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BIRTH RATES AND BORDER CROSSINGS: LATIN AMERICAN MIGRATION TO THE US, CANADA, SPAIN, AND THE UK

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ABSTRACT

We use census data for the US, Canada, Spain, and UK to estimate bilateral migration rates to these countries from 25 Latin American and Caribbean nations over the period 1980 to 2005. Latin American migration to the US is responsive to labor supply shocks, as predicted by earlier changes in birth cohort sizes, and labor demand shocks associated with balance of payments crises and natural disasters. Latin American migration to Canada, Spain, and the UK, in contrast, is largely insensitive to these shocks, responding only to civil and military conflict. The results are consistent with US immigration policy toward Latin America (which is relatively permissive toward illegal entry) being mediated by market forces and immigration policy in the other countries (which favor skilled workers and asylum seekers, among other groups) insulating them from labor market shocks in the region.

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Puerto Rico . . .
Always the hurricanes blowing,
Always the population growing.
And the babies crying,
And the bullets flying.
I like to be in America!

Stephen Sondheim, *Westside Story*

1 INTRODUCTION

Latin America and the Caribbean have among the highest emigration rates in the developing world. In 2000, 3.8% of the region's population was living in high-income countries in North America, Europe, or Asia, compared with emigration rates of 3.0% in the Middle East and North Africa, 2.5% in Eastern Europe and Central Asia, 0.7% in Asia and the Pacific, and 0.6% in Sub-Saharan Africa (see Table 1).[1] While Mexican migration to the US captures most of the attention, it is by no means the only significant flow in the region. There are also sizable flows from the Dominican Republic, El Salvador, and Haiti to the US; Barbados, Jamaica, and Trinidad and Tobago to Canada and the UK; and Bolivia, Colombia, and Ecuador to Spain (Fajnzylber and Lopez, 2008).

In this paper, we examine the contribution of demographic changes, geographic distance, and economic and political shocks in driving emigration from Latin America and the Caribbean. What makes the region an interesting case is not just the scale of emigration, but also its concentration. As of 2000, just four countries – the US, Canada, the UK, and Spain – were host to 75.4% of the region's emigrants (see Table 2). The concentration of migration flows to proximate high-income countries (the US) and countries with a shared colonial heritage (Canada, the UK, Spain) helpfully simplifies

[1] All rates are for emigration from developing countries in a particular region to high-income countries. Among developing-country regions, *total* emigration rates are highest in Eastern Europe and Central Asia (as seen in Table 1), largely because of the exodus of individuals (including ethnic Russians) from Former Soviet Union countries to Russia following the breakup of the Soviet Union.

both the measurement and analysis of international labor movements.[2]

Among the four main destination countries, there are sharp differences in how immigration policy treats prospective entrants with regards to skill, refugee status, and country of origin. These differences are important in light of the low skill levels of most Latin American emigrants, the propensity of the region for civil and military conflict, and the variation in countries' colonial history. In the US, nearly half of immigration from Latin America is undocumented, with government enforcement only partially impeding the inflow of illegal migrants (Hanson, 2006).[3] Permissiveness toward illegal entry creates ample opportunity for low skilled immigration. Canada's remoteness keeps most of its immigration legal.[4] The country uses a point system to regulate labor inflows, which heavily favors skilled applicants, while also allotting slots to refugees and asylees. In 2000, visas to skilled workers accounted for 58% of legal immigrant inflows in Canada, compared with 13% in the US (OECD, 2004). Outside of EU members, the UK restricts immigration, with exceptions for skilled workers, family members of UK citizens, certain Commonwealth citizens, and asylum seekers. The country also has low levels of illegal immigration compared to the US.[5] In Spain, large scale immigration is a recent phenomenon. Agreements with former colonies have enabled individuals from these countries to enter Spain, with many ultimately obtaining work permits.[6]

Surging emigration from Latin America is due in part to the high frequency of

[2] Current and former French and Dutch territories in Latin America and the Caribbean (French Guiana, Guadalupe, Martinique, Netherlands Antilles, and Suriname) have high emigration rates to France and the Netherlands, but are too small to obtain age-specific emigration rates, as is necessary for our analysis.
[3] Throughout the paper we use Latin America to refer to Latin America and the Caribbean.
[4] In 2002, for instance, Canada apprehended 9,500 illegal immigrants, compared to over 1 million in the US (OECD, 2004).
[5] In 2001, the UK found and removed 45,000 illegal immigrants from within its borders (OECD, 2004).
[6] As distinct from the US, Spain has frequently regularized illegal immigrants in the country, facilitating their access to work permits (Dolado and Velasquez, 2007).

negative wage shocks in the region. Over the last three decades, much of Latin America has experienced a demographic bulge, with large numbers of young people coming of working age and entering the labor force (Birdsall, Kelley, and Sinding, 2001). One would expect this increase in the region's relative labor supply to have put downward pressure on local wages and raised the incentive to emigrate. In some Latin American countries, birth rates have begun to drop sharply (Bongaarts and Watkins, 1996), but in others they are declining only slowly. While fertility rates in Mexico are on track to drop below replacement level by 2020 (Tuiran et al., 2002), they remain high in much of Central America and the Andes. Cross-national differences in fertility are useful empirically for isolating the effects of labor supply on emigration.

Macroeconomic instability associated with balance of payments crises, civil and military conflict, and natural disasters are other factors reducing wages and contributing to emigration from Latin America. While there is extensive literature on how such shocks have affected the region's growth performance (e.g., Collier et al., 2003; Raddatz, 2007; Edwards, 2008), much less work examines their importance for labor movements in the hemisphere. Our approach is to estimate how labor supply and demand shocks at the time a cohort enters the labor market affect initial and subsequent emigration. Since individuals are most mobile when they are young, shocks at the time of labor market entry may have long lasting effects on migration. Much of the work on the relationship between income and international migration considers the contemporaneous correlation between living standards and labor flows.[7] By identifying how shocks to young cohorts affect migration over the mobile period of their working lives, we provide a dynamic

[7] See, e.g., Clark, Hatton, and Williamson (2007), Mayda (2009), and Ortega and Peri (2009), and Hanson (2009) for a review of recent literature.

account of how events in origin countries affect international migration. Linking changes in labor supply to particular birth cohorts requires that we aggregate across skill levels (in order to successfully track origin country cohorts across both time and national borders), preventing us from accounting for migrant self-selection, the subject of much recent literature (see, e.g., Hanson, 2010). The payoff is that we are able to examine international migration over several decades and exploit sizable cross-country variation in how the demographic transition to lower fertility affects subsequent labor supply growth.

Related literature includes Hanson and McIntosh (2010), who find that variation in labor supply across Mexican regions accounts for nearly a third of regional variation in Mexican emigration rates, and Clark, Hatton, and Williamson (2007), who find that countries with larger populations of young people have higher rates of legal migration to the US. Because both papers examine a single destination – the United States – they are silent on how variation in receiving country immigration policy affects the sensitivity of migration to events in sending countries, a feature that is central to our analysis. Mayda (2009) and Ortega and Peri (2009) find that tightening immigration policy reduces bilateral migration flows. Still unknown is how immigration policy affects the responsiveness of migration flows to different types of shocks.

To preview our results, we find that migration rates to the US are more sensitive to fluctuations in relative birth cohort size (i.e., to labor supply shocks), but less sensitive to origin-country civil conflict than is migration to the other destinations. The raw effect of distance as well as its interaction with birth cohort size is most pronounced in migration to the US. The findings suggest that migration from Latin America to the United States is responsive to labor market shocks that affect origin country relative wages. The responsiveness and distance dependence of US labor inflows to economic shocks in Latin America reflects the importance of illegal labor movements in regional migration to the US, as these flows are largely mediated by market mechanisms.

The results for migration to Canada, the UK, and Spain are quite different, with migration rates to the countries being uncorrelated with origin country labor supply. Further, origin country balance of payments crises and natural disasters are associated with *lower* migration to Canada, the UK, and Spain. The one origin country shock that is associated with higher migration to these countries is civil and military unrest, which may facilitate applications for asylum. The results suggest that given the preference of Canada and the UK for skilled workers and asylum seekers, shocks whose only effect is to put downward pressure on origin country wages do little to increase Latin American migration to these destinations. Indeed, given that negative wage shocks may make it harder for individuals in Latin America to acquire skills (as would be the case if the financing of education is budget constrained), it is not surprising that they tend to reduce migration to countries that favor skilled workers.

In section 2, we present a simple dynamic model of migration from a given origin country to multiple destinations. In section 3, we describe data on labor supply, migration rates, economic and political shocks, and other variables. In section 4, we present the empirical results. And in section 5, we offer concluding remarks.

2 THEORY

To understand emigration from Latin America, we construct a model of national labor markets that are linked by migration. In each economy, there is one sector of production. Workers from Latin America are differentiated by age but are not otherwise distinguished by their skill.[8] We allow for costs in labor mobility, following models of internal migration in Blanchard and Katz (1992) and Borjas (2006).

In the origin country, the national wage for age group *i* at time *t* is given by,

$$(1) \qquad W_{it} = X_{it}(L_{it})^{\eta},$$

where W_{it} is the wage, X_{it} is a labor-demand shifter, L_{it} is the population of working-age adults in the country, and $\eta \leq 0$ is the inverse labor-demand elasticity. The supply of labor in the origin country is the population of group *i* that has not emigrated, such that

$$(2) \qquad L_{it} = L_{i0} - M_{it}$$

where L_{i0} is the pre-emigration population of group *i* and M_{it} is the number of individuals in *i* that have left the country by period *t*. Putting (1) and (2) together,

$$(3) \qquad \ln W_{it} = \ln X_{it} + \eta \ln L_{i0} - \eta m_{it},$$

where $m_{it}=M_{it}/L_{i0}$ is the fraction of group *i* that has moved abroad.[9] In equation (1), we treat wages as though they are a function of labor supply in a single age cohort. In the empirical estimation, we also account for the size of neighboring age cohorts.

An individual in the origin country has the option of staying at home or moving to one of two possible destinations, country *A* or country *B*. In the year birth cohort *i* first enters the labor market, the wage in country *c* is given by,

$$(4) \qquad W^{c}_{i0} = X^{c}_{i0}(L^{c}_{i0})^{\eta},$$

where X^{c}_{i0} is a labor-demand shifter, L^{c}_{i0} is initial labor supply, and η is the inverse labor-demand elasticity. In later periods, we assume the wage in country *c* is determined by initial labor supply and subsequent innovations to labor demand, imposing the restriction

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[8] We ignore other aspects of skill because in order to measure net migration by age in Latin America we need to track populations by characteristics which are invariant to time.

