnings inequality across countries (Borjas, 1987), migration costs (Chiquiar & Hanson, 2005; Chiswick, 1999), and factors reducing liquidity constraints for future immigrants (McKenzie & Rapoport, 2007, 2010). Hence, this body of literature gives the impression that selection patterns are sticky in the short run. Disruptive events, however, can induce short-run shifts in migrant selection by affecting the means and incentives to migrate. Yet, previous literature provides conflicting evidence about the response of migrant selection to economic shocks. With some studies finding significant selection adjustments to humanitarian and economic crises (Collins & Zimran, 2019; Villarreal, 2014), and others finding selection non-responsive to banking crises and natural disasters (Monras, 2020; Spitzer et al., 2020). Although immigration policies can also adjust migrant selection (see Bellettini & Ceroni, 2007; Greenwood & Ward, 2015; Massey, 2016; Spitzer & Zimran, 2018), immigration reforms are usually implemented with long lags, allowing immigrants to anticipate changes and adjust to them.[1] Thus, policy interventions may provide partial information about the speed of adjustment of migrant selection. A common feature among previous research is the use of annual or census data, which may not always capture short-run changes in the composition of immigration.

Overall, we know little about how quickly migrant selection adjusts to changes in the economic environment. This paper asks two questions to fill this void in the literature. Can migrant selection change in the short-run? And if so, through which mechanisms? To answer these questions, we study Mexico-to-United States immigration using novel high-frequency micro data that allows us to precisely pinpoint changes in the composition of immigrants within a year. These data consists of daily immigrant arrivals registered at nine entrance ports from 1906 to 1908 (see Figure A.1 in Annex A). The early twentieth century provides a unique opportunity to study selection adjustments as the United States maintained an open border for Mexican immigration (Durand, 2016; Fogel, 1978; Samora, 1982). The absence of entry restrictions minimizes the under-enumeration of undocumented immigrants and allows for immigration to respond to shocks in the short run.

[1] For example, it took 25 years to pass the 1917 Immigration Act, which banned the entry of illiterate immigrants to the United States (Spitzer & Zimran, 2018, p. 236).

We start by estimating the selection of Mexican immigrants using height as a proxy for physical productivity of labor.[2] We represent individuals who remained in Mexico using military recruitment records of ordinary soldiers and elite forces, and passport application records. These comparison samples capture the lower, intermediate, and upper ranks of Mexico's height distribution, respectively. Our empirical strategy estimates differences in height between immigrants and each comparison sample conditional on region and year of birth: factors that may influence height across space and over time. This approach allows us to determine from which part of the height distribution the first immigrants were drawn. We find that immigrants were 2.2 cm taller than the ordinary soldiers, 0.5 cm taller than the military elite forces, and 2.1 cm shorter than the passport holders. In other words, at the turn of the twentieth century, Mexican immigration was characterized by an intermediate or positive selection as the relatively tall and physically productive moved to the United States. This result coincides with research arguing that Mexican immigrants are not drawn from the lower ranks of the socioeconomic ladder (Chiquiar & Hanson, 2005; Kosack & Ward, 2014; Orrenius & Zavodny, 2005).

We then use the Panic of 1907, the most severe financial crisis before the Great Depression, as a natural experiment that affected unexpectedly the demand of immigrant workforce in the United States.[3] This allows us to identify short-run shifts in the selection of Mexican immigrants. Two characteristics of the Panic of 1907 are relevant for our identification strategy. First, it was influenced by the 1906 San Francisco Earthquake (Frydman et al., 2015; Moen & Tallman, 1992; Odell & Weidenmier, 2004). Its random nature rules out capturing anticipation effects that can distort the speed of adjustment of migrant selection. Second, although the crisis became a world-wide affair (Johnson, 1908, p. 455), no bank collapsed or went bankrupt, nor losses for bill holders or depositors occurred in Mexico (Gómez, 2011, p. 2095). This characteristic discards observing adjustments to simultaneous demand and supply shocks. Our results show that immigrants were positively selected (0.7 cm taller) relative to the military elite before the Panic. This pattern changed to a negative selection (0.2 cm shorter) during the Panic and returned to a stronger positive selection after the American financial system was restored. Shifts in selection are greater when controlling for unobserved factors across states, suggesting that the underlying adjustment channels operated at the local level. This finding is consistent with the argument that selection into migration is determined within sub-national environments (Abramitzky & Boustan, 2017; Spitzer & Zimran, 2018).

[2] Adult stature is indicative of income, health, and returns to strength, especially in contexts where large sectors of the economy are not mechanized (Juif & Quiroga, 2019).

[3] During the financial crisis, the credit system of the American economy was severely impacted. Banks and financial institutions of many cities limited or suspended their cash payments (Andrew, 1908, p. 497), and around two thousand firms and over one hundred state banks failed (Markham, 2002, p. 32).

Finally, to address how migrant selection adjusted in the short run, we focus on institutions involved in the immigration process. In the early twentieth century, stagnant wages and binding liquidity constraints resulted in high migration costs for the majority of the Mexican population (Cardoso, 1980; Rosenzweig, 1965). This condition favored the practice of a system of labor recruiting with colonial origins: the *enganche* (Brass, 1990; Durand, 2016). This labor institution reduced migration costs by offering wages in advance and transportation to the destination in exchange of future labor service. American employers adopted this practice to transport and allocate large groups of Mexican workers across the United States. We provide evidence suggesting that the *enganche* shaped the composition of Mexican immigration, as American recruiters systematically chose the tallest workers. On average, *enganche* immigrants were 0.9 cm taller than immigrants who crossed the US border using other means. In the pre-Panic period, the *enganche* effect accounted for 23% to 46% of the difference in height between immigrants and the military elite. When the Panic of 1907 hit the financial system, American companies were not able to finance the *enganche*; consequently, the share of recruited immigrant workers dropped from 36% to 1%. Together, these findings provide suggestive evidence that institutions sufficiently involved in the immigration process and intertwined with the business cycle constitute a feasible short-run adjustment channel of migrant selection.

Our main contribution is to show that, in the absence of entry restrictions, migrant selection can adjust very quickly to economic shocks. We observe significant changes in the composition of immigrants in a matter of months. From a policy perspective, this paper can be considered a counterfactual exercise that sheds light on what could be the speed of adjustment of migrant selection if immigration restrictions were relaxed or eliminated. The remainder of the paper proceeds as follows. We describe the historical context in the next section. In Section 3, we discuss related literature and present a conceptual framework to understand shifts in migrant selection. In Sections 4 and 5, we describe our data, empirical strategy, and results. We then address the underlying mechanisms of adjustment in Section 6. We conclude in Section 7.

2. Historical background

The United States became the world's leading manufacturing nation at the turn of the twentieth century (Maddison, 1987; Nelson & Wright, 1992; Wright, 1990). The rapid growth of the American economy increased employment opportunities, pulling millions of migrants from all over the world looking for

better living conditions.[4] Mexicans were not the exception. From 1900, Mexican immigration increased sharply and expanded its geographic range of settlement in the United States (Cardoso, 1980; Feliciano, 2001; Gratton & Merchant, 2015).[5] Diverse factors shaped Mexican mass migration during this period, but labor recruiting practices and the lack of restrictive immigration policies were key. American companies and contractors recruited intending migrants in Mexican towns offering wages in advance and transportation in exchange of future labor service (Brass, 1990; Durand, 2016). Once at the border, immigrant workers were admitted without restrictions since they were considered temporary aliens who moved back and forth supplying labor (Fogel, 1978; Gamio, 1930; Samora, 1982). Mexican immigrants were employed mainly in farms, mines, and railways across the American Southwest, particularly in unskilled occupations demanding physical strength.[6]

The American industrial ascendancy also multiplied investment opportunities. National and state banks increased their bond and stock assets from 50 million in 1892 to 487 million in 1907 (Johnson, 1908, p. 457). Moreover, the optimism engendered by the growing economy fueled the tendency of the public to take on more risk and invest in speculative industries. The Dow Jones index doubled from 1904 to 1906, and by the end of 1905, the call money rate was 25% and foreseen to increase further the following year (Markham, 2002, p. 29). The appetite for investment was funneled by a financial system that was expanding rapidly. About 16 thousand financial institutions supplied capital for the creation of new firms in every sector of the US economy (Bruner & Carr, 2007, p. 116).[7] However, these institutions were mostly financial intermediaries (small unit banks, fiduciary trust companies, and clearing houses) that operated without effective financial regulation. While the access to capital was relatively unconstrained, the absence of a central bank and the growing speculative environment made the US financial system fragile.

2.1 The Panic of 1907: a natural experiment of history

In April 1906, an earthquake devastated the city of San Francisco causing damages equal to 10.5 billion in current US dollars (Ager et al., 2020). Since most of the city's insurance policies were underwritten by British companies, extraordinarily large amounts of gold flowed from London to the United States. To maintain the desired level of reserves and exchange rate, the Bank of England and other European

[4] After 1900, European intercontinental emigration rose to over a million per year, with the United States absorbing most of these migrants (Hatton & Williamson, 1998, p. 7-9).
[5] The Mexican-born population enumerated in the US census increased five-fold from 1900 to 1920.
[6] Clark (1908, p. 477 & 486) documents that most Mexican immigrants were employed in rail track maintenance and as drillers, wood choppers, coke pullers, and surface men in mines.
[7] To dimension the size of the US financial system at the time, in 2007 existed 7,500 financial institutions.

banks undertook defensive measures to sharply reduce the outflows of gold and attract gold imports (Odell & Weidenmier, 2004, p. 1003). This bank policy added pressure to the fragile American financial markets, setting the stage for one of the most severe financial crises in American history: the Panic of 1907 (Frydman et al., 2015; Moen & Tallman, 1992; Andrew, 1908).

In March 1907, a scramble for liquidity produced a sell-off of securities. The repatriation of finance bills reduced substantially the US gold stock, pushing the economy into a severe recession (Odell & Weidenmier, 2004, p. 1021). This initial panic left losses of 2 billion dollars in stocks and forced some companies to suspend dividend payments (Markham, 2002, p. 29).[8] Companies and city governments raised their bonds' interest rates to contain the panic. However, the sell-off continued, pushing down stock prices and reducing reserve deposits of trust companies.[9] Finally, the Knickerbrocker Trust Company—the third largest trustee in New York—went into bankruptcy in October. This event spread the panic and sank the financial market. The suspension of payments continued as the liquidity crisis developed, constraining transactions in all sectors and pushing industries to curtail operations. Full convertibility of deposits was not restored until January 1908 (Frydman et al., 2015, p. 912; Johnson, 1908, p. 454). In the aftermath, two thousand companies went bankrupt as did more than 100 banks from August to December 1907 (Markham, 2002, p. 32). Furthermore, the Panic of 1907 punctuated the US economic expansion as the real GNP and industrial production decreased 6.7% and 30%, respectively. (Hansen, 2014; Odell & Weidenmier, 2004).

In this research, we use the Panic of 1907 as a natural experiment that affected unexpectedly the demand of immigrant labor in the United States. This allows us to identify short-run shifts in the selection of Mexican immigrants. In addition, the historical context and nature of the crisis provide the ideal conditions to study how migrant selection adjusts to shocks in the short run. First, at the turn of the twentieth century, Mexican immigrants did not face legal barriers to entering the United States.[10] Since immigration restrictions are implemented to control the scale and composition of immigration, they can hinder migrant selection adjustments. Therefore, an open border policy enables immigration to respond to shocks in the short run.[11] The lack of immigration restrictions also minimizes illegal border crossings

[8] Major players like the railway company Union Pacific saw their shares devalued by 29% (Johnson, 1908, p. 456).

[9] This phenomenon was recorded by the American press throughout 1907. For instance: "New York. Aug. 12 – The wildest break in the stock market since the present wave of selling occurred today. It carried stocks down from 1 to 17.5 points. In some cases to new low records. About one-half of the entire number of issues dealt on the exchange rate were sold at new low prices for the year." (The Washington Post, 1907).

[10] The Immigration Act of 1917 required all immigrants to pass a literacy test and pay an eight dollar head tax (Kosack & Ward, 2014, p. 1015). However, Mexicans were exempted from these restrictions until 1921 (Cardoso, 1980, p. 98).

[11] Alternatively, internal migration research can shed light on selection adjustments without capturing effects of immigration restrictions (Abramitzky & Boustan, 2017, p. 1324).

and thus the under-enumeration of undocumented immigrants: a factor that can bias selection estimates in contemporary settings (Fernandez-Huertas, 2011; Ibarraran & Lubotsky, 2007).