[9] In (3), we utilize the approximation that, for small values of X/Y, $\ln(X+Y) \approx \ln X + Y/X$.

that the impact of immigration on the destination country's wage is negligible. It is straightforward to extend the model to allow for adjustment in destination-country wages; we suppress such adjustment solely to simplify the exposition.[10]

To allow for costs in the mobility of labor between countries, we assume that migration from the origin country to destination-country *c* in any period *t* is an increasing function of the lagged difference in wages between the two countries:

$$v_{it}^c = \sigma^c \left(\ln W_{i,t-1}^c - \ln W_{i,t-1} - F^c \right), \tag{5}$$

where $v_{it}^c = \Delta M_{it}^c / L_{i0}$ is the net emigration rate to country *c* for group *i* at *t*, $\sigma^c \in [0,1]$ is the supply elasticity (specific to the destination country), and F^c is a wage discount that origin country nationals associate with living in country *c*. As long as σ^c is sufficiently small, it will take multiple periods before migration succeeds in raising the origin country wage to destination country levels.[11] In the empirical analysis, we will allow the magnitude of the labor supply elasticity, σ^c, to depend on origin and destination country characteristics, including distance and number of countries crossed, as a means of capturing how immigration policy in or migration costs to the destination may affect the responsiveness of bilateral migration to labor market shocks.

To solve the model, define the pre-migration effective wage differential between the origin country and destination *c* as,

$$\omega_{i0}^c = \ln W_{i0}^c - \ln W_{i0} - F^c = \eta \ln \ell_{i0}^c + \ln x_{i0}^c - F^c. \tag{6}$$

where $\ln \ell_{i0}^c = \ln L_{i0}^c - \ln L_{i0}$ is initial log relative labor supply and $\ln x_{i0}^c = \ln X_{i0}^c - \ln X_{i0}$ is

[10] Allowing for destination-country wage adjustment changes the magnitude of the reduced-form parameters in the emigration equation but does not change their sign. See Hanson and McIntosh (2010).

[11] For a zero migration disamenity, the condition that migration does not cause wage equalization in one period is that, $\ln W_{i1} = \ln W_{i0} - \eta\sigma^c \left(\ln W_{i0}^c - \ln W_{i0} \right) < \ln W_{i0}^c \Leftrightarrow 0 < 1 + \eta\sigma^c$, which we assume holds.

initial log relative labor demand. The pre-migration wage difference is increasing in the origin country's relative labor supply (since $\eta < 0$) and decreasing in the origin country's relative labor demand.[12] Using (3), (5), and (6), we solve for the $t = 0$ emigration rate, and then iterate forward, solving for the wage and emigration rate in each period. In an appendix, we show that after dropping higher order terms (i.e., those that involve a minimum of four-way interactions between the model parameters, all of which are individually less than one in value) and using the approximation that $(1+x)^t \approx 1+tx$, the net migration rate from the origin country to country A at time t can be written as,

(7) $$v_{it}^{A} = \sigma^{A}\omega_{i0}^{A}\left[1+\eta\sigma^{A}\left(t-1\right)\right]+\eta\sigma^{A}\sigma^{B}\omega_{i0}^{B}\left(t-1\right).$$

Plugging in the determinants of the initial wage differential in (6), we obtain,

(8) $$\begin{aligned} v_{it}^{A} = {} & ln\ell_{i0}^{A}[\theta^{A}+(\theta^{A})^2(t-1)]+[lnx_{i0}^{A}-F^{A}][\sigma^{A}+\sigma^{A}\theta^{A}(t-1)] \\ & +ln\ell_{i0}^{B}\theta^{B}\theta^{A}(t-1)+[lnx_{i0}^{B}-F^{B}]\sigma^{B}\theta^{A}(t-1) \end{aligned}$$

where $\theta^{c} = \eta\sigma^{c} < 0$. Equation (8) shows the key predictions of the theoretical framework: emigration to country A is decreasing (increasing) in the relative size of country A's initial labor supply (demand) and increasing (decreasing) in the initial relative labor supply (demand) of country B, where the effects of initial conditions diminish as a cohort ages, owing to adjustment in wages in the origin country. Since the dynamic wage adjustment terms (i.e., those that involve t) depend on the square of labor supply and labor demand elasticities, their effect on attenuating the impact of initial labor market conditions may be small (which empirical results will confirm). Similarly, since the effect of labor market conditions in country B on migration to country A depends on

[12] Here, we assume that labor demand is constant over time such that $X_{it}=X_{i0}$ and $X^{*}_{it}=X^{*}_{i0}$. It is easy to generalize the model to allow for time-varying labor demand shocks, as in Hanson and McIntosh (2010)

the three-way product of labor demand and supply elasticities, it may also be small (which empirical results will also confirm).

It is apparent in equation (8) that to examine the evolution of migration for a given birth cohort we need to be able to track cohorts over time, preventing us from accounting for time varying characteristics of individuals, such as education. Also apparent is that equation (8) is missing the effects of past innovations to labor demand in the source and destination countries on current migration flows. Allowing innovations to labor demand to affect wages introduces into (8) a series of distributed lag terms in these innovations (see note 12). In the estimation, we allow for such effects by including measures of labor market shocks that occurred between the time a cohort comes of working age and the current period.

Equation (8) is the basis for the empirical estimation. For individual birth cohorts in Latin American and Caribbean origin countries, we examine the correlation between the decadal migration rate to a specific destination country and initial relative labor supply, initial relative labor demand, and subsequent innovations to labor demand. Consistent with theory, we allow the responsiveness of migration to labor-market shocks to vary across destination countries. By pooling data across cohorts, origins, destinations, and time, we are able to include a rich set of fixed effects in the estimation to control for unobserved shocks to migration. The fixed effects also help absorb variation in migration disamenities and migration policy across countries.

3 DATA

The data we require for the estimation include measures of migration rates for pairs of origin and destination countries, labor supply by birth cohort and country, and measures of economic shocks for origin and destination countries.

3.1 Bilateral migration rates

To calculate bilateral migration rates we use the number of immigrants by age and origin country in each destination county's census count, and the size of the relevant birth cohorts in the origin country, as measured by the World Development Indicators. The bilateral net migration rate for a given birth cohort and origin-destination pair is then the change in the stock of immigrants in that cohort from a particular origin country in a particular destination, divided by the size of the original birth cohort in the origin. In all regressions, the dependent variable is the annualized bilateral net migration rate for a birth cohort over the relevant time period (in most cases the ten years between censuses).

For the US, we are able to measure age -specific stocks of immigrants from all but the very smallest Latin American and Caribbean countries in 1980, 1990, 2000, and 2005, using data from decennial censuses and the American Communities Survey (2005).[13] For Canada, we have similar measures from decennial censuses for 1981, 1991, and 2001, provided by Statistics Canada.

Data for the UK and Spain are more problematic. For the UK, we have country specific immigration stocks aggregated by five year birth cohorts in 1981, 1991, and 2001, based on data provided by the UK Census Commission. For Spain, we have similar data for 1981, 2001, and 2007 (the 1991 census reports region rather than country of birth for many countries in the sample). The aggregation of immigration stocks into five year birth cohorts for the UK and Spain means we have fewer observations on cohort specific migration rates for these countries. A further problem is that the UK provides

[13] We can measure immigrant stocks for the US in earlier years as well, but this is of no use since our data on births do not begin until 1960 (meaning we cannot measure source-country labor supply before 1976).

incomplete data on immigration stocks for non-Commonwealth countries in the region, as does Spain for countries that are not former colonies. Consequently, UK and Spanish data are a mix of stocks for individual origin countries and aggregates of remaining countries in the region. In both cases, the residual aggregates are very small in size, indicating that few individuals from former Spanish colonies migrate to the UK or vice versa. Because of the limited scope of the UK and Spanish data, we begin the analysis using data for the US and Canada, for which we have nearly complete data on origin countries, and then expand the sample to include the two other destinations. The appendix shows the number of usable cohort-specific bilateral net migration rates we have for each origin and destination country pair.

To gauge the magnitude of emigration from Latin America and the Caribbean, Table 2 reports total emigration rates in 2000 by origin country, as well as the fraction of emigrants residing in the US, Canada, Spain, and the UK, using data from Parsons at al. (2007). Excluded are Cuba, which severely restricts emigration, and countries with fewer than 200,000 inhabitants in 2000, all of which are Caribbean islands (on which we have incomplete data). Evident in Table 2 is variation in the attractiveness of the four principal destinations to emigrants from the region. In the Caribbean and Central America, the share of emigrants going to the four destinations is above 50 percent in all countries, except Nicaragua,[14] and above 70 percent in all other countries except Haiti, a former French colony, and Antigua and Barbuda.

In the more remote South American region, the share of emigrants going to the four destinations exceeds 50 percent for only two countries, Ecuador and Guyana. For Bolivia, Chile, Paraguay, and Uruguay, neighboring Argentina is an important

[14] In 2000, 43% of Nicaragua's emigrants resided in neighboring Costa Rica.

destination; the share of emigrants going to the four destinations plus Argentina is above 60 percent for each country. For Colombia, neighboring Venezuela is an important destination; the share of its emigrants going to the four destinations plus Venezuela is 81.3%. Thus, in South America nearby rich nations appear to compete for migrants with more distant high-income countries. In Table 2 we also see that Argentina and Brazil – South America's largest nations – have low emigration rates, in either case less than 2 percent. Of the countries in Table 2, we exclude from the analysis Argentina, which in the sample period is more a destination for migration than an origin, and Brazil, which as a former Portuguese colony sends few migrants to the US, Canada, the UK, or Spain.

In the empirical analysis, we focus on migration rates for individuals aged 16 to 40, as these are peak years for migration (Hanson and McIntosh, 2010). Also, since our birth cohort data from the World Development Indicators do not begin until 1960, we are unable to measure migration for cohorts older than 40 years of age. To gauge the variation in migration rates for the sample cohorts, Table 3 shows the average migration rate across cohorts by origin and destination country pair in the latest available year. Emigration rates for small countries are quite high, with over 10 percent of the sample cohorts of Antigua and Barbuda, the Bahamas, Barbados, Belize, Grenada, and Guyana – each with fewer than 1 million inhabitants – having migrated to the US alone. Migration rates into Canada and the UK are highest for former British colonies: Antigua and Barbuda, the Bahamas, Barbados, Granada, Guyana, Jamaica, and Trinidad and Tobago. For Spain, migration rates vary considerably across its former colonies, with the highest rates found in South America, which is relatively distant from the US. Ecuadoran migration to Spain is a curious outlier, with 17.8% of cohorts having migrated as of 2007.

Table 4 provides perspective on the sample variation we will be exploiting in the estimation, where the dependent variable is the annualized net migration rate calculated over the interval between the previous and current destination census. The table gives the net migration rates during the latest available interval. Apparent are sharp differences in net migration rates across origin countries for given destinations and across destinations for given origins. While migration rates to the US from Grenada, Honduras, Guyana, Mexico, and El Salvador are high, they are practically zero for Bolivia, Chile, Colombia, Nicaragua, and Paraguay, and the 2000-2005 period actually saw reverse net migration to Antigua and Belize. For the countries with high migration to the US, only Grenada and Guyana show high net migration rates to Canada. Similarly, among the countries showing little net migration to the US, Bolivia, Colombia and Paraguay exhibit sharp increases in migration to Spain. We turn next to facts that might account for this cross-sectional variation in changes in migration rates.