Second, previous literature agrees that the 1906 San Francisco earthquake triggered the chain of events that culminated in the Panic of 1907 (Bruner & Carr, 2007; Odell & Weidenmier, 2004). Hence, the random nature of the crisis rules out capturing anticipation effects that can distort the responsiveness of migrant selection to changes in the economic environment.[12] Third, although the Panic of 1907 became a world-wide affair (Johnson, 1908; Noyes, 1909), no bank collapsed or went bankrupt, nor losses for bill holders or depositors occurred in Mexico (Gómez, 2011, p. 2095). It is documented that the structure of the Mexican financial system prevented the contagion and guaranteed the national solvency abroad (The Wall Street Journal, 1910). Moreover, unlike the United States, the Mexican economy and manufactures production expanded in 1907, and there is no evidence that bankrupt companies or unemployment increased.[13] The crisis, however, depressed trade with the United States and may have induced a transient recession in 1908, which was quickly overcome in 1909 (see Figure A.2 in the Annex). This allows us to consider fixed the business conditions in Mexico during the Panic of 1907 and discard the presence of adjustments to simultaneous demand and supply shocks. In the next section, we present a conceptual framework to understand shifts in migrant selection patterns.

3. Conceptual framework and related literature

The basic Borjas-Roy model of self-selection predicts that migrants from countries with relatively high earnings inequality and returns to skill will be negatively self-selected: drawn from the lower half of the skill distribution (Borjas, 1987; Roy, 1951). This is because countries with high earnings dispersion are unattractive to low-earnings workers. Therefore, workers with less-than-average productive skills would have the most to gain from moving to countries with relatively low earnings inequality. Conversely, migrants moving from countries with relatively low earnings dispersion will be positively self-selected: drawn from the upper half of the skill distribution. One caveat, however, is that migration costs are assumed to be small and constant across individuals and thus do not influence the direction of selection.

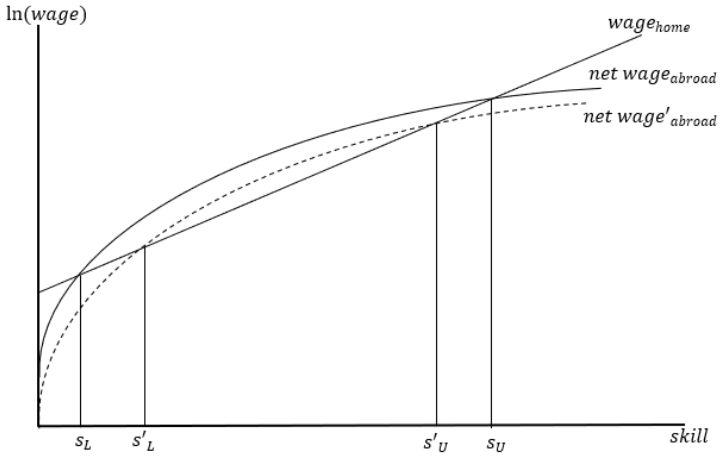
Chiquiar & Hanson (2005) extend the Borjas-Roy model by considering that in practice migration costs vary by skill level. Bureaucratic, transportation, job-search, and information costs involved in migration are fixed, representing fewer hours of work for the high skilled, who can finance migration with

[12] Although earthquakes had occurred in the region, the timing and magnitude of destruction of the San Francisco earthquake were unanticipated (Ager et al., 2020).

[13] Unfortunately, there are no adequate data to assess the impact of the crisis on employment levels in Mexico.

no or lower borrowing costs. This condition provides a nonlinear relationship between productive skills and net wages (wages minus migration costs) abroad. Figure 1 depicts the main implication of Chiquiar and Hanson's model. If migration costs are large enough and credit constraints sufficiently binding, immigration from home countries with high earnings dispersion can be characterized by an intermediate selection despite predictions of negative selection from the Borjas-Roy model. This is because the higher returns to skill at home dissuade high skilled immigration ($s > s_U$) and the high migration costs price out the poor and low skilled ($s < s_L$) from migrating.

Figure 1: Self-selection of immigrants



Source: Adapted from Chiquiar & Hanson (2005). Note: Mexican earnings data for the period is scattered and unreliable (López-Alonso, 2007). Available Gini coefficient estimates (United States: 0.54; Mexico: 0.51) may not be comparable and provide little information about differences in returns to skill between countries. Hence, predictions about the selection of Mexican immigration are ambiguous. See Lindert & Williamson (2016, p. 174) and Moatsos et al. (2014, p. 206) for income inequality estimations.

In this sense, developments in earnings inequality across countries and migration costs can explain shifts in migrant selection patterns. Indeed, the selection of immigrants arriving to the United States has changed over the last two centuries. The shift toward positive selection is partially explained by the increasing US income inequality and the divergence in absolute income between the United States and the developing world (Abramitzky & Boustan, 2017). Factors lowering the costs for future immigrants can also influence shifts in selection across generations; for example, migrant networks (McKenzie & Rapoport, 2007, 2010) and household wealth accumulation (Abramitzky et al., 2013; Connor, 2019). However, these factors tend to change slowly over time and are unlikely to account for selection adjustments in the short run.

3.1 Short-run shifts in migrant selection

To observe short-run shifts in migrant selection, the means or incentives to migrate must be impacted dramatically. Disruptive events affecting migration costs can induce changes in selection. In the past and present, guest worker programs, immigrant quotas, and skill-based admission systems have been implemented to artificially control the supply and skill composition of immigrant workforce (Clemens et al., 2018; Massey & Pren, 2012; Timmer & Williamson, 1998). A restrictive immigration policy increases migration costs, which means a downward shift of the *net wage* curve (see the dashed line in Figure 1). As a result, less individuals from both ends of the skill distribution will migrate. The increase in migration costs, however, will push toward a positive selection as the effect is strongest at low skill levels (Massey, 2016). Hence, immigration policies can adjust the direction and degree of selection into (return) migration once enacted (see Antecol et al., 2003; Bianchi, 2013; Greenwood & Ward, 2015; Mayda et al., 2018; Spitzer & Zimran, 2018; Ward, 2017). Yet, due to the political clout of immigrant groups, immigration reforms can take years or even decades to be implemented, allowing immigrants to anticipate changes and adjust to them (Goldin, 1994). Therefore, shifts in selection derived from policy interventions may provide partial evidence on the speed of adjustment of migrant selection.

Large-scale unanticipated shocks can also induce short-run shifts in selection by affecting wages at home and abroad. Diagrammatically, this means upward or downward shifts of the *wage* or *net wage* lines, which can be influenced by events such as economic crises, natural disasters, or social conflicts. However, previous literature provides conflicting evidence about the short-term response of migrant selection to economic shocks. Villarreal (2014) shows that the Great Recession (2007-9) modified significantly the selection of Mexican immigrants in terms of education. Collins & Zimran (2019) also document a decline in human capital of Irish migrants during Ireland's Great Famine (1845-9). In contrast, Monras (2020) argues that observable characteristics of Mexican immigrants did not change significantly before and after the Mexican Peso Crisis of 1995, and Spitzer et al. (2020) find no evidence that the Messina-Reggio Calabria Earthquake (1908)—arguably the most devastating natural disaster in modern European history—impacted Italian emigration or its composition.

A common feature of research studying disruptive events affecting immigration is the use of annual or census data, which may not always capture short-run shifts in migrant selection. To overcome this limitation, we exploit high frequency micro data (daily immigrant arrivals) that allow us to precisely pinpoint changes in the composition of immigrants within a year. Next, we describe these novel historical data and our measure of selection.

4. Data

4.1 Measure of selection

We use human stature to estimate the selection of Mexican immigrants. Average height reflects genetic factors as well as nutritional and health conditions during early childhood and youth. Since wealthier people have better access to food, hygienic conditions, and medical resources, they tend to be taller than the poorer population (see Borrescio-Higa et al., 2019; Deaton, 2007; Komlos & Baten, 2004; Komlos & Meermann, 2007; Komlos & A'Hearn, 2019; Steckel, 1995). Taller individuals also develop better cognitive abilities, reach higher levels of education, and earn more as adults (Case & Paxson, 2008; Ogórek, 2019; Schultz, 2002). Hence, human stature is indicative of earnings, wealth, and life chances.

Average height is a relevant measure of migrant selection when large sectors of the economy rely on physical productivity of labor and earnings data are scattered or unreliable. In fact, in contexts prior to widespread mechanization, human stature is indicative of returns to strength (Juif & Quiroga, 2019, p. 116). López-Alonso (2007) documents that this was the case of Mexico in the early twentieth century, making human stature the best measure to estimate selection patterns of Mexican immigration. Moreover, height is a useful measure of selection because for adult immigrants it cannot be manipulated in anticipation of or in response to migration (Spitzer & Zimran, 2018, p. 229).

4.2 Immigrant sample

The registration of aliens arriving at the Mexico-US land border began in 1906. American authorities used different types of documents to collect information about these individuals. These documents are known as Mexican Border Crossing Records (MBCRs) and to our knowledge are the only individual-level data available to study Mexican immigration before 1910. The sample that we exploit comes from the publication N° A3365.[14] It contains two-sheet manifests reporting rich and diverse information of immigrants that crossed the border at nine entrance ports (see Figure A.1 in Annex A). The manifests report individual characteristics (age, sex, marital status, occupation, literacy, citizenship, and race), anthropometric data (height, complexion, and color of eyes and hair), and geographic information (birthplace, final destination, and last residence). The anthropometric data was recorded by a sworn

[14]The title of the publication is: Lists of Aliens Arriving at Brownsville, Del Rio, Eagle Pass, El Paso, Laredo, Presidio, Rio Grande City, and Roma, Texas, May 1903-June 1909, and at Aros Ranch, Douglas, Lochiel, Naco, and Nogales, Arizona, July 1906-December 1910. The publication N° A3365 does not report data for years prior 1906 and entrance ports in California.

physician and surgeon, who examined each immigrant at the entrance port. In addition, the manifests provide information about the immigrant's current and previous migration spells.

One caveat is that the immigrant's age, birthplace, and occupation were self-reported and thus subject to biases. A second caveat is that the sample records only documented immigration (crossings at official entrance ports) and may present problems of selection and under-enumeration. However, unlike nowadays, Mexican immigrants did not have incentives to avoid official entrance ports but the desert. Most official entrance ports were also railway terminals and thus the principal crossing points for immigrants from central Mexico. In addition, Escamilla-Guerrero (2020) provides evidence suggesting that the sample is representative for Mexican immigration during the 1900s and may capture an important share of the total border crossings. We exclude data from 1909 onward to capture only labor immigrants and not refugees from the Mexican Revolution (1910–20). The sample covers the period from July 1906 to December 1908 and consists of 9,083 Mexican immigrants.[15]

4.3 Comparison samples: military records and passport applications

We use military recruitment files and passport records to compare immigrants with individuals that chose to remain in Mexico. These data are the result of extensive archival work completed by López-Alonso (2015), who uses height to study secular trends of living standards in Mexico from 1850 to 1950.[16] We believe that these comparison samples capture different parts of the height (earnings) distribution of the Mexican population, allowing us to identify from which part of the distribution the immigrants were drawn.

The military recruitment files consist of two samples that capture two different parts of the height distribution in Mexico. On the one hand, the federales were ordinary soldiers of the Mexican army (cavalry, infantry, and artillery), who served and retired, died in the line of duty, or deserted the military. At the time, there were minimum age, health, literacy, and stature requirements to enlist in the army. While these requirements might have introduced systematic biases to the sample, López-Alonso (2015, p. 112) shows that none of them were enforced during the period. The sample size is 7,088 males born between 1840 and 1950, who proxy for the average laborer/peasant in Mexico—that is, the lower ranks of the height (earnings) distribution. The source of these data are the archives of the Ministry of National Defense (*Secretaría de la Defensa Nacional*–SEDENA).

[15] Escamilla-Guerrero (2020) provides a full description of the publication N° A3365 and sampling plan followed to transcribe the micro data.

[16] López-Alonso (2015, p. 107) provides a detailed description of the archival work involved.

On the other hand, the rural police, known as the rurales, was a militia created in 1860 as an armed group loyal to the president. The members of this militia received a higher salary than the federales and needed to bring their own horses and weapons in the militia's beginnings. The rurales often received additional monetary rewards and political favors to maintain the stability in the country. We consider the rurales sample separately from the federales because the rurales were clearly not representative of the ordinary soldier. Since the rurales received a higher salary and extra monetary and non-monetary rewards for their service, they were above the ordinary soldiers in the socioeconomic ladder. Hence, the rurales could be considered as the military elite of that time, representing the intermediate ranks of the height (earnings) distribution in Mexico (López-Alonso, 2015, p. 156). The sample size is 6,820 individuals born between 1840 and 1900.[17] The sample covers all the enlistment records of this militia, and the source of these data is the National Archives, Public Administration Section (*Archivo General de la Nación*–AGN).