3.2 Labor supply in sending and receiving countries

The first labor market shock we consider are changes in labor supply, associated with earlier differences in birth rates across countries. We measure labor supply using the number of live births in each country, as reported in World Development Indicators, which begin in 1960. Assuming that individuals enter the labor force at age 16, the number of individuals born, say, in El Salvador in 1970 would indicate the number of individuals coming of working age in 1986. By taking the ratio of origin country and birth country labor supply, we can take advantage of the cross-destination country heterogeneity in this dyadic data structure.

In using number of births to measure labor supply, we ignore variation across source countries in both mortality rates and labor force participation rates, data on which we cannot obtain by age and year. While cross-country variation in mortality rates is a concern, there are two reasons why it is unlikely to be a significant problem for our analysis. One is that we focus on migration of those of prime migration age, which is 16 to 40. For individuals out of childhood but not yet in middle age, variation in mortality across Latin American countries is relatively low. More importantly, much of the variation in mortality rates is absorbed by the country and time dummies that we include in the estimation. In a regression of annual mortality rates for nations in Latin America and the Caribbean on country dummies and year dummies, the adjusted R squared is 0.94 for infant mortality, 0.95 for under-5 mortality, and 0.86 for adult mortality. Thus, most of the cross-country variation in mortality can be removed by removing country-specific means and time-specific means from the data, which we do in the empirical analysis.

Figure 1 shows the time series of births for countries in Latin America and the Caribbean from 1960 to 2005. Immediately apparent is strong variation in the time pattern of births across countries. In the Andes, births grow steadily between 1960 and 1980 in all countries except Colombia and then flatten out. In Central America, births grow steadily through the mid 1970s in all countries except Costa Rica and then flatten differentially, slowing first in El Salvador, followed by Nicaragua and Honduras and never slowing in Guatemala. By the 1960s, the Southern Cone had already entered an era of slow population growth and births are flat across time in all countries except Paraguay. The Caribbean contains a mix of outcomes, with some countries showing growth in births (Belize, Dominican Republic, Haiti), and others showing declines (Barbados, Guyana, Jamaica, Trinidad and Tobago). Variation in the growth of births across countries produces variation in the growth of labor supply 15 to 20 years hence. It is this variation in birth levels we will exploit to identify the impact of labor supply on emigration.

An important question is whether the factors that produce variation in fertility across countries are correlated with emigration, potentially confounding our empirical analysis. The literature associates national differences in levels and changes in fertility with a large set of determinants (see, e.g., Dasgupta, 1995; Galor, 2005; Lehr, 2009). Because realizations on emigration are observed between 16 and 40 years after the shifts which caused the changes in birth cohort size, we take these changes to be pre-determined for our analysis. We assume that, given country, year, and cohort fixed effects, the most plausible explanation for correlation between country-level birth cohort size and subsequent migration is the cohort size itself. Of course, the size of birth cohorts may summarize more about a country than its labor supply. In section 4, we discuss alternative interpretations of our results.

3.3 Labor demand shocks in sending and receiving countries

To control for how changes in labor demand affect migration, we include in the estimation of equation (8) per capita GDP in the year a cohort entered the labor market, as well as contemporaneous per capita GDP, for both the origin and destination country. As we control for origin and destination country fixed effects in the regressions, per capita GDP effectively picks up how differential income values in a given year affect migration. As it turns out, entry year and contemporaneous per capita GDP tend to be highly correlated, such that we sometimes include just one of these variables.

Average income is an obvious control, but by no means the only factor that affects migrant perceptions of living standards at home or abroad. Over the time period we study, which spans the mid 1970s to the mid 2000s, Latin America experienced multiple balance of payments crises, frequent natural disasters, and episodes of intense civil unrest. Such events disrupt the lives of individuals, reducing their income and wealth and often displacing them from their homes. While these shocks are temporary, they are often severe in nature, sufficient to lead to temporary or permanent emigration. We construct measures of the incidence of these shocks equal to the number of events that occur in a country over a given time period divided by the number of years in the period, which we refer to as the annualized shock incidence.

To capture balance of payments crises, which are typically followed by a banking crises and collapse in GDP, we use the measures of sudden stops in Cavallo (2007), which indicates whether a country has a large decline in its current account, with foreign capital inflows suddenly reversing and becoming capital outflows. Calvo (1998) associates such episodes with a loss in investor confidence in a country, as occurs when investors downgrade expectations about a country's capacity to service its debts or maintain a pegged exchange rate. Cavallo's definition of a sudden stop is whether a country experiences a decline of greater than two standard deviations in a current account surplus in successive years, where he measures the standard deviation four different ways. We take the average incidence across the four measures between census intervals. Table 5 reports the incidence of sudden stops over the sample period. Mexico, Colombia, and Ecuador are the countries most prone to capital inflow reversals, with 11 other economies experiencing at least one sudden stop in recent years. Nine countries experience no sudden stops, with seven of these being Caribbean nations.

Natural disasters are a common occurrence in Latin America, given its proximity to the Ring of Fire and exposure to tropical storms in both the Caribbean and Pacific. Following Yang (2008), we define a serious natural disaster as an earthquake over 7.5 on the Richter scale, a windstorm (e.g., hurricane) lasting a week or more, or a landslide or volcanic eruption that affects more than 1000 people. We count the number of events that occur between census intervals. Data on these events are from the International Emergency Event Database (http://www.emdat.be/). Mexico, Ecuador, Nicaragua, and Honduras have the highest incidence of natural disasters, with only seven countries escaping a serious disaster during the sample period.

The last three decades have been a time of political transition in Latin America, with military coups displacing democratically elected governments during the 1960s and 1970s, followed by a return to democracy in the 1980s and 1990s. Armed insurgencies have occurred in over a half dozen countries, with these conflicts involving thousands of casualties and lasting for a decade or more. We measure conflict as the number of years between census intervals in which a serious conflict exists (be it extra-state, intra-state, internal, or internationalized internal in nature) that resulted in the deaths of over 1000 people. The source is the CSCW Monadic Armed Conflict Database from the International Peace Research Institute (http://www.prio.no/). Colombia, El Salvador, Guatemala, and Nicaragua are the most conflict prone countries, with each country being subject to a conflict of some type in one quarter or more of the sample years.

3.4 Immigration policy in receiving countries

The four main receiving countries for Latin American emigration differ considerably in their immigration policies. The US, which is the most important destination for Latin American emigrants, manages immigration through granting permanent residence visas and temporary work visas, and enforcing the US territory against illegal immigration. The 2,000 mile long US border with Mexico makes illegal entry an attractive option for migrants from Latin America. In 2005, the last year of our US sample, there were 18.9 million immigrants from Latin America and the Caribbean residing in the US (Camarota, 2005), of whom 46.2% were estimated to be in the country illegally (Passel, 2006). The majority of legal immigrants from Latin America enter as family members of US citizens and residents. In 2005, family sponsored visas accounted for 76.6% of US legal inflows from the region, with employer sponsored visas (the majority of whom are skill workers) accounting for 13.6% and refugees and asylees accounting for 1.9% (DHS, 2005).[15] While the US is relatively open to inflows of low skilled labor from Latin America, few individuals in the region qualify as skilled workers and fewer still (outside of Cuba) as refugees or asylees.

Canada has long managed its immigration policy through a regime that favors skilled workers, the legal basis for which was established in 1976 and modified several times since (Mayda and Patel, 2004). Individuals earn points for entry depending on their youth, education, work experience, ability to speak English or French, and having a job offer from a Canadian employer. In 2001, the last year in our Canadian sample, skilled immigrants accounted for 60.6% of permanent immigration visas, family members of Canadians 26.6%, and refugees and asylees 11.3% (OECD, 2004). Because of the emphasis on skills, Latin America, where education levels remain relatively low, accounts for a small share of Canadian immigration, comprising 8.0% of legal inflows in 2001. If an individual from Latin America cannot quality for a Canadian visa on the basis of skills or family, the primary means of entry would be through asylum.

[15] These figures exclude Cuba, for which 90.0% of immigrants are refugees or asylees.

The UK belongs to the European Union and allows for the unrestricted movement of EU citizens. Outside of the EU, immigration is limited to family members of UK citizens, skilled workers, temporary workers with a job offer from a UK employer, citizens of Commonwealth countries with UK ancestry, and refugees and asylees. Commonwealth citizens aged 17 to 30 who lack UK ancestry may qualify for a "working holiday" in which they spend two years in the UK, with eligibility to work for one of these.[16] Some individuals may abuse such visas by staying on in the country and working illegally. In 2001, the last year of our UK sample, asylum seekers accounted for 24.5% of immigration admissions, temporary foreign workers 22.8%, and EU citizens 16.2%, with the remainder made up by family members of UK citizens and skilled workers (OECD, 2004). In 2002, which is after our sample period, the UK implemented a point system intended to expand skilled immigration (Mayda and Patel, 2004). For Latin America, opportunities to migrate to the UK would appear to be limited primarily to Commonwealth citizens and refugees and asylum seekers.

Spain's immigration policy is somewhat difficult to specify. As an EU member, it allows the unrestricted movement of EU citizens. Until the late 1980s, the country was primarily a source of emigration. Following the sudden increase in immigration inflows in the 1990s, government policy responded slowly, being concerned initially with how to treat those who had already found a way into the country. It appears that a large fraction of non-EU immigrants who entered Spain in the 1990s and 2000s did so illegally or as visitors (Dolado and Velasquez, 2007). For those able to obtain employment, the government has been relatively permissive in granting legal work permits, offering multiple amnesties to undocumented workers in the last two decades. The most

[16] See http://www.ukvisas.gov.uk.

significant barrier to migrants from Latin America entering Spain may not be obtaining a visa but the cost associated with travel, establishing residence, and finding initial employment as an undocumented worker. Recently, Spain has expanded the number of work visas it supplies in an attempt to direct immigration through legal channels, requiring prospective migrants to line up a job before entering the country.

Immigration policy mediates how labor demand and supply shocks affect migration rates between origin and destination countries. In the absence of barriers to immigration, the only barrier to moving between countries is the travel expense of relocating from one place to another, which is likely to be positively related to the distance between locations. Where illegal immigration is an option, distance is likely to have an even more pronounced role. For individuals in Mexico, migrating illegally to the United States is a matter of crossing the US-Mexico border. For individuals in Guatemala, illegal migration is more difficult as they must successfully pass through Mexico before negotiating the US border. And for individuals from countries further to the south, illegal migration is likely to be more problematic still. Given the complication of crossing multiple borders, it is perhaps not surprising that Mexico accounts for 56% of illegal immigrants in the US, Central America 15%, and South America only 7% (Passel, 2006). Where legal immigration regulated by binding quotas is the only option, as in Canada and the UK, distance may be a much less important factor. There is likely to be greater weight on whether individuals have family members in the destination, ancestral ties to the destination, sufficient skills, or claims on asylum.