Finally, the passport records consist of all the passport applications made from 1910 to 1942 reporting the applicant's height. We believe that this sample represents the upper ranks of the height (earnings) distribution because passport holders were individuals with the economic means to travel abroad for business, leisure or education purposes (López-Alonso & Condey, 2003). Yet, two important characteristics of these data should be noticed. First, height was self-reported by the applicant. Second, the records capture all the issued passports but not all the travel permits issued by regional offices to applicants that could not travel to Mexico City. The sample size is 6,746 male individuals born between 1860 and 1922. The source of these data are the archives of the Ministry of Foreign Affairs (*Secretaría de Relaciones Exteriores*–SRE).

4.4 Data refinements and descriptive statistics

To obtain the best migrant selection estimates, we implement a series of data refinements. We keep only males reporting full geographic information (municipality and state of birth).[18] This allows us to capture differences in selection across Mexican regions. In addition, we keep individuals that have reached their terminal height at the moment of registration: individuals between 22 and 65 years old. This avoids capturing growing and shrinkage effects (Spitzer & Zimran, 2018, p. 231).

To minimize capturing effects of the Mexican Revolution present in the comparison samples, we keep military and passport holders that had passed their pubertal growth spurt before the Mexican Revolution

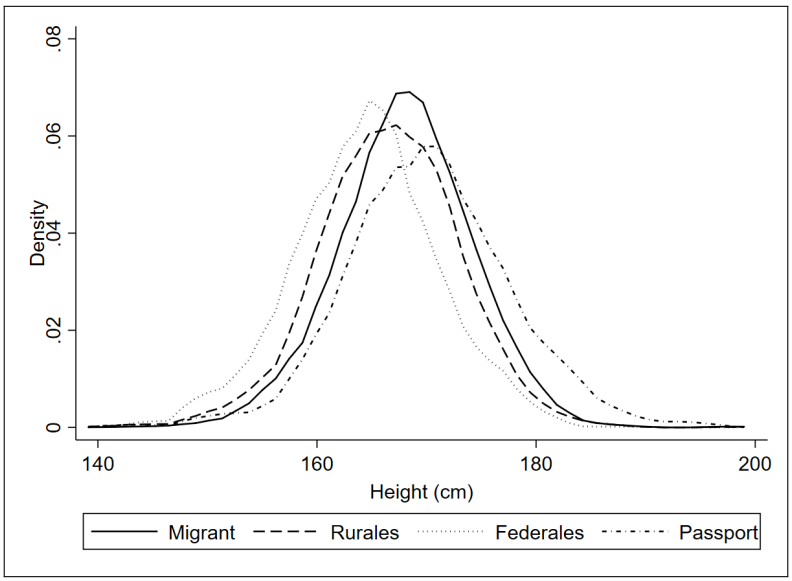
[17] The desertion rates in this militia were high since its members could sell their equipment at any time and locating deserters was costly López-Alonso (2015, p. 117–21).

[18] We constrain our analysis to males because the military data do not report the birth place for females.

regardless of their year of registration: individuals 18 years old or older before 1911. In other words, we keep individuals that had reached their peak growth velocity before the conflict. We apply this partial refinement because keeping only those individuals registered before the conflict (the ideal comparison sample) reduces significantly the size of the samples. Therefore, our estimates may capture some effects of the conflict—for example, time-varying sample selection.

Figure 2 confirms that the samples approximate normal distributions and do not suffer from truncation. Table 2 presents the main characteristics of the final samples. On average, immigrants were 168 cm tall, 3.6 cm taller than the ordinary soldiers, 1.4 cm taller than the military elite, and 2.1 cm shorter than the passport holders. Recall that a lower average height indicates that a group faced worse conditions of health care, nutrition, disease environment, and work assignments some 10 to 50 years before being observed (Schneider & Ogasawara, 2018, p. 64).[19] In this sense, differences in height between samples confirm that the ordinary soldiers belonged to the lowest social strata, whereas immigrants and the military elite belonged to the intermediate strata in Mexico.

Figure 2: Kernel density estimates of height



Source: Migrant sample from Mexican Border Crossing Records–Microfilm publication N° A3365. Military and Passport samples from López-Alonso (2015). Note: The samples approximate normal distributions. The military data are not truncated, confirming that the 160 cm minimum-height requirement to join the army was not enforced.

[19] Schneider & Ogasawara (2018) argue that disease environment, proxied by infant mortality rates, have economically meaningful effects on child height at ages 6-11.

Table 1: Average height (centimeters) across regions (males)

	North	Bajio	Center	South
Migrant	169.2	167.0	167.9	165.4
	(6.0)	(5.9)	(7.2)	(5.4)
Rurales	167.4	166.8	166.0	166.3
	(6.39	(6.3)	(6.4)	(5.7)
Federales	166.8	165.2	163.7	161.3
	(6.9)	(6.6)	(5.9)	(5.7)
Passports	171.3	171.1	169.4	168.9
	(7.3)	(7.5)	(7.3)	(7.1)
Observations	2,208	5,850	2,978	461

Source: Immigrant sample from Mexican Border Crossing Records–Microfilm publication N° A3365. Military and Passport samples from López-Alonso (2015). Note: Standard deviations in parenthesis. We classify the regions of birth following López-Alonso (2015, p. 127). We limit the sample to males because the military data do not report geographic information for females. We consider individuals that had reached their terminal height: individuals between 22 and 65 years old.

Table 2: Summary statistics: immigrant, military and passports samples (males)

	Immigrant	Federales	Rurales	Passport
Average Height (cm)	168.0	164.4	166.6	170.1
Average Age (years)	31.2	35.3	29.7	48.3
Labor Class (%)				
Unskilled	89.1	73.3	47.8	3.7
Skilled	7.7	24.1	49.3	34.2
Professional	2.2	2.6	3.0	61.3
Literacy (%)				
Literate	38.4	45.3	49.5	100.0
Marital Status (%)				
Married	58.9	na	na	na
Single	38.8	na	na	na
Widowed	1.8	na	na	na
Region of Birth (%)				
North	45.5	18.7	2.9	13.4
Bajio	52.5	27.3	60.6	30.0
Center	1.8	42.8	33.0	47.3
South	0.3	11.3	3.5	9.3
Cash in hand–US dollars (median)				
North	10.0	na	na	na
Bajio	1.0	na	na	na
Center	20.0	na	na	na
South	10.0	na	na	na
Observations	3,609	1,249	5,300	1,339

Source: Immigrant sample from Mexican Border Crossing Records–Microfilm publication N° A3365. Military and Passport samples from López-Alonso (2015). Note: We classify the regions of birth and occupations following López-Alonso (2015, p. 127 & 128). We limit the sample to males because the military data do not report geographic information for females. We consider individuals that had reached their terminal height at the moment of registration: individuals between 22 and 65 years old.

However, immigrants had the lowest literacy rate and were mostly unskilled laborers. This confirms that immigrants moved to perform activities where brawn relative to brain had a greater value—that is, jobs with high returns to physical productivity. Clark (1908, p. 477 & 486) documents that most Mexican immigrants were confined to track maintenance in the railways, and that they were employed as drillers,

wood choppers, coke pullers, and surface men (strip mining): occupations requiring physical strength.[20] In contrast, 62% of the passport holders self-reported as professionals, confirming that they belonged to the upper social class.

The regional distribution of the samples shows that immigrants came mostly from the North and Bajio, while soldiers were recruited mainly in the Bajio and Center. The passports sample concentrates in the Center region, confirming that most passport holders may have lived in Mexico City or nearby states. At the time, the Mexican upper social strata resided in these locations, and based on the amount of cash held at the crossing, immigrants from the Center were considerably richer than the rest (see Table 2). They reported to have 20 dollars, two times the amount held by immigrants from the North. Bajio immigrants had only one dollar in hand when crossing the border, suggesting that they were the poorest (Durand, 2016). In addition, Table 1 shows that differences in height between immigrants and ordinary soldiers almost doubles in the Center and South relative to the North, suggesting the presence of substantial variation in the degree of migrant selection across regions. In the next section, we estimate the selection of Mexican immigration and assess its responsiveness to the Panic of 1907.

5. Empirical strategy

To estimate the selectivity of Mexican immigration, we pool the migrant sample with each of the comparison samples separately. We regress the height of individual i ($height_i$) on a dummy variable that takes the value of 1 if the individual belongs to the migrant sample and zero otherwise ($migrant_i$), a vector of individual characteristics ($\mathbf{X}_i$) that includes region of birth, and year of birth fixed effects (α_c):

$$height_i = \beta + \Phi migrant_i + \mathbf{X}_i'\theta + \alpha_c + e_i. \tag{1}$$

The estimated coefficient Φ captures the average difference in height between immigrants and federales, rurales, or passport holders, respectively. The region of birth categories (North, Bajio, Center and South) control for environmental factors such as food availability, dietary patterns, or endemic diseases that might influence height at the region level.[21] The year-of-birth fixed effects control for factors influencing height across years, such as idiosyncratic shocks affecting living standards of the population over time.

[20] Certainly, Mexicans were employed as cotton pickers during the harvest season. This activity required nimble fingers rather than physical strength (Clark, 1908, p. 482).

[21] The regional classification was taken from López-Alonso (2015, p. 127).

The estimated coefficients Φ are average selection estimates for the period October 1906–December 1908. However, as mentioned previously, from August 1907 to January 1908 the US economy was severely affected by the Panic of 1907.[22] To capture shifts in selection into migration as a consequence of this crisis, we extend Equation 1 by interacting the indicator variable for immigrants with dummy variables for the Panic ($panic$) and post-Panic period ($panic^{post}$):

$$\begin{aligned} height_i = &\beta + \Phi_1 migrant_i + \Phi_2 migrant_i \times panic + \Phi_3 migrant_i \times panic^{post} \\ &+ \mathbf{X}_i'\theta + \alpha_c + e_i. \end{aligned} \tag{2}$$

The estimated coefficients Φ_2 and Φ_3 capture average differences in height of individuals that migrated during the Panic period (August 1907–January 1908) or after the Panic (February 1908–December 1908), respectively. These estimates are relative to those who migrated before the Panic (October 1906–July 1907). The difference in height between pre-Panic immigrants and the different comparison samples (non-immigrants) is captured by Φ_1. Holding everything else equal, the estimated selection pattern during the Panic of 1907 is $\Phi_1 + \Phi_2$.

5.1 Self-selection of Mexican immigrants

Column 1 of Table 3 shows that on average immigrants were 2.1 cm taller than the federales. The difference in height between immigrants and rurales was 0.5 cm, implying that immigrants were slightly taller than the military elite (column 2). Relative to the passport holders, immigrants were 3.1 cm shorter (column 3). Given that taller individuals tend to earn more, the results allow us to infer that earnings of immigrants were higher than those of ordinary soldiers and very similar to the earnings of the military elite. Therefore, it is unlikely that the first Mexican immigrants were negatively self-selected, but drawn primarily from the intermediate or upper ranks of the earnings distribution in Mexico—that is, Mexican immigration in the early twentieth century was characterized by an intermediate or positive selection. Moreover, as stature is correlated with unobserved productive skills, our results suggest that immigrants may have had even higher human capital accumulation (Bodenhorn et al., 2017, p. 201). This finding aligns with literature arguing that past and contemporary Mexican immigrants were not drawn from the lower ranks of the educational (Chiquiar & Hanson, 2005), skills (Orrenius & Zavodny, 2005), or height distribution (Kosack & Ward, 2014).

[22] There is no consensus about the ending month of the crisis. Yet, previous literature agrees that normalcy in the financial market was restored in January 1908 (Frydman et al., 2015, p. 937).

As a robustness check, we include state-of-birth fixed effects instead of region categories in the models for which more disaggregated geographic data is available (rurales and passports). This helps us to rule out that our results are driven by unobserved factors across states of birth. Columns 4–5 of Table 3 show that our initial results hold in significance and magnitude.

Table 3: Unconditional self-selection
Dependent variable: height (centimeters)

	1	2	3	4	5
	Federales	Rurales	Passports	Rurales	Passports
Migrant	2.124	0.522	-3.173	0.459	-3.135
	(0.348)	(0.178)	(0.401)	(0.184)	(0.409)
Region of birth					
North	5.497	2.469	3.470		
	(0.533)	(0.451)	(0.665)		
Bajio	3.334	0.491	1.459		
	(0.527)	(0.417)	(0.655)		
Center	2.487	-0.239	0.744		
	(0.526)	(0.431)	(0.662)		
Observations	4,858	8,896	4,948	8,896	4,948
R-squared	0.114	0.052	0.056	0.062	0.074
Birth year FE	Yes	Yes	Yes	Yes	Yes
Birth state FE	No	No	No	Yes	Yes

Source: Mexican Border Crossing Records–Microfilm publication N° A3365 and López-Alonso (2015). Notes: Mexican immigration was characterized by an intermediate or positive selection on the basis of height. Robust standard errors in parenthesis. The omitted category is individuals born in the South region.