To consider the interaction between distance and immigration policy, Figure 2 shows how net migration rates to destinations change with distance from the origin country, where we plot this relationship for each destination separately. For the US, in which nearly half of Latin American immigration is illegal, migration rates decline strongly with distance. Moving further away from the US appears to complicate migrating to the country. For Canada, in which skill based immigration and asylum are the primary options for most Latin Americans, migration rates change little with distance from the origin. The relationship for Spain is similarly flat. Only for the UK do we also see a negative association between migration rates and distance, where this relationship may be attributable to British former colonies being concentrated in the Caribbean, which is located relatively close to Europe. The variation in the distance-migration relationship is initial evidence of how immigration policy may mediate the underlying drivers of migration. In the next section, we examine a range of shocks more formally.

4 RESULTS

4.1. Partitioned Analysis

Table 6 provides a first comparative overview of the results by estimating the migration effects of labor supply and demand shocks separately for each destination. The dependent variable in all specifications is the annualized net migration rate for a given birth cohort and origin-destination pair (the change in the stock of immigrants in that cohort from a particular origin country in a particular destination, divided by the size of the original birth cohort in the origin). The first two columns present impacts in the US and Canada using annual birth cohorts (meaning we measure migration rates in each birth year separately). Data from Spain and the UK come aggregated into 5-year birth cohorts, and when we perform pooled analysis we will aggregate the US and Canada in a similar way. Table 6 presents partitioned results under both aggregation schemes.

The analysis features variables that enter at the origin country level, the origin birth cohort level, the destination birth cohort level, and interactions with destination country dummies. The data therefore have a non-nested multi-level structure, and it is not perfectly clear how we should handle our standard errors. The number of clusters is relatively small across most of the primary dimensions (26 birth countries, 4 destinations, 10 destination census waves, and 12 aggregated birth cohorts), and so our ability to estimate consistent cluster level covariance terms is limited.[17] As a conservative way of estimating standard errors that nonetheless provides a sufficient number of observations for consistent estimation, we cluster our analysis at the dyad level (origin * destination), for 73 dyads in an aggregated dataset of 832 usable observations.[18] In the segregated data structure of Table 6 this is equivalent to clustering by origin country.

For the US, we find a strong impact of a demographic push created by large origin birth cohorts. The log birth cohort size ratio (birth cohort size in origin/birth cohort size in destination) enters positively and highly significantly. Emigration to the US is increasing and strongly concave in age, with the peak migration age being 28. There is evidence of a complex relationship between initial income of a cohort, which increases migration to the US, and current income, which weakly retards it. Canada displays patterns that are similar but considerably muted in absolute terms; the marginal effect of a given labor supply shock is one twenty-fifth as large for migration to Canada, and insignificant. While migration to the US is increasing and concave in age, it is interesting to note that Canadian immigration generates migration rates that are weakly increasing

[17] Cluster asymptotics are based on the number of clusters and not the number of observations per cluster (Cameron, Gelbach, and Miller 2008).
[18] We have experimented with different clustering structures, and all results discussed here are robust to the alternative strategy of clustering by origin country.

and *convex* in age, perhaps reflecting the bias of the country's point system in favor of individuals who have completed their education and are therefore older.

Columns 3-6 of Table 6 present results using birth cohorts aggregated at the five-year level, as is found in the raw data from Spain and the UK. We collapse the North American origins to match the age aggregation used in the UK census, and then define all dummies effectively shifting the Spanish birth structure off by one year so that there is full agreement between the census years, ages, and birth years in the aggregated cohorts across all four destinations.[19] This aggregation makes little difference in the answers for the impact of labor supply shocks on migration into Canada and the US; point estimates and t-statistics are both very similar. We have little explanatory power in the partitioned regressions over migration to Spain or the UK, although if anything the effect of labor supply shocks appears to have an opposite sign in the UK as it does in the US. That the results for the US are similar for one- and five-year birth cohorts suggests that the size of neighboring cohorts, first discussed in Section 2, carries little weight in identifying how initial labor supply affects later migration. We return to neighboring cohorts below.

Figure 2 suggests a sharply different role of geographic distance for the US and Canada. The basic role of the US in buffering Canada from overland migration implies that the issue of contiguity of migration origins may also play less of a role. To investigate this possibility, Table 7 interacts measures of proximity with labor supply shocks to see whether they modulate the migration impact of demographic push factors. As described in Section 3.1, the data from the US and Canada provide a more

[19] This is done to assure comparability when we move to pooled analysis. While the weighting of the regressions by the size of the cohort takes care of any mechanical objections over correct sample inference, there may additional problems arising from the error in the estimates differing, or the smoothing in the impact that arises from aggregation of birth cohorts. We therefore transform the structure of the US and Canadian data to match that of the other countries.

comprehensive view of migration across origins. While all four destinations record a complete set of origins in their final census, only the North American countries have done so consistently over time.[20] Data from the US and Canada allow us to test for marginal effects across the whole distribution of origins and not just those with strong links to the destination. We therefore focus first on an analysis of heterogeneity in the response to labor market conditions, using data from these two countries alone.

The first four columns of Table 7 present results for the US and Canada separately, taking advantage of the large set of origins available for these two countries. For the US, the impact of labor supply shocks is lower for island nations, weakly lower with great circle distance, and much smaller for non-island countries based on the number of other countries that must be crossed to reach the US by land. Hence, proximity plays a role in determining the impact of variation in labor supply, particularly for origins where migrants make an overland trip to reach the US. For Canada, in contrast, birth cohort sizes are insignificant overall as well as having no differential slope across any of our measures of proximity.[21] Note that the uninteracted coefficients on labor supply shocks are of real interest here as they represent the projected impact of a labor supply in an idealized origin that is 'on top of' the destination, with no distance between them and no countries to cross. Even in such an idealized case, immigration to Canada does not respond to birth cohort size.

[20] The most obvious form of attrition bias caused by the UK and Spain recording only high-migration origins in early years is that by definition a dyad with zero observed migration has demonstrated no sensitivity to the shocks measured here. This would suggest that the UK and Spain would have marginal effects that are biased *upwards* by attrition. Our results show precisely the opposite, namely that the US (which records the most complete set of origins) is much *more* sensitive to a wide variety of shocks, and hence we conclude that if anything this attrition problem is causing us to underestimate the true degree of 'American exceptionalism'.

[21] Note that with only a single destination, we cannot include raw distance in combination with origin fixed effects, and so the uninteracted impact of distance is omitted in columns 1-4. Countries crossed is not defined for Spain and the UK, and so we do not include this variable in the pooled regressions.

Columns 5-8 of Table 7 pool together all destinations, a data structure that forces us to consider the substantial heterogeneity present across destinations in the sample. The US population is ten times that of Canada, and hence even with comparable proportional migration the flow of migration measured relative to the size of origin-country birth cohorts will differ by an order of magnitude. Furthermore, as seen in Table 3, migration to the US as a fraction of origin population is substantially higher than it is to the other destinations. In order to prevent this cross-sectional heterogeneity in birth-cohort ratios and migration rates from informing coefficients, we always include destination-country fixed effects when multiple destinations are pooled together.

The pooled analysis confirms the uniqueness of the US as a destination. Column 5 of Table 7 shows that birth cohort size is a stronger driver of migration to the US than to the other destinations, and column 6 shows that proximity to the US is more important as well. Column 7 combines these two effects and shows that the rate at which the sensitivity to labor supply shocks falls off with distance is again greatest for migration to the US. In column 8 we again confirm the unique sensitivity to labor supply of nearby origins with overland migration routes to the US, but also find that for the (Caribbean) island origins where overall migration to the US is lower, sensitivity to birth cohort size is also lower. This poses an interesting geographic divide, suggesting that population growth in Mexico and Central America primarily pushes migrants to the US, while growth in labor supply in the Caribbean, equally close to the US but tied to the UK and Canada through historical bonds, pushes migrants to those destinations instead.

4.2. Shocks

We next consider how a broader set of shocks may drive migration, and may modulate the effect of labor supply shocks themselves. Our data provide an intuitive way to examine the impact of shocks on migration because we have long time series over many countries, and so observe a sufficiently large number of shocks in the data to estimate precise impacts. The three shocks we consider in Table 8 are:

- *Number of Serious Natural Disasters* is the annualized count, over census intervals, of earthquakes over 7.5 Richter, windstorms lasting a week or more, or landslides or volcano eruptions affecting more than 1000 people in origin country. In order to remove heterogeneity introduced by the raw size of the country, we divide the number of shocks by land area (thousand square kilometers).

- *Number of Sudden Stops* is the annualized count, over census intervals, of Sudden Stops 1-4 from Cavallo (2007), defined as a year-on-year fall in the current account surplus of at least 2 standard deviation from the sample mean, with standard deviations calculated four alternative ways.

- *Civil Conflict* is from CSCW Monadic Armed Conflict data, calculated as a the number of years between census intervals in which conflict exists in the origin country in which more than 1000 people died.

Table 8 takes the pooled data structure to the analysis of origin-country shocks in driving emigration from the Americas. The table can be read by taking the 'Shock' referred to in the third row from the column title, so the first two columns examine the effect of and interactions with natural disasters, and so on.

Negative shocks that are not political in nature will likely increase the desire for emigration from origin countries, but will not alter the access to legal immigration in asylum-driven destinations. Civil conflict, on the other hand, both increases the 'push' factor behind emigration and creates the ability to apply for asylum. Correspondingly, in Table 8 we find that non-political shocks (weakly) increase migration to the US (columns 1 and 3), while political shocks increase migration to all other destinations (column 5). The uninteracted coefficient on civil conflict is 0.25, indicating that average migration rates to *all three* other destinations will go up by 2.5% over ten years, or an additional

7.5% of the birth cohort emigrated to all three destinations over the 10 years around the conflict. Even here the US is distinct; in the case of civil conflict migration rates to the US are significantly *lower*, both relative to the other destinations and in absolute terms.

The even-numbered columns in Table 8 intersect the two families of shocks by examining whether the responsiveness of migration to labor supply and income shocks is larger when these coincide with shocks of other types. In other words, perhaps an individual in a large, low-wage cohort would have stayed put had economic times been good, but in the face of a downturn will choose to migrate. Large cohorts that also face non-political shocks are far more likely to migrate to the US (columns 2 and 4), and large cohort facing political shocks are far more likely to migrate to the other destinations (column 6). Labor supply does interact with other shocks in powerful ways. The heterogeneous response of migration to origin-country shocks across destinations is most pronounced when labor supply pressures are increasing the incentives to migrate.

Columns 3 and 4 of Table 8 present a nuanced picture of the ways in which income and national economic shocks interact to drive migration to the US, because they allow us to separately identify the impact of the overall initial wealth of a cohort (GDP pc at age 16) independently from a sudden macroeconomic shock (sudden stops). We see that when a cohort does experience an economic shock, the higher is income at the time when the shock occurs, the greater is the impact of the shock on migration to the US. Combined with the results in the second row of Table 6, this suggests that on the whole income is a sharper determinant of the ability to undertake the economically costly move to the US, but that underlying there is a stronger tendency for a downturn in a migrant's economic prospects in the origin country to trigger migration to the US.

Column 6 of Table 8 continues to provide evidence of the uniqueness of political shocks across the destinations. While labor supply plays a relatively larger role in driving migration to the US under all the other shocks, here we see it playing a much *weaker* role when there is a civil conflict. That is to say, once a political shock has opened up the asylum conduit for migration to Canada, Spain, and the UK, birth cohort sizes become more influential, again in both absolute and relative terms.

4.3 Network Effects

A different cut on Table 8 is that where shocks deliver a comparatively large direct effect on the number of migrants going to a destination, further migration to that destination becomes more sensitive to birth cohort size. One interpretation of this result is that network effects begin to lower the costs of further migration once it has begun, and so the constant pressure that birth cohort sizes exert on the incentive to migrate becomes more visible. We now proceed to examine these network effects more directly.

A standard way to investigate heterogeneity that arises from network effects is to use the historical stock of migrants as a proxy for the strength of networks (see the survey in Hanson, 2010). The analogy in our data is to use the earliest census year in which we have an observation on migration between an origin and a destination, and calculate the dyadic stock of migrants across cohorts in that year. This is then the first available observation on the number of people from each origin living in each destination.

Column 1 of Table 9 gives a base specification for comparison purposes. Column 2 illustrates the strong overall effect of initial migrant stocks on subsequent migration rates across the sample. Column 3 shows that the full-sample sensitivity to labor supply shocks is not significantly higher when a large base stock of migrant exists, although the interaction between labor supply shocks and initial migrant stock is positive and is significant at the 90% level. The final column tests whether the raw effect of base migrant stocks is stronger in the US; the results indicate that these stocks matter about twice as much in the US as elsewhere.[22] Our results thus demonstrate a role of network effects that is strong overall and substantially stronger in the US. While variables that proxy for the strength of network effects explain migration overall, they are particularly critical in determining the predominantly economically-driven migration to the US.

4.4. Extensions and Robustness Checks

A first concern that may arise when considering these results relates to the use of relatively fine-grained birth cohorts (even our most aggregated analysis uses five-year cohorts). While the comparison of aggregated (five-year birth cohorts) and disaggregated (one-year birth cohorts) results in Table 6 does not incline us to think that this aggregation will be the source of major measurement problems, a question remains as to the relationships between adjacent cohorts. To the extent that the size of a given cohort has strong effects over the behavior of its neighbors, at the very least we will encounter problems with the independence of observations, and may even find biased answers to the extent that these cohort sizes are correlated.

Issues of multicollinearity prevent us from simply controlling for the size of the preceding and following cohort, because these neighboring cohorts will be highly correlated with the size of one's own cohort in the data. As a way of getting around this

[22] Additional analysis not presented here draws on the extension of the model presented here in Hanson and McIntosh (2010). This work explicitly considers the role of network effects, showing that the dynamic adjustment path of migration as a given cohort ages presents a tension between the dampening effects of wage arbitrage on further migration (which would decrease the effect of a shock with age) and the formation of migration networks with peers as your cohort is increasingly in that destination. Our results here show little heterogeneity in the impact of shocks across cohort age, indicating that these two forces on average are in balance both in the overall sample and to the US specifically.

problem, we calculate the growth rate from the previous cohort to this one, and the growth rate from this cohort to the next, and control for these rates rather than for the raw cohort size itself. Table 10 repeats the analysis of Table 6 using aggregated cohorts and controlling for these cross-cohort growth rates. No significant effects of the size of adjacent cohorts are found in the US (the only country in which the raw effects are significant) and while the coefficient on the growth rate from the last cohort to the current one is significant in the overall sample, it is not significantly negative in any individual country. Most importantly, the coefficient estimates on the contemporaneous effects remain very stable when we control for cross-cohort effects. Hence we find no evidence that spillover effects across cohorts are likely to be causing major measurement errors.

A similar concern could arise in our analysis of shocks if it were the case that countries that had shocks in one period always had them in later periods, or if the impact of the shocks themselves displayed sufficient persistence. To analyze this Table 11 calculates annualized shock variables over the *preceding* census interval and includes them in a specification similar to Table 7. We find natural disasters to be the only type of shock with any persistence in migration impacts, but the lagged effects are always of the same sign and with a reduced magnitude from the original shock. The heterogeneity observable in the response to shocks for migration to the US is very similar in the response to lagged shocks. Again, inclusion of these lags does not change our overall read on the results, which is that natural disasters disproportionately increase migration to the US and political shocks increase it to the other destinations.

In unreported results, we examined whether the results may be driven by Mexico, which is the largest source country for immigrants in the US. All of our results are robust to dropping Mexico from the estimation sample. In other results, we considered whether the importance of agriculture may mediate the impact of labor market shocks. Since the supply of agricultural land is relatively inelastic, increases in labor supply may have a more negative effect on wages in agriculture dependent economies than in economies specialized in manufacturing (which is intensive in relatively elastic capital). We found no evidence that the level of agricultural development in origin countries, on its own or interacted with labor supply or labor demand shocks, matters for emigration.

5 DISCUSSION

We intersect data on the size of birth cohorts in origin countries with data on the size of immigrant stocks by age and origin country in the US, Canada, Spain and UK to examine factors associated with emigration from 25 Latin American and Caribbean countries over the period 1980 to 2005. We find that for migration to the US labor supply shocks, in the form of abnormally large or small birth cohorts, are a significant push factor, while they are uncorrelated with migration to Canada, Spain, or UK. The effect of labor supply shocks decreases with distance from the destination for the case of the US but not for the other countries.

Our cohort panel data cover a long time span over a broad set of countries and therefore provide a good platform for examining how large but relatively rare shocks may contribute to migration. We find that natural disasters and balance of payments crises increase the impact of labor supply shocks on migration to the US, but not to the other destinations, whereas civil and military conflict have the reverse effect, decreasing migration to the US but raising it to Canada, Spain and the UK.

These results draw a picture of one destination, the US, that is uniquely engaged in a demographic dance with its neighbors. Inaccessibility by land, along with immigration regimes that are more formulaic and asylum-based, have effectively turned off a susceptibility to labor supply-driven migration in Canada, the UK, and Spain. The United States displays a similar insensitivity with respect to the far-off countries of South America. With its close neighbors, migration rates to the US respond strongly to shocks; larger or richer cohorts are most likely to migrate to the US, with this sensitivity heightened by economic volatility in the destination.

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Appendix

A. Deriving the estimating equation

Using equations (3), (5), and (6), we solve for the t = 0 emigration rate, and then iterate forward, solving for the wage and emigration rate in each period. After some algebra, the emigration rate to country A for age group i in period t can be shown to be,

$$
\begin{aligned}
v_{it}^{A} &= \sigma^{A}\omega_{i0}^{A}\left(1+\eta\sigma^{A}\right)^{t-1}+\sigma^{A}\omega_{i0}^{B}\left[\left(1+\eta\sigma^{B}\right)^{t-1}-1\right] \\
&+\omega_{i0}^{B}\eta\left(\sigma^{A}\right)^{2}\sum_{s=1}^{t-2}\left[\left(1+\eta\sigma^{B}\right)^{s}-1\right]+\omega_{i0}^{B}\left[\eta^{2}\left(\sigma^{A}\right)^{3}+\left(\eta\sigma^{A}\right)^{2}\sigma^{B}\right]\sum_{s=1}^{t-3}\left[\left(1+\eta\sigma^{B}\right)^{s}-1\right] \\
&+\omega_{i0}^{A}\eta\sigma^{A}\sigma^{B}\sum_{s=1}^{t-3}\left[\left(1+\eta\sigma^{A}\right)^{s}-1\right]+\omega_{i0}^{A}\left[\left(\eta\sigma^{A}\right)^{2}\sigma^{B}+\left(\eta\sigma^{B}\right)^{2}\sigma^{A}\right]\sum_{s=1}^{t-2}\left[\left(1+\eta\sigma^{A}\right)^{s}-1\right]+\cdots
\end{aligned}
\tag{A1}
$$

where there is a continuing series of high-order interactions of the model coefficients up to the power t-1. The expression for country B is analogous. While the expression appears complicated, the determinants of current emigration from the source country are simply initial wage differences between the origin and the two destinations, ω_{i0}^{A} and ω_{i0}^{B}. The large number of terms in (A1) comes from the fact that positive emigration occurs only along the transition from an initial period in which there are large international wage differences to a final equilibrium of small wage differences.[23] Migration from the origin country to destination A today affects migration to B tomorrow, which affects migration to A in the following period, and so on. Since these higher order effects depend on a minimum of four-way interactions in the labor demand elasticity and labor supply elasticities (which are each less than one in absolute value), they are likely to be very small in practice; to simplify the expression, we exclude these terms.

To interpret (A1), consider each term in the expression. The first term on the right indicates that the current emigration rate to country A is higher the larger is the initial wage gap between the origin country and destination-country A. Note that the emigration rate declines over time (owing to the assumption that $1+\eta\sigma^{A}<1$), as the exodus of labor pushes up source-country wages. The second term on the right indicates that the current emigration rate to country A is lower the larger is the initial wage gap between the source country and destination-country B, as the availability of an alternative location siphons off migrants who would have otherwise gone to A. The terms on the second and third lines of (A1) are the initial terms in a series of higher order effects, which capture the implications for current migration to country A of how past migration to country A has affected migration to country B and of how past migration to country B has affected migration to country A. Excluding the higher-order terms and using the approximation that $(1+x)^t \approx 1+tx$, we can rewrite (A1) in much simpler form as

[23] Because of the migration disamenity, international wage differences may not be fully eliminated.

(A2) $$v_{it}^{A} = \sigma^{A}\omega_{i0}^{A}\left[1+\eta\sigma^{A}\left(t-1\right)\right]+\eta\sigma^{A}\sigma^{B}\omega_{i0}^{B}\left(t-1\right).$$

Plugging in the determinants of the initial wage differential in (6), we obtain,

(A3) $$v_{it}^{A} = ln\ell_{i0}^{A}[\theta^{A} + (\theta^{A})^{2}(t-1)] + [lnx_{i0}^{A} - F^{A}][\sigma^{A} + \sigma^{A}\theta^{A}(t-1)]$$
$$+ln\ell_{i0}^{B}\theta^{B}\theta^{A}(t-1) + [lnx_{i0}^{B} - F^{B}]\sigma^{B}\theta^{A}(t-1)$$

where $\theta^{c} = \eta\sigma^{c} < 0$. Equations (A2) and (A3) are the basis for estimation.