We acknowledge that our military and passport samples may be selected. For example, the federales were not conscripts but volunteers, and it is expected that in a growing economy, like Mexico at the time, the opportunity cost of enlisting increases for productive and tall individuals (Bodenhorn et al., 2017, p. 173). Hence, the federales sample may capture the shortest individuals within the lower ranks of the height distribution. This would lead to imprecise migrant selection estimates resulting from comparisons with extreme values of the distribution. In addition, no-pecuniary factors such as patriotism, recruitment practices, and socioeconomic status of soldiers can influence the composition of volunteers enlisting in the military (Komlos & A'Hearn, 2019, p. 1145). However, if our comparison samples had major selection problems, we would expect to obtain conflicting migrant selection estimates across specifications: a negative selection relative to the lower social strata (ordinary soldiers) and a positive selection relative to the upper social strata (passport holders). Table 3 shows that our estimates are consistent across models. Therefore, if any, sample selection bias in our comparison groups should be minimum.

To take into account potential sample selection biases, we control for skill level (unskilled, skilled, and professional). By estimating migrant selection conditional on skill, we factor out composition effects

resulting from skill-based selection mechanisms present in our comparison samples. For example, the military could have preferred unskilled over skilled volunteers to minimize desertion of ordinary soldiers. Columns 1–3 of Table 4 show unconditional and conditional migrant self-selection estimates. Year of birth is an explanatory variable in all three models. Column 2 and 3 add region of birth and skill level controls, respectively. Differences between estimates of column 1 and 2 confirm that environmental factors at the region level explain about 34%–67% of the differences in height between immigrants and stayers. Results in column 3 (Panels A and B) show no differences in migrant selection when controlling for skill level, suggesting that the skill composition of both military samples are not driving our migrant selection estimates. However, controlling for skill level reduces in 32% the difference in height between immigrants and passport holders (Panel C). This finding shows that comparing like with like—individuals born in the same year and region, and with similar cognitive abilities (skills)—is advisable when the comparison groups may suffer from ambiguous sample selection bias. Hence, we control for skill level in all subsequent models.

Table 4: Conditional self-selection by region
Dependent variable: height (centimeters)

	1	2	3	4	5
	Complete Sample			North	Bajio
Panel A. Federales					
Migrant	3.259	2.124	2.209	1.273	2.490
	(0.306)	(0.348)	(0.350)	(0.630)	(0.609)
Observations	4,858	4,858	4,822	1,848	2,227
R-squared	0.077	0.114	0.117	0.061	0.041
Panel B. Rurales					
Migrant	1.604	0.522	0.557	1.114	0.437
	(0.152)	(0.178)	(0.187)	(0.608)	(0.214)
Observations	8,896	8,896	8,860	1,769	5,087
R-squared	0.038	0.052	0.053	0.049	0.033
Panel C. Passports					
Migrant	-1.993	-3.173	-2.143	-2.282	-2.849
	(0.327)	(0.401)	(0.508)	(1.178)	(0.880)
Observations	4,948	4,948	4,901	1,793	2,286
R-squared	0.033	0.056	0.059	0.047	0.080
Region of birth categories	No	Yes	Yes	No	No
Skill level categories	No	No	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes	Yes	Yes

Source: Mexican Border Crossing Records–Microfilm publication N° A3365 and López-Alonso (2015). Notes: We estimate migrant selection conditional on skill to factor out composition effects resulting from skill-based selection mechanisms present in our comparison samples—for example, military recruitment practices. Robust standard errors in parenthesis. The omitted categories are individuals born in the South region (columns 2–3) and unskilled workers (columns 3–5).

Did the magnitude of selection vary across regions? To answer this question, we estimate separately Equation 1 for each region. We only present results for the North and Bajio because these regions concentrate 98% of the migrant sample. Columns 4–5 of Table 4 show that there was considerable variation in the degree of regional selection across Mexico. The positive selection relative to the ordinary soldiers was stronger in the Bajio than in the North (Panel A). By 1910, salaries and living standards in the Bajio were considerably lower than elsewhere in Mexico (Rosenzweig, 1965, p. 450; Campos-Vázquez & Vélez-Grajales, 2012, p. 613). Therefore, the poor and short were priced out from migration in the Bajio. Panel B shows that Bajio immigrants were only 0.4 cm taller than the military elite, suggesting that immigrants from poorer regions were drawn from the intermediate ranks of the regional height distribution. In the North region, however, immigrants were clearly taller than the military elite—that is, drawn from the upper ranks of the height distribution (Panel B). We also find that immigrants were shorter than the passport holders in both regions. This result shows that immigrants faced worse nutritional and health conditions during their childhood and youth relative to the upper social strata; consequently, immigrants were shorter and had lower returns to health human capital.

5.2 The effect of the Panic of 1907

Columns 1–3 of Table 5 show the effect of the Panic of 1907 on migrant selection. Individuals that migrated during the crisis were approximately 0.9 cm shorter than their pre-Panic counterparts—that is, migrants became less positively selected during this period. However, the estimated selection during the post-Panic period is close to zero and not statistically significant, meaning that those who migrated after the crisis had a stature similar to pre-Panic immigrants.

Column 1 of Table 5 reveals that before the Panic, immigrants were positively selected relative to the average soldier (2.4 cm taller). This pattern changes during the Panic, when immigrants became less positively selected (1.4 cm), but it returns to pre-crisis levels afterward. Columns 2–3 show the same "U" pattern relative to the rurales and passports samples. When controlling for unobserved factors across states, the selection estimates change for the post-Panic period. Columns 4–5 of Table 5 show that immigrants became more positively selected than their pre-Panic peers. Therefore, the findings suggest that in the beginnings of the twentieth century, when immigrants were able to cross the border without restrictions, the composition of Mexican immigration adjusted very quickly to short-run changes in the demand of immigrant workers. This can be appreciated more clearly in Figure 3 that depicts the adjusted height of migrants during the complete period under analysis (October 1906–December 1908).

To estimate the adjusted values in each month, we regress the migrants' height on skill level, state of birth, year of birth, year-month of crossing, and entrance port fixed effects.

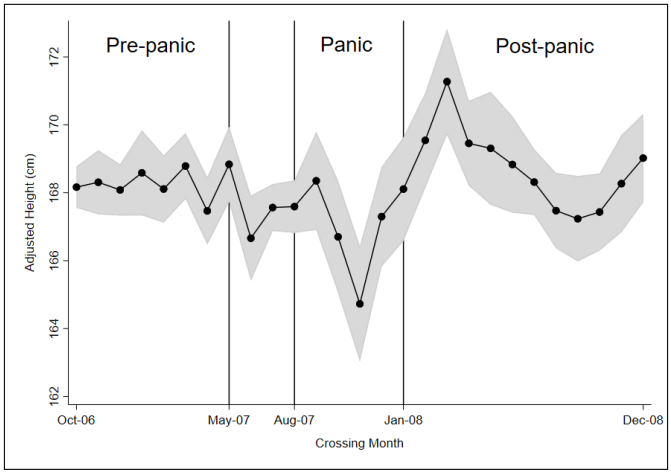
The shifts in our measure of selection follow closely the development of the crisis. In March 1907, the first strong drop in stock prices occurred. In the following months, the speculation and uncertainty continued and by May 1907 the US economy had fallen into a short but severe recession (Odell & Weidenmier, 2004, p. 1003). Similarly, we observe the first fall in the adjusted height from May to August 1907. In August 1907, the Secretary of the Treasury announced the deposit of 28 million dollars to banks across the United States for relieving the expected stringency in money supply and bring back confidence to the financial system (Markham, 2002, p. 31). This measure only delayed the financial crash of October, but along with substitutes for legal currency and the creation of "legal holidays" prevented even more bankruptcies during the Panic period (Andrew, 1908, p. 516). Following the narrative of these events, the adjusted height increases slightly after August and falls later on. Finally, the adjusted height increases significantly after January 1908, when the payments to depositors of commercial banks were fully restored. This evidence reveals that the underlying adjustment mechanisms were intertwined with the business conditions in the United States and operated at the local level (see results including state-of-birth fixed effects in columns 4–5). In the following section, we address the channel through which migrant selection adjusted in the short run.

Table 5: Impact of the Panic of 1907 on self-selection patterns
Dependent variable: height (centimeters)

	1	2	3	4	5
	Federales	Rurales	Passports	Rurales	Passports
Migrant	2.400	0.731	-1.953	0.412	-2.204
	(0.364)	(0.204)	(0.518)	(0.213)	(0.524)
Migrant × Panic	-0.976	-0.994	-0.958	-0.644	-0.675
	(0.288)	(0.289)	(0.288)	(0.291)	(0.290)
Migrant × Post-Panic	-0.111	-0.060	-0.092	0.870	0.622
	(0.251)	(0.246)	(0.253)	(0.279)	(0.291)
Observations	4,822	8,860	4,901	8,860	4,901
R-squared	0.119	0.054	0.061	0.065	0.079
Skill level categories	Yes	Yes	Yes	Yes	Yes
Region of birth categories	Yes	Yes	Yes	No	No
Birth year FE	Yes	Yes	Yes	Yes	Yes
Birth state FE	No	No	No	Yes	Yes

Source: Mexican Border Crossing Records–Microfilm publication N° A3365 and López-Alonso (2015). Notes: The Panic of 1907 changed significantly migrant selection. Immigrants became less positively selected during the crisis. Robust standard errors in parenthesis. The omitted categories are individuals born in the South region and unskilled workers.

Figure 3: Effect of the Panic of 1907. Adjusted height of migrants



Source: Mexican Border Crossing Records–Microfilm publication N° A3365. Note: We estimate the adjusted values regressing the migrants' height on skill level, state of birth, year of birth, year-month of crossing, and entrance port fixed effects. **May-07:** By May 1907, the US had fallen into a short but severe recession. **Aug-07:** In August 1907, the Secretary of the Treasury announced the deposit of 28 million dollars to banks across the US for relieving the expected stringency in money supply and bring back confidence to the financial system. **Jan-08:** In January 1908, the payments to depositors of commercial banks were fully restored.

6. Short-run adjustment channels

We have presented evidence showing that Mexican immigration was characterized by an intermediate or positive selection, and that the Panic of 1907 sparked short-run shifts in migrant selection. The absence of detailed earnings data for the period prevents us to explore changes in US earnings as an adjustment channel of selection. Moreover, substitutes for cash were emitted and rationalized to the population to contain the impact of the financial breakdown (Andrew, 1908). This policy could have contributed to keep earnings relatively unaffected until the restoration of the financial system. For these reasons, we focus on channels affecting migration costs.[23] Specifically, we assess the role of labor institutions. Institutions involved in the immigration process can shape and adjust migrant selection as they ease borrowing constraints and reduce migration costs (Abramitzky & Boustan, 2017, p. 1325). If labor institutions are also intertwined with business cycles, they can serve as adjustment channels of migrant selection during periods of economic depression or expansion. To test this proposition, we study the *enganche*, an institutionalized labor recruiting practice of the time.

6.1 The enganche

During the nineteenth century, Mexico was characterized by regional labor demand and supply mismatches. The *enganche*, a practice to recruit and transport workers to remote locations or with labor

[23] The Panic of 1907 could have impacted other channels affecting migration costs. For example, migrant networks relaxing credit constraints for low-skilled immigrants (McKenzie & Rapoport, 2010).

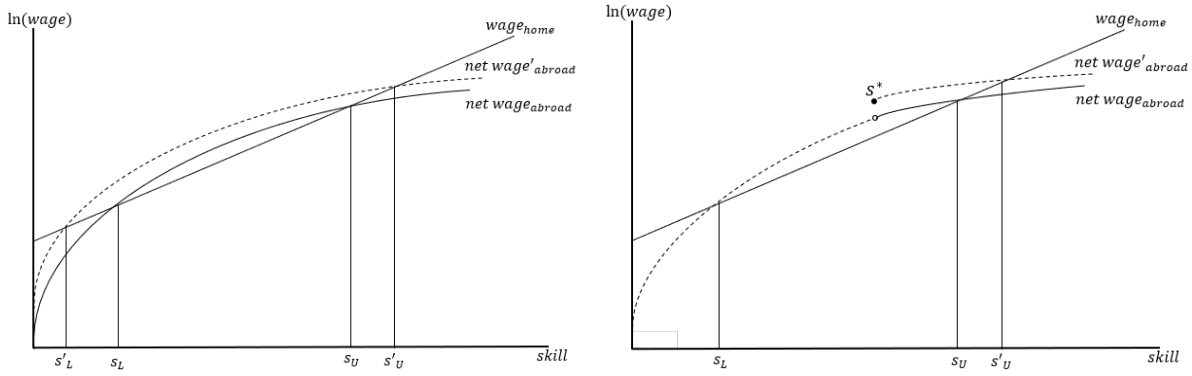
shortages, was institutionalized to regulate labor markets (Durand, 2016, p. 50–1). Recruiters "hooked" workers by offering wages in advance in exchange of future labor service, creating a relationship of indebtedness that kept workers at the destination until the debt was cleared (Brass, 1990, p. 74). This labor-recruiting system was mainly practiced in regions with population pressures and low salaries (Rosenzweig, 1965, p. 448).

At the turn of the twentieth century, American companies and labor contractors adopted the *enganche* to satisfy the increasing demand of workers in the American Southwest and other regions. The internationalization of this labor institution was possible due to the expansion of the Mexican railways network and its connection to the US rail lines from 1884. Indeed, recruiters used railways for traveling south into Mexico and transporting recruited immigrant workers north to the United States (Woodruff & Zenteno, 2007, p. 512). However, the recruitment of workers was not confined to places with railway access. Clark (1908, p. 475) argues that Mexican workers also arrived at border towns where they met representatives of large labor contracting companies or *enganche* agencies. Once recruited, the workers crossed the border and received transportation to the destination and a subsistence allowance, both discounted from their future wage. The indebtedness attached to the *enganche* also prevented immigrants from job turnover and reduced their bargaining power over working conditions. Although this labor institution was probably not attractive for every intending migrant, it could have been the only option to migrate for the poor or those facing credit constraints.[24] Overall, we can understand the *enganche* as a persistent labor institution that reduced transportation and job-search costs for intending migrants (Clark, 1908; Durand, 2016; Gamio, 1930).

We argue that the effect of labor recruiting on migrant selection depends on the intensity and nature of recruiting. If recruiting is practiced in low scale, the skill composition of immigration may not change. However, if labor recruiting is importantly involved in the immigration process, the effect toward a positive or negative selection depends on how intending migrants are recruited. In Chiquiar and Hanson's model, the introduction of labor recruiting decreases migration costs at all skill levels when intending migrants are randomly recruited. This means an upward shift of the *net wage* curve (see Panel A of Figure 4). As a result, more individuals will migrate from both ends of the skill distribution. The effect on the direction (degree) of selection depends on the distance between s_L and s'_L, the distance between s_U and s'_U, and the density of the skill distribution in these segments.

[24] Durand & Arias (2000) document that the *enganche* system took advantage of the precarious social conditions and limited labor options in some Mexican regions.

Figure 4: Labor recruiting and changing migration costs



(A) Random recruiting *(B) Assortative recruiting*

Intending migrants can also be sorted and recruited based on observable skills. The introduction of assortative recruiting decreases migration costs only at some skill levels, resulting on more individuals migrating from a specific part of the skill distribution. In this case, the effect on the direction (degree) of selection depend primarily on the chosen recruitment threshold (s^*), which reflects the employers' preferences. Panel B of Figure 4 depicts a scenario where recruiters choose intending migrants with $s > s^*$: from the upper ranks of the home country skill distribution.

6.2 Identification of enganche immigrants

Our data do not identify directly immigrants that used the *enganche* to cross the border. Hence, we design a methodology to identify *enganche* immigrants based on the characteristics of this system of labor recruiting. The *enganche* profitability depended on the number of workers recruited and the associated costs of transportation. Previous literature suggests that recruiters commonly transported between 30 and 400 workers depending on the nature of the jobs and season of the year (Clark, 1908, p. 470 & 476; Durand, 2016, p. 56 & 63). We validate this information with twenty advertisements published in Mexican and American newspapers from 1902 to 1909. The number of vacancies advertised range from 50 to 600, which suggests that the minimum number of workers that made the *enganche* profitable was about 30 to 50.

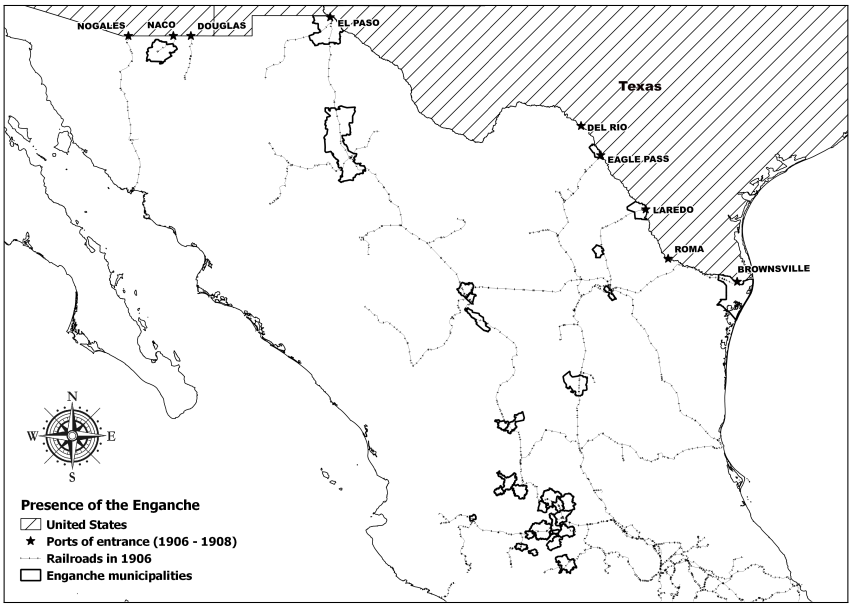
To identify recruited workers in the sample, we first estimate monthly flows of immigrants based on the reported year-month of crossing, entrance port, origin (Mexican municipality), and destination (American county).[25] Then, we standardize the size of each flow using the mean and standard deviation of each municipality-port-county combination or migration corridor. By estimating z-scores for each flow,

[25] We use the month of crossing because the day is not always reported.

we are able to identify unusual monthly-crossing peaks in each migration corridor. Finally, we consider as *enganche* immigrants those individuals belonging to a flow (group) of at least 30 immigrants registered at the same entrance port, in the same month, reporting the same origin and destination, and which size was at least one standard deviation above the average size of the flows belonging to the same migration corridor. This criteria allows us to identify groups of immigrants that were different in size, which proxies for the presence of the *enganche*. We present a formal expression of this methodology in Annex B.

Figure 5 displays the municipalities where labor recruiting was practiced. All the municipalities have direct access to railways, which was necessary for the transportation of recruited workers. The spatial distribution of the *enganche* also supports the argument that labor recruiting was practiced at border towns and in the central plateau of Mexico, where salaries were relatively low and labor-market pressures were high.

Figure 5: Spatial distribution of the enganche (1906–08)



Source: Mexican Border Crossing Records–Microfilm publication N° A3365. Note: The polygons display the municipalities with presence of the *enganche*, a system of labor recruiting that reduced migration costs. Recruiters or *enganchadores* covered the transportation costs of the immigrant in exchange of future labor service.

6.3 The enganche effect

Since labor recruiting affects migration costs directly and is intertwined with the destination's business cycle, it represents a feasible short-run adjustment channel of migrant selection. To test if the *enganche* influenced selection into migration, we first expand Equation 1 as follows:

$$height_i = \beta + \Phi_1 migrant_i + \Phi_2 enganche_i + \mathbf{X}_i'\theta + \alpha_c + e_i. \tag{3}$$

Where $enganche_i$ is a dummy variable that takes the value of 1 if the immigrant crossed the border using the *enganche* and zero otherwise. The estimated coefficient Φ_2 captures the difference in height between *enganche* and *non-enganche* immigrants. Column 2 of Table 7 shows that American recruiters chose the tallest laborers among those willing to migrate. On average, *enganche* immigrants were 0.6 centimeters taller than immigrants that crossed the US border without using labor recruiting. The estimated coefficient Φ_1 is the difference in height between *non-enganche* immigrants and each comparison sample. For example, column 2–Panel B of Table 7 shows that *non-enganche* immigrants were 0.3 centimeters taller than the military elite (intermediate selection), whereas *enganche* immigrants were clearly positively self-selected: 1 centimeter taller ($\Phi_1 + \Phi_2$). Therefore, American companies and labor contractors practiced assortative labor recruiting. These results hold when including state-fixed effects (column 6), suggesting that this labor institution shaped selection into migration at the local level.

Table 6: Composition of Mexican immigration across periods

	Pre-Panic Oct 1906–Jul 1907	**Panic Aug 1907–Jan 1908**	**Post-Panic Feb 1908–Dec 1908**
Panel A. Complete Sample			
Average Height (cm)	168.1	167.3	168.4
Average Age (years)	30.5	31.8	32.3
Labor Class (%)			
Unskilled	91.6	88.3	83.8
Skilled	5.4	7.8	12.8
Professional	2.0	2.8	2.6
Enganche (%)	36.2	1.2	13.2
Observations (%)	58.0	16.0	25.8
Panel B. Bajio			
Average Height (cm)	166.9	166.6	167.6
Average Age (years)	30.5	31.5	31.7
Labor Class (%)			
Unskilled	96.7	94.3	86.9
Skilled	2.2	3.6	10.7
Professional	0.7	1.4	2.1
Enganche (%)	42.7	0.7	10.2
Observations (%)	64.9	14.8	20.1
Panel C. North			
Average Height (cm)	169.8	168.2	168.9
Average Age (years)	30.4	32.1	32.8
Labor Class (%)			
Unskilled	86.2	85.0	82.6
Skilled	9.5	11.1	14.0
Professional	2.5	2.2	2.1
Enganche (%)	27.3	1.8	15.5
Observations (%)	50.0	17.0	32.5

Source: Mexican Border Crossing Records–Microfilm publication N° A3365. Note: We classify the regions of birth following López-Alonso (2015, p. 127). We consider individuals that had reached their terminal height: individuals between 22 and 65 years old.

Table 7: Impact of the enganche on self-selection patterns
Dependent variable: height (centimeters)

	1	2	3	4	5	6	7	8
Panel A. Federales								
Migrant	2.209	2.065	2.400	2.235				
	(0.350)	(0.354)	(0.364)	(0.375)				
Migrant × Panic			-0.976	-0.822				
			(0.288)	(0.300)				
Migrant × Post Panic			-0.111	-0.007				
			(0.251)	(0.258)				
Enganche		0.631		0.474				
		(0.236)		(0.249)				
Observations	4,822	4,822	4,822	4,822				
R-squared	0.117	0.119	0.119	0.120				
Panel B. Rurales								
Migrant	0.557	0.394	0.731	0.562	0.514	0.373	0.412	0.219
	(0.187)	(0.198)	(0.204)	(0.226)	(0.194)	(0.205)	(0.213)	(0.234)
Migrant × Panic			-0.994	-0.841			-0.644	-0.474
			(0.289)	(0.301)			(0.291)	(0.302)
Migrant × Post Panic			-0.060	0.040			0.870	0.978
			(0.246)	(0.253)			(0.279)	(0.285)
Enganche		0.617		0.457		0.513		0.513
		(0.234)		(0.247)		(0.236)		(0.247)
Observations	8,860	8,860	8,860	8,860	8,860	8,860	8,860	8,860
R-squared	0.053	0.054	0.054	0.055	0.063	0.064	0.065	0.066
Panel C. Passports								
Migrant	-2.143	-2.252	-1.953	-2.096	-2.103	-2.216	-2.204	-2.381
	(0.508)	(0.509)	(0.518)	(0.523)	(0.513)	(0.514)	(0.524)	(0.528)
Migrant × Panic			-0.958	-0.807			-0.675	-0.486
			(0.288)	(0.299)			(0.290)	(0.300)
Migrant × Post Panic			-0.092	0.010			0.622	0.740
			(0.253)	(0.260)			(0.291)	(0.296)
Enganche		0.618		0.466		0.627		0.594
		(0.237)		(0.249)		(0.241)		(0.251)
Observations	4,901	4,901	4,901	4,901	4,901	4,901	4,901	4,901
R-squared	0.059	0.060	0.061	0.062	0.077	0.078	0.079	0.080
Skill level categories	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region of birth categories	Yes	Yes	Yes	Yes	No	No	No	No
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Birth state FE	No	No	No	No	Yes	Yes	Yes	Yes

Source: Mexican Border Crossing Records–Microfilm publication N° A3365 and López-Alonso (2015). Notes: Robust standard errors in parenthesis.