B. No. of usable bilateral migration rates (five year birth cohorts)

	Destination Country:			
Origin Country:	**Canada**	**Spain**	**UK**	**USA**
Antigua-Barbuda	10	0	0	16
Bahamas	10	0	0	15
Belize	10	0	8	18
Bolivia	10	5	0	18
Barbados	10	0	8	16
Chile	10	9	0	18
Colombia	10	5	0	18
Costa Rica	10	5	0	18
Dominican Republic	10	5	0	18
Ecuador	10	5	0	18
Grenada	2	0	0	5
Guatemala	10	5	0	18
Guyana	10	0	8	16
Honduras	10	5	0	18
Haiti	10	0	0	18
Jamaica	10	0	8	18
Mexico	10	9	0	18
Nicaragua	10	5	0	18
Panama	10	5	0	18
Peru	10	9	0	18
Paraguay	10	5	0	17
El Salvador	10	5	0	18
Trinidad & Tobago	10	0	8	18
Uruguay	10	5	0	17
Venezuela	10	9	0	18
Total	252	96	40	444

Table 1: Emigration from Developing Countries, 2000

		Emigration to high income countries		Emigration to all countries	
	Population	Emigrants	Emigration rate	Emigrants	Emigration rate
East Asia & Pacific	1,804,027,262	12,315,945	0.0068	16,646,474	0.0092
Europe & Central Asia	444,417,646	11,096,197	0.0250	40,475,642	0.0911
Latin America & Caribbean	513,924,769	19,446,628	0.0378	24,212,595	0.0471
Middle East & North Africa	276,357,816	8,359,017	0.0302	12,914,533	0.0467
South Asia	1,358,784,470	8,794,178	0.0065	23,906,281	0.0176
Sub-Saharan Africa	672,823,767	4,291,261	0.0064	17,434,890	0.0259

High-income countries include Canada and the US; Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland; Australia, Hong Kong, Korea, New Zealand, Singapore, Taiwan, and Japan; and Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates. Source: Authors' calculations based on data from Parsons, Skeldon, Walmsley, and Winters (2007).

Table 2: Emigration rates in Latin America and the Caribbean, 2000

Origin Country	Emigration rate	Share of emigrants from US, Can, Spain, UK
Antigua & Barbuda	0.625	0.562
Bahamas	0.124	0.895
Barbados	0.401	0.852
Dominican Republic	0.111	0.828
Grenada	0.678	0.711
Haiti	0.096	0.643
Jamaica	0.371	0.884
Trinidad & Tobago	0.258	0.878
Mexico	0.105	0.928
Belize	0.214	0.857
Costa Rica	0.030	0.736
El Salvador	0.163	0.871
Guatemala	0.055	0.835
Honduras	0.058	0.822
Nicaragua	0.107	0.448
Panama	0.066	0.820
Argentina	0.017	0.410
Bolivia	0.047	0.188
Brazil	0.006	0.304
Chile	0.036	0.249
Colombia	0.040	0.443
Ecuador	0.058	0.768
Guyana	0.503	0.840
Paraguay	0.079	0.053
Peru	0.029	0.491
Uruguay	0.076	0.233
Venezuela	0.015	0.558
Total	0.051	0.754

The emigration rate is the share of emigrants (as measured by Parsons et al., 2007) in the total population. Very small countries in Latin America and the Caribbean are excluded.

Table 3:
Average stock of migrants from each origin to each destination, latest year

	% of Cohort in Destination Country:			
Origin Country:	**Canada**	**Spain**	**UK**	**USA**
Antigua-Barbuda	1.98		5.02	19.51
Bahamas	0.68		4.82	14.48
Belize	0.75		1.75	10.47
Bolivia	0.03	4.47	0.05	0.58
Barbados	2.77		9.28	13.38
Chile	0.16	1.00	0.15	0.53
Colombia	0.04	3.41		1.04
Costa Rica	0.10	0.13	0.07	2.75
Dominican Republic	0.06	4.41	0.03	6.88
Ecuador	0.08	17.81	0.13	2.58
Grenada	5.40		5.09	15.40
Guatemala	0.12	0.06	0.01	5.69
Guyana	5.60		2.92	18.72
Honduras	0.08	0.48	0.03	6.52
Haiti	0.43		0.01	3.47
Jamaica	3.18		7.78	14.39
Mexico	0.04	0.07	0.03	11.55
Nicaragua	0.19	0.19	0.02	3.11
Panama	0.10	0.21	0.09	3.74
Peru	0.06	2.27	0.07	1.12
Paraguay	0.07	1.63	0.02	0.31
El Salvador	0.57	0.18	0.03	14.35
Trinidad & Tobago	3.44		4.56	11.98
Uruguay	0.18	6.19	0.13	1.81
Venezuela	0.04	0.82	0.10	0.69
Census years available:	1981, 1991, 2001	1981, 2001, 2007	1981, 1991, 2001	1980, 1990, 2000, 2005

Notes: The years for which the above figures correspond are 2001 for Canada and the UK, 2005 for the US, and 2007 for Spain.

Table 4: Average annualized net migration rates (fraction of a percent) from each origin to each destination, latest available year

	Destination Country:			
Origin Country:	**Canada**	**Spain**	**UK**	**USA**
Antigua-Barbuda	0.073			-0.281
Bahamas	0.001			0.224
Belize	0.020		0.027	-0.280
Bolivia	0.001	0.624		0.032
Barbados	0.031		0.346	0.179
Chile	0.001	0.081		0.021
Colombia	0.003	0.212		0.027
Costa Rica	0.003	-0.013		0.180
Dominican Republic	0.002	0.366		0.186
Ecuador	0.003	1.347		0.132
Grenada	0.434			0.976
Guatemala	0.004	-0.003		0.380
Guyana	0.173		0.107	0.974
Honduras	0.002	0.047		0.462
Haiti	0.014			0.129
Jamaica	0.081		0.481	0.215
Mexico	0.002	0.000		0.505
Nicaragua	0.001	0.021		-0.020
Panama	0.000	-0.028		0.059
Peru	0.003	0.250		0.076
Paraguay	-0.001	0.242		0.023
El Salvador	0.009	0.014		0.670
Trinidad & Tobago	0.081		0.230	0.347
Uruguay	0.003	0.499		0.247
Venezuela	0.002	-0.098		0.038

Notes: The years for which the above figures correspond are 2001 for Canada and the UK, 2005 for the US, and 2007 for Spain.

Table 5: Annualized values of shocks

Origin Country:	# of Serious Natural Disasters	# of Sudden Stops	Fraction of years in which Civil Conflict
Antigua-Barbuda	0.05	0.00	
Bahamas	0.04	0.00	0.00
Belize	0.05	0.00	0.00
Bolivia	0.13	0.03	0.00
Barbados	0.00	0.03	0.00
Chile	0.16	0.11	0.00
Colombia	0.02	0.09	0.42
Costa Rica	0.10	0.06	0.00
Dom. Republic	0.04	0.00	0.04
Ecuador	0.34	0.07	0.00
Grenada	0.00	0.00	
Guatemala	0.15	0.00	0.26
Guyana	0.00	0.00	0.00
Honduras	0.18	0.00	0.08
Haiti	0.04	0.00	0.00
Jamaica	0.01	0.00	0.00
Mexico	0.42	0.12	0.00
Nicaragua	0.20	0.03	0.23
Panama	0.00	0.04	0.00
Peru	0.18	0.04	0.31
Paraguay	0.00	0.04	0.00
El Salvador	0.12	0.01	0.31
Trin. & Tobago	0.00	0.03	0.00
Uruguay	0.00	0.04	0.00
Venezuela	0.03	0.04	

# of Serious Natural Disasters: The sum, over census intervals, of earthquakes over 7.5 Richter, windstorms lasting a week or more, or landslides or volcano eruptions affecting more than 1000 people.

# of Sudden Stops: The sum, over census intervals, of Sudden Stops 1-4 from Cavallo (2007), defined as a year-on-year fall in the current account surplus of at least two standard deviations from the sample mean, with the standard deviation calculated four alternative ways.

Civil Conflict: Calculated as the number of years between census intervals in which a serious conflict exists (Extra-state, Intra-state, Internal, or Internationalized Internal) that killed over 1000 people in a country.

Table 6: Partitioned results on bilateral migration rates

	One-year Birth Cohorts		Five-year Birth Cohorts			
Dependent Variable: Annualized migration rate over census interval, percent.	**USA**	**CAN**	**USA**	**CAN**	**SPN**	**UK**
Log Birth Cohort Size Ratio	0.430	0.014	0.404	0.016	-0.191	-0.261
	(4.76)**	(1.23)	(4.14)**	(1.18)	(1.10)	(2.14)
Log GDP pc Ratio at Age 16	0.145	0.011	0.157	0.012	-0.031	-0.056
	(2.18)*	(1.90)	(2.08)*	(1.76)	(0.72)	(1.59)
Log GDP pc in year of census	-0.00003	0.00000	-0.00003	0.00000	0.00002	-0.00020
	(0.53)	(0.35)	(0.55)	(0.36)	(0.06)	(1.77)
Years since cohort turned 16	0.037	0.001	-0.027	-0.001	0.017	0.008
	(2.45)*	(1.65)	(0.67)	(0.62)	(1.33)	(0.97)
Years since 16 squared	-0.0014	0.0000	-0.0013	0.0000	-0.0008	-0.0005
	(2.14)*	(1.86)	(2.33)*	(1.72)	(1.99)	(1.19)
Observations	1804	1082	444	252	96	40
Birth country, birth cohort, and census wave fixed effects included in all specifications. Regressions are weighted by the size of the birth cohort.						
* significant at 95%, ** significant at 99%, t-statistics in parentheses and SEs clustered by origin/destination dyad.						

Table 7: Effects of distance from the US and Canada on bilateral migration rates

	USA		Canada		All Destinations Pooled			
Dependent Variable: Annualized migration rate over census interval, percent.	Distance Inter-actions	Countries Crossed Inter-actions	Distance Inter-actions	Countries Crossed Inter-actions	Labor Supply	Distance	Distance Inter-actions	Island Inter-actions
Log Birth Cohort Size Ratio	0.672	0.485	0.012	0.012	0.077	0.121	0.166	0.073
	(4.26)**	(3.00)**	(1.20)	(1.16)	(1.44)	(2.17)*	(1.71)	(1.34)
Log GDP pc Ratio at Age 16	0.051	-0.042	0.010	0.011	0.034	0.031	0.034	0.015
	(0.70)	(0.41)	(1.62)	(1.67)	(0.76)	(0.66)	(0.70)	(0.33)
Log Birth Cohort Ratio * Distance	-0.072		0.0005				-0.014	
	(1.79)		(0.37)				(0.94)	
Log Birth Cohort Ratio * Island	-0.436	-0.650	-0.008	-0.002	-0.112	0.062	-0.043	-0.100
	(2.37)*	(3.76)**	(1.08)	(0.24)	(3.02)**	(1.45)	(0.97)	(1.21)
Log Birth Cohort Ratio		-0.0636		0.00108				
* Countries Crossed		(3.91)**		(0.90)				
Birth Cohort Ratio, US Only					0.128		0.278	0.141
					(3.94)**		(4.27)**	(4.48)**
Dyadic Distance						-0.041	-0.012	
						(0.67)	(0.25)	
Dyadic Distance, US Only						-0.098	-0.245	
						(4.20)**	(5.08)**	
Birth Cohort Ratio * Distance, US only							-0.055	
							(4.12)**	
Island, US Only								-0.830
								(3.75)**
Birth Cohort Ratio * Island , US only								-0.257
								(6.56)**
Observations	1804	1804	1082	1082	3022	3022	3022	3022

All regressions use birth year, origin country, and census year fixed effects plus linear and quadratic age terms. The pooled regressions include destination fixed effects. Regressions are weighted by the size of the birth cohort.