However, we are interested in knowing whether this labor institution influenced adjustments in selection. Table 6 shows the composition of immigration in the pre-Panic (October 1906–July 1907), Panic (August 1907–January 1908), and post-Panic (February 1908–December 1908) periods. We can observe that the *enganche* was almost not practiced during the Panic of 1907. The share of immigrants recruited in Mexico went from 36% in the pre-Panic period to 1.2% during the Panic and partially recovers in the post-Panic period. Recall that during the crisis, banks and financial institutions limited or suspended cash payments. Therefore, American companies and labor contracting agencies were not able to finance

the *enganche*, since they needed constant liquidity to pay train tickets, subsistence allowances, and wages in advance for tens or hundreds of recruited workers. As the crisis developed, thousands of firms and over one hundred banks failed, which also reduced the demand for immigrant workers (Markham, 2002, p. 32). In addition, the crisis particularly affected major railway companies that limited their operations during this period, constraining the transportation of workers in the United States (Johnson, 1908, p. 456). In sum, during the Panic of 1907 the recruiting of laborers with above-average physical productivity stopped and the *enganche* effect toward a positive selection disappeared.

To assess the effect of the *enganche* on selection patterns across periods, we expand Equation 2 as follows:

$$\begin{aligned} height_i = &\beta + \Phi_1 migrant_i + \Phi_2 migrant_i \times panic + \Phi_3 migrant_i \times panic^{post} \\ &+ \Phi_4 enganche_i + \mathbf{X}_i'\theta + \alpha_c + e_i. \end{aligned} \tag{4}$$

Where $enganche_i$ is the same indicator variable previously defined. Equation 4 controls for the *enganche* effect (Φ_4) and provides estimates of Φ_1, Φ_2 and Φ_3 for *non-enganche* immigrants. The estimated coefficient Φ_4 is the average difference in height between *enganche* and *non-enganche* immigrants in the pre-Panic and post-Panic, because the share of *enganche* immigrants was very small during the Panic.

Column 3–Panel B of Table 7 shows that immigrants were 0.7 centimeters taller than the military elite (rurales) in the pre-Panic period. When controlling for the *enganche* effect, we observe a less positive selection relative to the military elite (column 4–Panel B).[26] This effect accounts for 23% of the average difference in height between immigrants and rurales. A similar pattern is observed with the other comparison samples. Therefore, the *enganche* pushed toward a positive selection in the pre-Panic period. However, this effect is lost during the Panic of 1907. Column 4 of Table 7 shows that *non-enganche* immigrants became less positively selected: they were 0.8 centimeters shorter than their pre-Panic counterparts. This result reveals that the absence of the *enganche* effect in combination with unobserved forces influenced the less positive selection during the Panic. In addition, the estimated coefficient Φ_3 remains insignificant, implying that the *enganche* did not influence the selection of immigrants in the post-Panic period. While the share of *enganche* immigrants increased in the post-Panic period (from 1 to 13%), it was far from pre-Panic levels (36%). This suggests that labor recruiting resumed gradually and thus its influence was not significant in the short-run after the Panic.

[26] Using the estimated coefficient Φ_4 to approximate the selection pattern of *enganche* immigrants in each period would be inaccurate, because the share of *enganche* migrants varies across periods.

We also regress Equation 4 including state-of-birth fixed effects instead of region categories. Column 8-Panel B shows that the *enganche* effect remains strong and statistically significant. Although the estimates for the pre-Panic period are not statistically significant, the coefficients' size suggest that the *enganche* accounted for 46% of the average difference in height between immigrants and the military elite. The results also confirm that in the post-Panic period, *non-enganche* immigrants became more positively selected than their pre-Panic peers. In Annex C, we provide evidence suggesting that regional droughts in Mexico may have driven this shift toward a more positive selection.

7. Conclusion

Previous literature has been inconclusive about the short-term response of migrant selection to changes in the economic environment. In this paper, we use high-frequency data on Mexican immigration and the Panic of 1907—a severe financial crisis that affected unexpectedly the demand of immigrant workforce in the United States—to assess how quickly migrant selection adjusts to economic shocks. At the turn of the twentieth century, the United States maintained an open border policy, allowing the identification of selection adjustments unhindered by entry restrictions.

We find evidence suggesting that the first Mexican immigrants were drawn from the intermediate or upper ranks of the height distribution. In other words, Mexico sent relatively tall and physically productive laborers to the United States. This positive selection pattern changed significantly in response to the financial crisis, and the adjustment toward a negative selection occurred very quickly (in matter of months). We show that the short-run adjustments were influence by a historical labor-recruiting practice sufficiently involved in the immigration process and intertwined with the American business conditions. From a policy perspective, our results suggest that more open borders may allow the composition of immigration to adjust to short-run changes in the business cycle. Whether the speed of adjustment of migrant selection can reduce (increase) frictions in the labor markets remains an open question for future research.

We believe that short-run adjustments in migrant selection can have important implications. Changing selection can affect earnings of natives and existing immigrants in the destination, which in turn can modify internal migration patterns at the local level (Abramitzky et al., 2019). Short-run changes in the composition of arriving cohorts can also affect the assimilation process of the immigrant population (Massey, 2016). In the sending communities, short-run changes in the composition of migrants can affect

inequality across households through direct and indirect effects of remittances (Ibarraran & Lubotsky, 2007; McKenzie & Rapoport, 2007).

References

Abramitzky, R., Ager, P., Boustan, L. P., Cohen, E., & Hansen, C. W. (2019). The effects of immigration on the economy: Lessons from the 1920s border closure. *National Bureau of Economic Research Working Paper 26536*.

Abramitzky, R. & Boustan, L. (2017). Immigration in American Economic History. *Journal of Economic Literature*, *55*(4), 1311–45.

Abramitzky, R., Boustan, L. P., & Eriksson, K. (2013). Have the poor always been less likely to migrate? Evidence from inheritance practices during the age of mass migration. *Journal of Development Economics*, *102*, 2–14.

Ager, P., Eriksson, K., Hansen, C. W., & Lønstrup, L. (2020). How the 1906 san francisco earthquake shaped economic activity in the american west. *Explorations in Economic History*, 1013–1042.

Andrew, A. P. (1908). Substitutes for Cash in the Panic of 1907. *The Quarterly Journal of Economics*, *22*(4), 497–516.

Antecol, H., Cobb-Clark, D. A., & Trejo, S. J. (2003). Immigration policy and the skills of immigrants to Australia, Canada, and the United States. *Journal of Human Resources*, *38*(1), 192–218.

Barjau Martínez, L. (1976). Estadísticas Económicas del Siglo XIX. *Cuadernos de Trabajo del Departamento de Investigaciones Históricas – INAH*, (14), 19–21.

Bellettini, G. & Ceroni, C. B. (2007). Immigration Policy, Self-selection, and the Quality of Immigrants. *Review of International Economics*, *15*(5), 869–877.

Bianchi, M. (2013). Immigration Policy and Self-Selecting Migrants. *Journal of Public Economic Theory*, *15*(1), 1–23.

Bodenhorn, H., Guinnane, T. W., & Mroz, T. A. (2017). Sample-selection biases and the industrialization puzzle. *The Journal of Economic History*, *77*(1), 171–207.

Borjas, G. J. (1987). Self-Selection and the Earnings of Immigrants. *American Economic Review*, *77(4)*, 531–553.

Borrescio-Higa, F., Bozzoli, C. G., & Droller, F. (2019). Early life environment and adult height: The case of chile. *Economics & Human Biology*, *33*, 134–143.

Brass, T. (1990). The Latin American enganche system: Some revisionist reinterpretations revisited. *Slavery and Abolition*, *11*(1), 74–103.

Bruner, R. F. & Carr, S. D. (2007). Lessons from the financial crisis of 1907. *Journal of Applied Corporate Finance*, *19*(4), 115–124.

Cahill, K. J. (1998). The us bank panic of 1907 and the mexican depression of 1908–1909. *The Historian*, *60*(4), 795–811.

Campos-Vázquez, R. M. & Vélez-Grajales, R. (2012). Did Population well-being improve during Porfirian Mexico? A regional analysis using a quasi-human development index. *Journal of Human Development and Capabilities*, *13*(4), 597–620.

Cardoso, L. A. (1980). *Mexican emigration to the United States, 1897-1931*. Tucson: University of Arizona Press.

Case, A. & Paxson, C. (2008). Stature and status: Height, ability, and labor market outcomes. *Journal of Political Economy*, *116*(3), 499–532.

Chiquiar, D. & Hanson, G. H. (2005). International migration, self-selection, and the distribution of wages: Evidence from mexico and the united states. *Journal of political Economy*, *113*(2), 239–281.

Chiswick, B. (1999). Are immigrants favorably self-selected? *American Economic Review*, *89*(2), 181–185.

Clark, V. (1908). Mexican Labor in the US. *Bulletin of the United States Bureau of Labor*, *XVII*(78), 466–522.

Clemens, M. A., Lewis, E. G., & Postel, H. M. (2018). Immigration restrictions as active labor market policy: Evidence from the mexican bracero exclusion. *American Economic Review*, *108*(6), 1468–87.

Collins, W. J. & Zimran, A. (2019). The economic assimilation of irish famine migrants to the united states. *Explorations in Economic History*, *74*, 101302.

Connor, D. S. (2019). The cream of the crop? Geography, networks, and Irish migrant selection in the age of mass migration. *The Journal of Economic History*, *79*(1), 139–175.

Contreras, C. (2005). The droughts in mexico during the XIX century. *Investigaciones Geográficas*, (58), 118–133.

Deaton, A. (2007). Height, health, and development. *Proceedings of the National Academy of Sciences*, *104*(33), 13232–13237.

Durand, J. (2016). *Historia Mínima de la Migración México-Estados Unidos*. Mexico City: El Colégio de México.

Durand, J. & Arias, P. (2000). *La experiencia migrante: iconografía de la migración México-Estados Unidos*. Ucol.

El Colegio de México (1960). *Estadísticas Económicas de Porfiriato: Comercio Exterior de México, 1877-1911*.

Escamilla-Guerrero, D. (2020). Revisiting mexican migration in the age of mass migration: New evidence from individual border crossings. *Historical Methods: A Journal of Quantitative and Interdisciplinary History*, 1–19.

Feliciano, Z. M. (2001). The skill and economic performance of Mexican immigrants from 1910 to 1990. *Explorations in Economic History*, *38*(3), 386–409.

Fernandez-Huertas, J. (2011). New Evidence on Emigrant Selection. *The Review of Economics and Statistics*, *93*(1), 72–96.

Fogel, W. (1978). *Mexican illegal alien workers in the United States*. Los Angeles: Institute of Industrial Relations (UCLA).

Frydman, C., Hilt, E., & Zhou, L. Y. (2015). Economic effects of runs on early "shadow banks": Trust companies and the impact of the panic of 1907. *Journal of Political Economy*, *123*(4), 902–940.

Gamio, M. (1930). *Mexican immigration to the United States*. Chicago: University of Chicago Press.

Gómez-Galvarriato, A. (2009). The Political Economy of Protectionism. In *The Decline of Latin American Economies: Growth, Institutions, and Crises*. University of Chicago Press.

Goldin, C. (1994). The political economy of immigration restriction in the United States, 1890 to 1921. In *The regulated economy: A historical approach to political economy* (pp. 223–258). University of Chicago Press.

Gómez, M. (2011). Había una vez un sistema de bancos privados emisores de billetes. México, 1897-1910. *Historia Mexicana*, 2069–2109.

Gratton, B. & Merchant, E. (2015). An Immigrant's Tale: The Mexican American Southwest 1850 to 1950. *Social Sciences History*, (39), 521–50.

Greenwood, M. J. & Ward, Z. (2015). Immigration quotas, World War I, and emigrant flows from the United States in the early 20th century. *Explorations in Economic History*, *55*, 76–96.

Hansen, B. A. (2014). A failure of regulation? Reinterpreting the panic of 1907. *Business History Review*, *88*(3), 545–569.

Hatton, T. J. & Williamson, J. G. (1998). *The Age of Mass Migration: Causes and Economic Impact*. New York: Oxford University Press.

Ibarraran, P. & Lubotsky, D. (2007). Mexican immigration and self-selection: New evidence from the 2000 Mexican census. In *Mexican immigration to the United States* (pp. 159–192).

Johnson, J. F. (1908). The crisis and panic of 1907. *Political Science Quarterly*, *23*(3), 454–467.

Juif, D. & Quiroga, G. (2019). Do you have to be tall and educated to be a migrant? Evidence from Spanish recruitment records, 1890–1950. *Economics & Human Biology*, *34*, 115–124.

Komlos, J. & A'Hearn, B. (2019). Clarifications of a Puzzle: The Decline in Nutritional Status at the Onset of Modern Economic Growth in the United States. *The Journal of Economic History*, *79*(4), 1129–1153.

Komlos, J. & Baten, J. (2004). Looking Backward and Looking Forward: Anthropometric Research and the Development of Social Science History. *Social Science History*, *28*(2), 191–210.

Komlos, J. & Meermann, L. (2007). The introduction of anthropometrics into development and economics. *Historical Social Research/Historische Sozialforschung*, 260–270.

Kosack, E. & Ward, Z. (2014). Who Crossed the Border? Self-Selection of Mexican Migrants in the Early Twentieth Century. *The Journal of Economic History*, *74*(4), 1015–1044.

Lindert, P. H. & Williamson, J. G. (2016). *Unequal gains: American growth and inequality since 1700*. Princeton University Press.

López-Alonso, M. (2007). Growth with inequality: Living standards in Mexico, 1850–1950. *Journal of Latin American Studies*, *39*(1), 81–105.

López-Alonso, M. (2015). *Estar a la altura. Una historia de los niveles de vida en Mexico, 1850-1950*. Mexico City: Fondo de Cultura Económica.

López-Alonso, M. & Condey, R. P. (2003). The ups and downs of Mexican economic growth: the biological standard of living and inequality, 1870–1950. *Economics and Human Biology*, *1*(2), 169–186.

Maddison, A. (1987). Growth and slowdown in advanced capitalist economies: techniques of quantitative assessment. *Journal of Economic Literature*, *25*(2), 649–698.

Markham, J. W. (2002). The Panic of 1907. In *A financial history of the United States*, volume II: From JP Morgan to the Institutional Investor (1900-1970) (pp. 29–41). Sharpe.

Massey, C. G. (2016). Immigration quotas and immigrant selection. *Explorations in Economic History*, *60*, 21–40.

Massey, D. S. & Pren, K. A. (2012). Unintended consequences of US immigration policy: Explaining the post-1965 surge from Latin America. *Population and Development Review*, *38*(1), 1–29.

Mayda, A. M., Ortega, F., Peri, G., Shih, K., & Sparber, C. (2018). The effect of the H-1B quota on the employment and selection of foreign-born labor. *European Economic Review*, *108*, 105–128.

Mayet, E. F., y Cervera, J. S., & Arias, D. P. G. (1980). Las sequías en México: historia, características y efectos. *Comercio Exterior*, *30*(7), 756.

McKenzie, D. & Rapoport, H. (2007). Network effects and the dynamics of migration and inequality: theory and evidence from Mexico. *Journal of Development Economics*, *84*(1), 1–24.

McKenzie, D. & Rapoport, H. (2010). Self-selection patterns in Mexico-US migration: the role of migration networks. *The Review of Economics and Statistics*, *92*(4), 811–821.

Moatsos, M., Baten, J., Foldvari, P., van Leeuwen, B., & van Zanden, J. L. (2014). Income inequality since 1820. In *How was life? Global well-being since 1820* (pp. 291–316). OECD.

Moen, J. & Tallman, E. W. (1992). The bank panic of 1907: the role of trust companies. *The Journal of Economic History*, *52*(3), 611–630.

Monras, J. (2020). Immigration and wage dynamics: Evidence from the mexican peso crisis. *Journal of Political Economy*, *128*(8), 3017–3089.

Nelson, R. R. & Wright, G. (1992). The rise and fall of american technological leadership: the postwar era in historical perspective. *Journal of Economic Literature*, *30*(4), 1931–1964.

Noyes, A. D. (1909). A year after the panic of 1907. *The Quarterly Journal of Economics*, *23*(2), 185–212.

Odell, K. A. & Weidenmier, M. D. (2004). Real shock, monetary aftershock: The 1906 San Francisco earthquake and the panic of 1907. *The Journal of Economic History*, *64*(4), 1002–1027.

Ogórek, B. (2019). Talented but lazy. The height-school premium among Cracow's schoolboys in the interwar period. *Economics & Human Biology*, *34*, 252–256.

Orrenius, P. M. & Zavodny, M. (2005). Self-selection among undocumented immigrants from Mexico. *Journal of Development Economics*, *78*(1), 215–240.

Robles, G. (1960). El desarrollo industrial. In *México, 50 años de revolución* (pp. 197). Fondo de Cultura Económica.

Rosenzweig, F. (1965). El Desarrollo Económico de México de 1877 a 1911. *El Trimestre Económico*, *32*(127(3)), 405–454.

Roy, A. D. (1951). Some thoughts on the distribution of earnings. *Oxford economic papers*, *3*(2), 135–146.

Samora, J. (1982). *Los mojados: The wetback story*. Notre Dame: University of Notre Dame Press.

Schneider, E. B. & Ogasawara, K. (2018). Disease and child growth in industrialising Japan: critical windows and the growth pattern, 1917-39. *Explorations in Economic History*, *69*, 64–80.

Schultz, T. P. (2002). Wage gains associated with height as a form of health human capital. *American Economic Review*, *92*(2), 349–353.

Spitzer, Y., Tortorici, G., & Zimran, A. (2020). International migration responses to natural disasters: Evidence from modern europe's deadliest earthquake. *National Bureau of Economic Research Working Paper 27506*.

Spitzer, Y. & Zimran, A. (2018). Migrant self-selection: Anthropometric evidence from the mass migration of Italians to the United States, 1907–1925. *Journal of Development Economics*, *134*, 226–247.

Stahle, D. W., Cook, E. R., Burnette, D. J., Villanueva, J., Cerano, J., Burns, J. N., Griffin, D., Cook, B. I., Acuna, R., Torbenson, M. C., et al. (2016). The Mexican Drought Atlas: Tree-ring reconstructions of the soil moisture balance during the late pre-Hispanic, colonial, and modern eras. *Quaternary Science Reviews*, *149*, 34–60.

Steckel, R. H. (1995). Stature and the Standard of Living. *Journal of Economic Literature*, *33*(4), 1903.

The Wall Street Journal (1910). Financial wisdom in mexico. *Jan 13*, 1.

The Washington Post (1907). Stocks thrown over. *Aug 13*, 3.

Timmer, A. S. & Williamson, J. G. (1998). Immigration policy prior to the 1930s: Labor markets, policy interactions, and globalization backlash. *Population and Development Review*, *24*(4), 739–742.

Villarreal, A. (2014). Explaining the decline in mexico-us migration: The effect of the great recession. *Demography*, *51*(6), 2203–2228.

Ward, Z. (2017). Birds of passage: Return migration, self-selection and immigration quotas. *Explorations in Economic History*, *64*, 37–52.

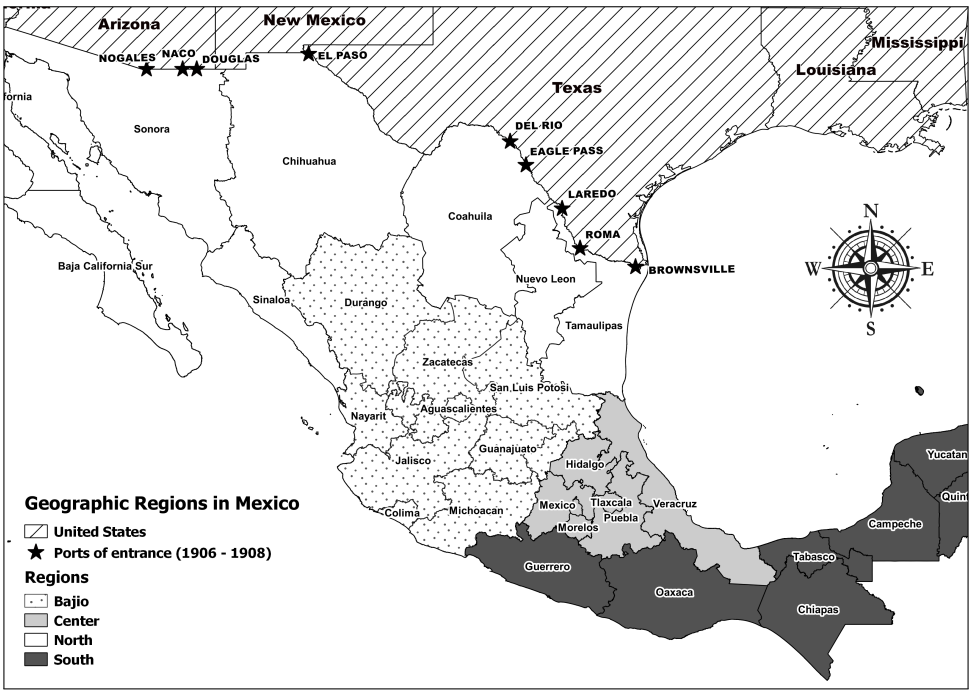
Wells, N., Goddard, S., & Hayes, M. J. (2004). A self-calibrating Palmer drought severity index. *Journal of Climate*, *17*(12), 2335–2351.

Woodruff, C. & Zenteno, R. (2007). Migration networks and microenterprises in Mexico. *Journal of Development Economics*, *82*(2), 509–528.

Wright, G. (1990). The origins of american industrial success, 1879-1940. *The American Economic Review*, 651–668.

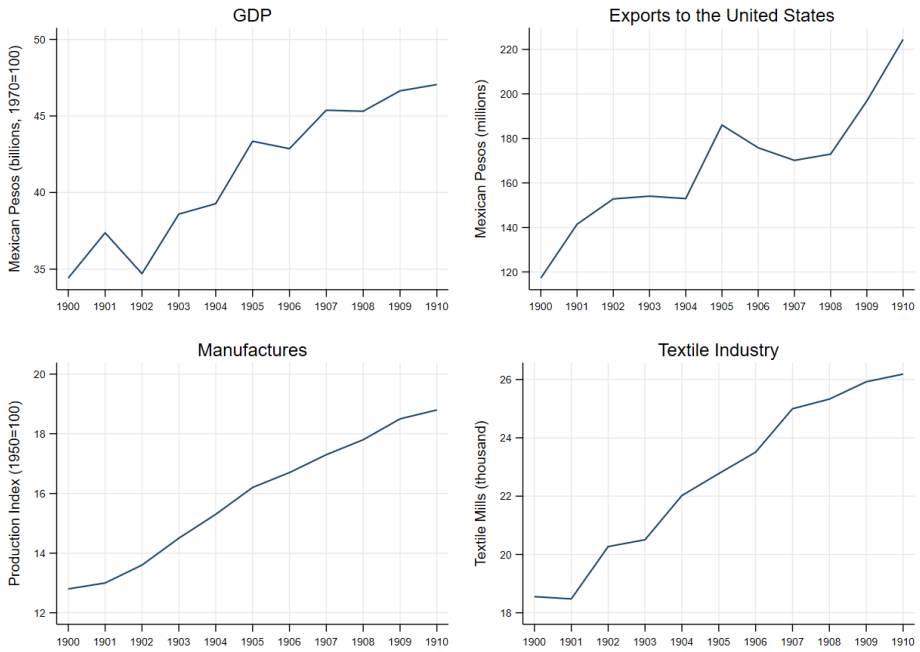
Annex A

Figure A.1: Mexican Regions and Entrance Ports (1906–08)



Notes: We classify the regions of birth following López-Alonso (2015, p. 127).

Figure A.2: Mexican Economy during the Panic of 1907



Sources: GDP, Banco de México; Exports, El Colegio de México (1960); Textile industry, Barjau Martínez (1976); Manufactures, Robles (1960). The US financial crisis of 1907 did not affect the production of manufactures nor the expansion of the textile industry—both are usually used to illustrate the economic growth and modernization of Mexico from 1890 to 1910 (Gómez-Galvarriato, 2009). The crisis depressed regional trade in 1907, but exports to the United States began to recover from 1908. In addition, there is no evidence of mass unemployment nor bankrupt companies in Mexico during or after the Panic of 1907.