* significant at 95%, ** significant at 99%, t-statistics in parentheses and SEs clustered by origin/destination dyad.

Table 8: Economic and political shocks and bilateral migration rates

	Type of Shock:					
Dependent Variable: Annualized migration rate over census interval, percent.	**Annualized # of Serious Natural Disasters (per '000 square km.)**		**Annualized # of Sudden Stops**		**Annualized Civil Conflict**	
Log Birth Cohort Size Ratio	0.116	0.076	0.047	0.152	0.062	0.054
	(1.61)	(1.23)	(0.59)	(1.72)	(0.71)	(0.58)
Log GDP pc Ratio at Age 16	0.025	-0.097	0.046	0.097	0.036	-0.018
	(0.47)	(1.57)	(0.88)	(1.64)	(0.55)	(0.29)
Shock	-2.373	-82.024	-0.793	-1.701	0.255	0.151
	-0.64	(2.26)*	(1.61)	(1.87)	(2.48)*	(0.42)
Shock, US only	10.962	203.542	1.205	3.285	-0.404	-1.237
	(1.46)	(3.53)**	(1.81)	(3.55)**	(2.81)**	(2.21)*
Cohort Size Ratio * Shock		-14.819		-1.034		0.156
		(2.94)**		(4.39)**		(1.44)
GDP Ratio * Shock		1.852		-1.066		0.013
		(0.20)		(3.11)**		(0.08)
Cohort Size Ratio * Shock, US only		27.480		1.394		-0.498
		(4.64)**		(4.49)**		(5.21)**
GDP Ratio * Shock, US only		12.127		1.462		-0.108
		(0.80)		(3.67)**		(0.50)
Years since cohort turned 16	-0.006	0.014	-0.061	-0.047	-0.051	-0.028
	-0.18	(0.52)	(2.74)**	(2.26)*	(2.21)*	(1.08)
Years since 16 squared	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(1.52)	(1.63)	(1.56)	(1.69)	(1.63)	(1.74)
Observations	832	832	724	724	642	642
p-value on F-Test that the shock or the interaction between the shock and the cohort size effect is significant in U.S.:	0.0004	0.0036	0.1540	0.0253	0.1057	0.0022

All regressions calculated using five-year birthyear cohorts, with birth cohort, birth country, destination country, and census wave fixed effects included in all specifications. Interactions of Cohort Size ratio*US only and GDP ratio*US are included in columns 2,4,and 6 but not reported. Regressions are weighted by the size of the birth cohort.

* significant at 95%, ** significant at 99%, t-statistics in parentheses and SEs clustered by origin/destination dyad.

# of Serious Natural Disasters is the sum, over census intervals, of earthquakes over 7.5 Richter, windstorms lasting a week or more, or landslides or volcano eruptions affecting more than 1000 people in sending country.

# of Sudden Stops is the sum, over census intervals, of Sudden Stops 1-4 from Cavallo data, defined as a fall in the CA surplus of at least 2 SD from sample mean, with standard deviations calculated four different ways.

Civil Conflict is from CSCW Monadic Armed Conflict data, calculated as the number of years between census intervals in which a serious conflict exists (Extra-state, Intra-state, Internal, or Internationalized Internal) that killed over 1000 people in the sending country.

Table 9: Migration networks and bilateral migration rates

	(1)	(2)	(3)	(4)
Dependent Variable: Annualized migration rate over census interval, percent.	**Basic**	**Migrant Stocks**	**Labor Supply & Migrant Stocks**	**US Migrant Stocks**
Log Birth Cohort Size	0.114	0.088	-0.053	0.106
	(1.84)	(1.86)	(0.55)	(2.33)*
Log GDP pc Ratio at Age 16	0.038	0.020	-0.052	0.036
	(0.67)	(0.39)	(0.45)	(0.72)
GDP pc as of year of census	0.000	0.000	0.000	0.000
	-0.34	(0.25)	(0.31)	(0.43)
Years since 16	-0.021	-0.029	-0.028	-0.017
	(0.59)	(1.03)	(0.98)	(0.62)
Years since 16 squared	-0.001	-0.001	-0.001	-0.001
	(1.61)	(1.63)	(1.65)	(1.67)
Log earliest observable stock of migrants		0.108	0.124	0.059
		(6.52)**	(6.82)**	(2.70)**
Earliest stock * Log Birth Cohort Size			0.013	
			(1.80)	
Earliest stock * LogGDP Ratio			0.007	
			(0.69)	
US * Earliest stock				0.065
				(4.31)**
Observations	832	832	832	832
All regressions calculated using five-year birthyear cohorts, with birth country, birth cohort, destination, and census wave fixed effects. Regressions are weighted by the size of the birth cohort.				
* significant at 95%, ** significant at 99%, t-statistics in parentheses and SEs clustered by origin/destination dyad.				
Weighted mean of dependent variable in Canada (omitted country): .006				

Table 10: Effect of adjacent cohorts on bilateral migration rates

Dependent Variable: Annualized migration rate over census interval, percent.	**All**	**USA**	**CAN**	**SPN**	**UK**
Log Birth Cohort Size Ratio	0.071	0.473	0.026	-0.508	0.008
	(0.97)	(4.16)**	(1.26)	(1.92)	(0.03)
Log GDP pc Ratio at Age 16	0.022	0.186	0.013	-0.091	-0.053
	(0.41)	(3.45)**	(1.75)	(1.70)	(0.74)
Log GDP pc in year of census	0.000	0.000	0.000	0.000	0.000
	(0.36)	(0.64)	(0.33)	(0.10)	(1.03)
Log origin birth cohort size, (next/this)	7.343	24.069	4.452	-6.899	6.438
	(1.19)	(0.89)	(1.24)	(1.58)	(1.92)
Log origin birth cohort size, (this/last)	-12.286	-58.153	-4.183	7.842	-1.264
	(1.87)	(2.05)	(1.33)	(2.19)*	(0.52)
Years since cohort turned 16	-0.021	-0.023	-0.001	0.009	0.013
	-0.59	(0.58)	(0.55)	(0.53)	(1.03)
Years since 16 squared	-0.001	-0.001	0.000	-0.001	-0.001
	(1.61)	(2.35)*	(1.74)	(1.68)	(0.74)
Observations	805	443	252	80	30

All regressions calculated using five-year birthyear cohorts. Birth country, birth cohort, and census wave fixed effects included in all specifications, plus Destination country FE in the first column. Regressions are weighted by the size of the birth cohort.

* significant at 95%, ** significant at 99%, t-statistics in parentheses and SEs clustered by origin/destination dyad.

Table 11: Lagged effects of shocks and bilateral migration rates

	Type of Shock:					
Dependent Variable: Annualized migration rate over census interval, percent.	**Annualized # of Serious Natural Disasters**		**Annualized # of Sudden Stops**		**Annualized Civil Conflict**	
Log Birth Cohort Size Ratio	0.173	0.089	0.436	0.367	0.377	0.356
	(1.61)	(0.50)	(2.89)**	(1.95)	(2.01)	(1.88)
Log GDP pc Ratio at Age 16	0.035	0.038	0.163	0.155	0.145	0.121
	(0.37)	(0.32)	(1.90)	(1.55)	(1.19)	(0.80)
Shock	-0.337	-0.407	-0.417	-1.312	0.287	0.857
	-1.93	(0.37)	(1.19)	(1.22)	(2.44)*	(1.02)
Shock, US only	0.677	1.228	0.842	0.821	-0.398	-0.642
	(3.68)**	(2.56)*	(1.43)	(0.72)	(2.72)**	(2.18)*
Lagged Shock	-0.234	-0.388	-1.006	0.578	0.036	0.123
	(3.49)**	(1.48)	(1.25)	(0.97)	(0.26)	(0.22)
Lagged Shock, US Only	0.256		1.269		-0.107	
	(2.96)**		(1.67)		(0.76)	
Age	0.004	-0.012	-0.033	-0.023	-0.027	-0.030
	-0.08	(0.18)	(0.89)	(0.67)	(0.80)	(0.77)
Age Squared	0.001	0.001	0.000	0.000	0.000	0.000
	(2.26)*	(2.17)*	(1.60)	(0.93)	(0.53)	(1.00)
Cohort Size Ratio * Shock		0.177		-0.084		-0.141
		(0.75)		(0.30)		(1.08)
GDP Ratio * Shock		0.065		-0.358		0.268
		(0.15)		(0.88)		(0.77)
Cohort Size Ratio * Lagged Shock		0.006		-0.055		0.056
		(0.09)		(0.29)		(1.10)
GDP Ratio * Lagged Shock		-0.191		0.232		0.018
		(1.06)		(0.72)		(0.09)
Observations	515	515	434	434	376	376

All regressions calculated using five-year birthyear cohorts, with birth cohort, birth country, destination country, and census wave fixed effects included in all specifications. Interactions of Cohort Size ratio*US only and GDP ratio*US are included in columns 2, 4, and 6 but not reported. Regressions are weighted by the size of the birth cohort.

* significant at 95%, ** significant at 99%, t-statistics in parentheses and SEs clustered by origin/destination dyad.

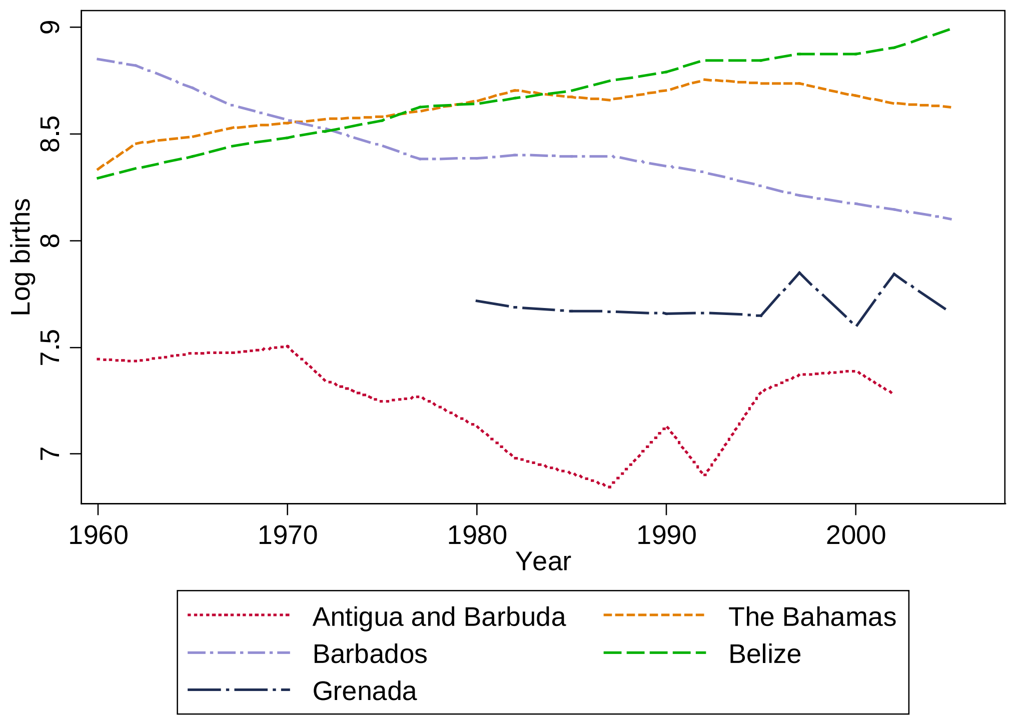
# of Serious Natural Disasters is the sum, over census intervals, of earthquakes over 7.5 Richter, windstorms lasting a week or more, or landslides or volcano eruptions affecting more than 1000 people in sending country.