Annex B

Identification of the Enganche

To identify the *enganche*, we quantify the number of migrants (i) by port of entrance (p), year-month of crossing (t), municipality of origin (o), and county of destination (d):

$$w_{ptod} = \sum i_{ptod}. \tag{5}$$

We standardize the size of each migration flow (w_{ptod}) using the mean (μ_{pdo}) and standard deviation (σ_{pdo}) of the corridor (w_{pdo}) to which the flow belongs:

$$z_{ptod} = (w_{ptod} - \mu_{pdo}) / \sigma_{pdo}. \tag{6}$$

The *z-scores* (z_{ptod}) allow us to identify unusual monthly crossing peaks in each migration corridor. Following Clark (1908) and Durand (2016), American recruiters commonly hired between 30 and 400 migrants depending on the nature of the jobs and season of the year. Therefore, we identified the *enganche* flows with the following criteria:

$$enganche_{ptod} = \begin{cases} 1 & \text{if } w_{ptod} \geq 30 \text{ and } z_{ptod} \geq 1 \\ 0 & \text{if } otherwise. \end{cases} \tag{7}$$

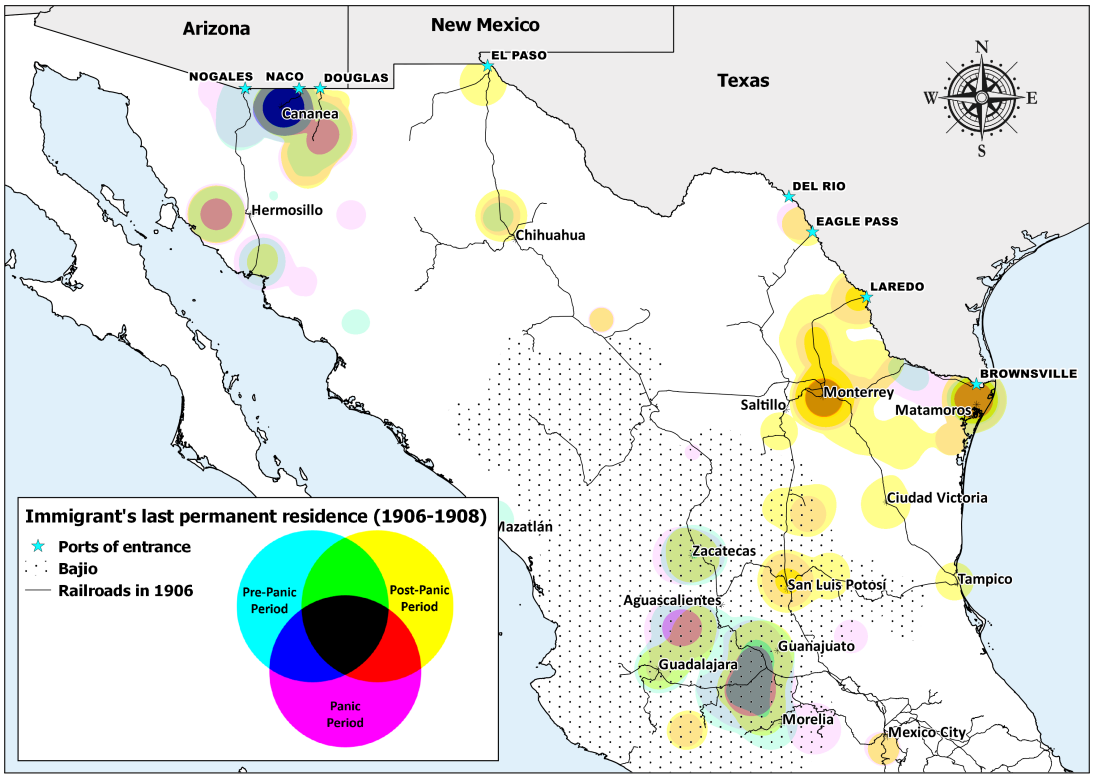
We identify flows of at least 30 migrants registered at the same port of entrance, in the same specific month, reporting the same origin (Mexican municipality) and destination (US county) locations; and which size was at least one standard deviation above the average size of the flows in each migration corridor. Finally, we match the identified *enganche* flows with the final migrant sample: all individuals belonging to an *enganche* flow are considered *enganche* migrants.

Annex C

Shocks from the supply side: droughts in Mexico

Results in Table 7 show that the selection of Mexican immigration changed after the Panic of 1907, and that this shift arose from unobserved factors across states. The forces explaining why immigrants became more positively selected in the post-Panic period could come from the demand or supply side. On the one hand, as a result of the shock, the post-Panic labor demand in the United States could have changed and thus the required immigrant profile. On the other hand, factors in Mexico might have pushed taller individuals to emigrate during the post-Panic period. We explore the latter scenario looking at climate shocks that might have influenced migrant selection after the Panic of 1907. Contreras (2005, p. 123), Clark (1908, p. 473), and Mayet et al. (1980, p. 757) document that the states of Chihuahua, Nuevo León, Quéretaro, San Luis Potosí and Zacatecas experienced droughts in 1907 and 1908, causing important crop losses in some areas (Cardoso, 1980, p. 12). Moreover, Figure C.1 shows that immigrants came disproportionately from these states during the post-Panic period.

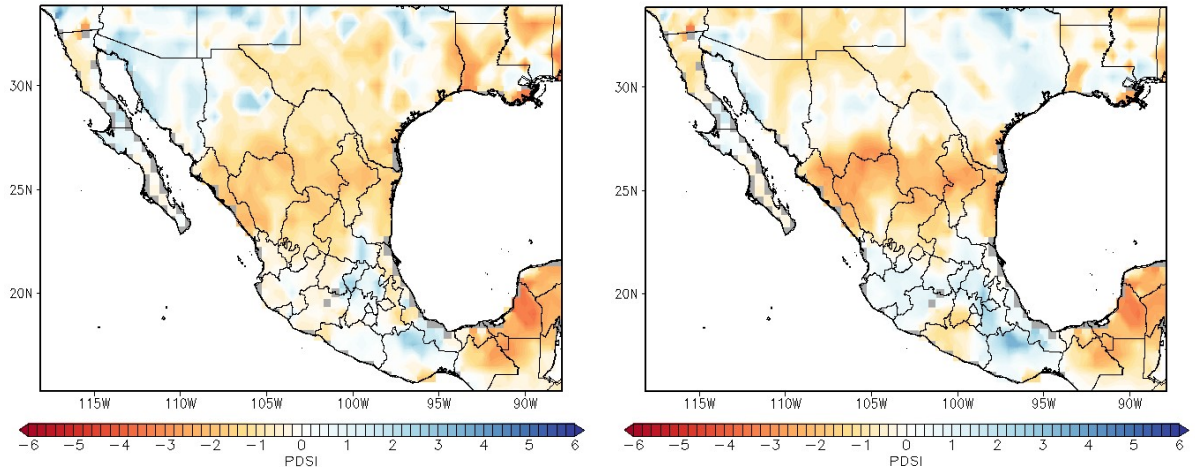
Figure C.1: Spatial distribution of the immigrant sample



Source: Mexican Border Crossing Records–Microfilm publication N° A3365.
Note: We consider individuals that had reached their terminal height: individuals between 22 and 65 years old. Pre-Panic (Oct 1906 - Jul 1907), Panic (Aug 1907 - Jan 1908) and Post-Panic (Feb 1908 - Dec 1908).

We identify the presence of droughts at the municipality level using the Mexican Drought Atlas (Stahle et al., 2016). It provides reconstructions of a self-calibrating Palmer Drought Severity Index (PDSI) on a 0.5° latitude/longitude grid centered over Mexico from AD 1400-2012. We consider that a municipality experienced droughts if the estimated PDSI was -2.0 or lower. According to Wells et al. (2004), these values represent moderate to severe droughts.[27] Figure C.2 shows that droughts affected specific states within regions: the northern Bajio, the eastern states of the North region and the Yucatan peninsula. The PDSI estimates confirm the presence of droughts in the states mentioned by the historical literature except for Queretaro.[28] The PDSI also captures that municipalities of Coahuila, Durango, Sinaloa and Tamaulipas were affected by these climate shocks. Precisely, the municipality level estimates allows us to identify droughts accurately within regions.

Figure C.2: Droughts in Mexico (1907–08) based on the PDSI



(a) Jan - Dec 1907 *(b) Jan - Dec 1908*

Source: Stahle et al. (2016). Note: The Palmer Drought Severity Index (PDSI) uses temperature and precipitation data to estimate relative dryness. It is a standardized index that spans from -6 (dry) to +6 (wet). However, values below -2.0 represent moderate droughts while values above +2.0 represent moderate wet spells. The panel shows the presence of regional droughts in 1907 and continues in 1908. The average drought severity index (at the state level) in 1908 was -2.7 (Chihuahua), -2.3 (Coahuila), -2.4 (Durango), -2.4 (Nuevo León), 1.4 (Queretaro), -0.9 (San Luis Potosi), -2.3 (Sinaloa), -2.2 (Tamaulipas), -0.8 (Zacatecas).

To test if droughts influenced the selection into migration, we expand Equation 2 as follows:

$$\begin{aligned} height_i =& \beta + \Phi_1 migrant_i + \Phi_2 migrant_i \times panic + \Phi_3 migrant_i \times panic^{post} \\ &+ \Phi_4 migrant_i \times panic^{post} \times drought + \Phi_5 enganche_i + \mathbf{X}_i'\theta \\ &+ \alpha_c + \gamma_s + e_i. \end{aligned} \tag{8}$$

[27] The Palmer Drought Severity Index (PDSI) uses temperature and precipitation data to estimate relative dryness. It is a standardized index that spans from -6 (dry) to +6 (wet). However, values below -4.0 represent extreme droughts while values above +4.0 represent extreme wet spells (Wells et al., 2004).

[28] The municipalities belonging to the states of San Luis Potosi and Zacatecas present PDSI estimates close to our threshold, and thus we considered them as municipalities that experienced droughts. However, the municipalities of Queretaro present a positive estimates (1.4), which imply the presence of mild wet spells.

Where *drought* is a dummy variable that takes the value of 1 if the migrant's location of last residence (municipality) experienced droughts (PDSI values of -2.0 or lower) and zero otherwise. Since the *enganche* was restored after the Panic, we include an indicator variable for immigrants that crossed the border through this labor institution ($enganche_i$). Equation 8 includes state-of-birth fixed effects (γ_s) instead of region of birth categories, because droughts did not affect states homogeneously. Moreover, large states were partially affected, thus we want to capture the effect of droughts on local selection into migration. Everything else equal, the estimated selection pattern in the locations experiencing droughts during the post-Panic period is $\Phi_1 + \Phi_3 + \Phi_4$.

Table C.1 shows that immigrants from municipalities experiencing droughts were taller (at least 0.7 cm) than their counterparts from non-drought municipalities (estimated coefficient Φ_4): they were more positively selected relative to the comparison samples. We can see that post-Panic migrants were 0.8 cm taller than their pre-Panic peers (column 1), but when controlling for the droughts effect the coefficient size reduces (column 2). In other words, the presence of droughts accounts for 28% of the differences in height between pre-Panic and post-Panic migrants. Additionally, we control for the *enganche* effect to obtain the net effect: droughts accounted for 15% of the stronger positive selection observed after the Panic of 1907. The same pattern holds relative to the passport holders, however the estimates are not statistically significant, potentially due to sample size constraints.

Table C.1: Impact of droughts on self-selection patterns.
Dependent variable: height (centimeters)

	1	2	3	4	5	6
	Rurales	Rurales	Rurales	Passports	Passports	Passports
Migrant	0.412	0.409	0.224	-2.204	-2.212	-2.382
	(0.213)	(0.213)	(0.234)	(0.524)	(0.523)	(0.528)
Migrant × Panic	-0.644	-0.627	-0.465	-0.675	-0.656	-0.475
	(0.291)	(0.291)	(0.302)	(0.290)	(0.290)	(0.300)
Migrant × Post-Panic	0.870	0.620	0.736	0.622	0.396	0.524
	(0.279)	(0.314)	(0.321)	(0.291)	(0.321)	(0.327)
Migrant × Post-Panic × Drought		0.826	0.789		0.785	0.736
		(0.410)	(0.412)		(0.420)	(0.422)
Enganche			0.492			0.574
			(0.248)			(0.252)
Observations	8,860	8,860	8,860	4,901	4,901	4,901
R-squared	0.065	0.066	0.066	0.079	0.080	0.081
Skill level categories	Yes	Yes	Yes	Yes	Yes	Yes
Region of birth categories	No	No	No	No	No	No
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes
Birth state FE	Yes	Yes	Yes	Yes	Yes	Yes

Source: Mexican Border Crossing Records–Microfilm publication N° A3365 and López-Alonso (2015). Notes: Robust standard errors in parenthesis. The omitted categories are unskilled workers and locations without droughts.

Since droughts impact homogeneously the population of an affected location, it is likely that individuals relatively taller than pre-Panic immigrants were pushed to emigrate during the post-Panic due to poor harvests. Hence, the observed positive selection might be a result of two overlapping forces: the reactivation of the American financial system and the presence of regional droughts in Mexico.