# of Sudden Stops is the the sum, over census intervals, of Sudden Stops 1-4 from Cavallo data, defined as a fall in the CA surplus of at least 2 SD from sample mean, with standard deviations calculated four different ways.

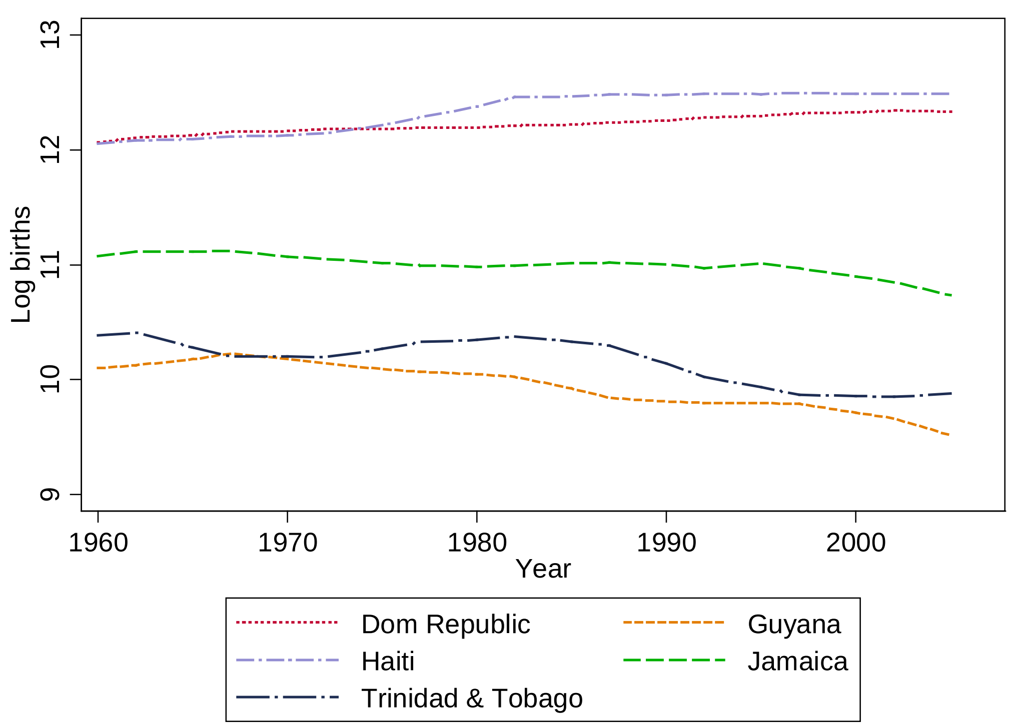
Civil Conflict is from CSCW Monadic Armed Conflict data, calculated as the number of years between census internals in which a serious conflict exists (Extra-state, Intra-state, Internal, or Internationalized Internal) that killed over 1000 people in the sending country.

Figure 1: Number of births by country, 1960-2005

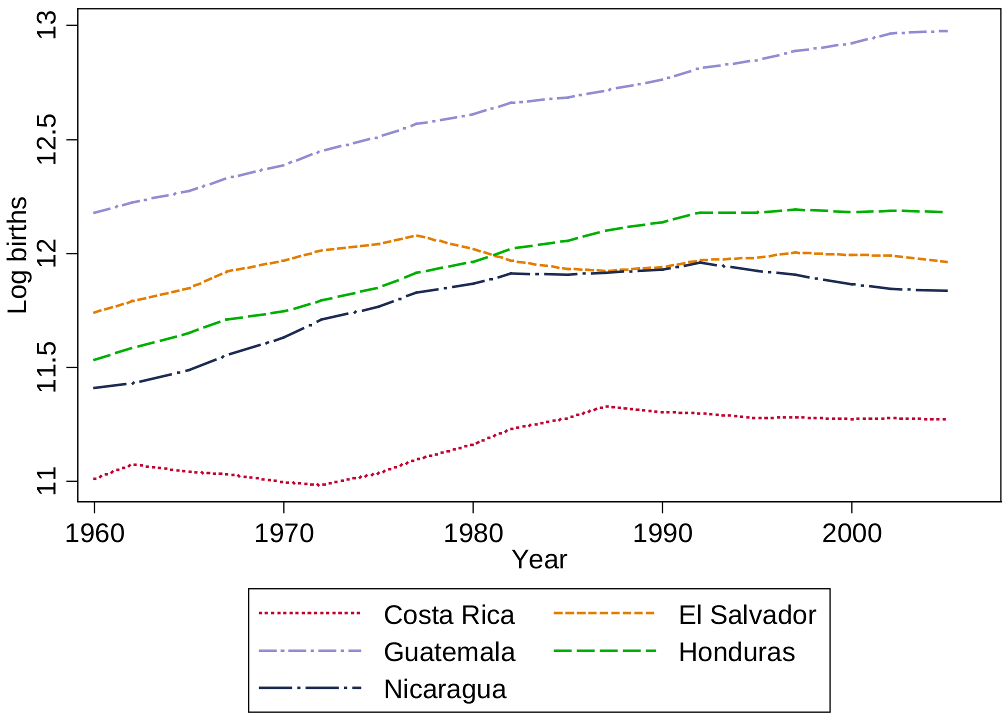
(a) Smaller Caribbean Basin Countries



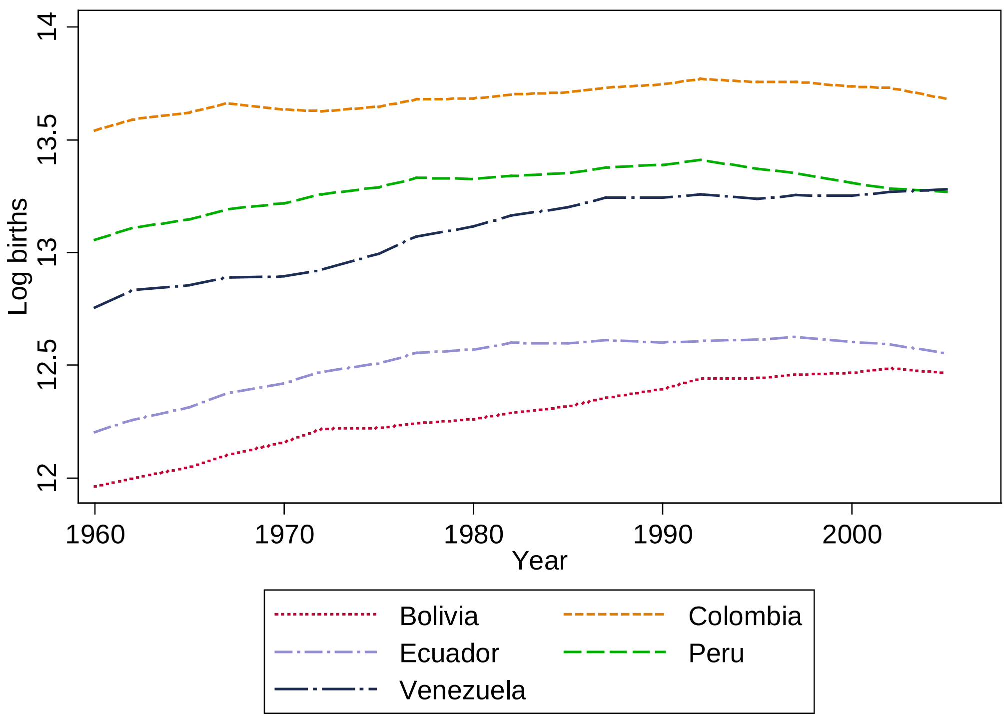
(b) Larger Caribbean Basin Countries



(c) Central America



(d) Andes



(e) Southern Cone

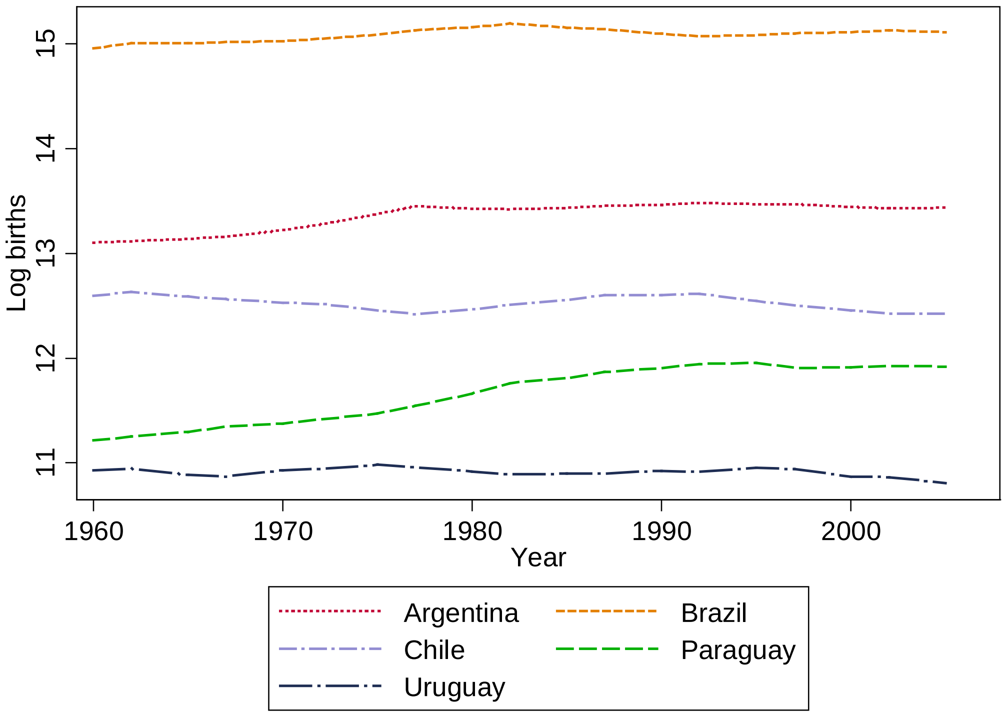


Figure 2: Average Migration by Distance from US