Exporting Goods, Not People?

The Impact of Trade Liberalization on Migration Flows from the Americas to the United States

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Abstract:

In response to surging migration rates, politicians have proposed trade policy with migrants' origin countries as a strategy to curb migration flows. The underlying rationale is that trade liberalization brings the necessary economic development and employment opportunities to prevent migration. This research scrutinizes this assertion by using a panel dataset of trade and migration flows between 25 countries in the Americas and the United States for the 1996-2019 time period. The research builds on a gravity model of migration and uses average weighted tariffs as instrument for total trade flows to avoid simultaneity issues. The paper deploys two novel measures of migration: US border patrol apprehensions and asylum applications. Contrary to the political narrative, the results point to a complementary relationship between trade and migration. However, the effect is limited, with a one percent increase in trade provoking only a 0.0404 and 0.0272 increase in asylum applications and border apprehensions respectively. Factors like pre-existing migration stocks, GDP per capita and population prove to be far more important indicators for migration flows. More specifically, the results indicate that the relationship between trade and migration is driven primarily by rising US agricultural exports to the region. Many small-scale farmers in the region were dispelled from the market by cheap subsidized exports from the US forcing them to migrate.

Keywords: International migration, international trade, trade policy, economic development, gravity model
JEL classification: F2, F15, F16

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Introduction

During negotiations on the North American Free Trade Agreement (NAFTA) between Mexico, the United States (US) and Canada, former Mexican president Carlos Salinas famously postulated that the country wanted "to export goods, not people". His rationale was that the agreement would jump-start the country's development, providing additional jobs and higher wages and thus preventing the outflow of Mexican workers to the US. The US and the European Union (EU) have indeed adopted a focus on free trade agreements (FTAs) with migrants' origin countries as part of their strategy to curb migration flows. With global migration on the rise due to climate change, insecurity and economic inequality, it becomes an even more relevant question whether trade policy can be used to prevent people from migrating in the foreseeable future. Therefore, this primary aim of this research is to assess the following research question: What is the effect of trade liberalization between the US and the Americas[1] on migration flows from that region to the US?

It is evident that there is a strong relation between international trade and international migration considering that they are two key facets of globalization. However, there exists considerable debate over the nature of the causal relationship of trade on migration. Neoclassical economists argue that trade brings about wage convergence and this decreases incentives to migrate (Mundell, 1957). Critics point out that trade and migration may be complements due to technological differences between trading countries, changes in costs to migrate and adjustment costs associated with trade liberalization (Markusen, 1983; Schiff, 1994; Lopez & Schiff, 1996). Another line of reasoning argues that the impact of trade on migration diverges depending on the level of development of the origin country (Clemens, 2014; Dao et al., 2018). At lower levels of income, trade liberalization lifts budgetary constraints to leave, whereas for higher levels increased economic opportunity provides an incentive to stay.

There exists limited empirical literature that analyses the causal impact of trade on migration, and this paper aims to enrich this strand of literature through several important ways. Firstly, this research departs from cross-country comparisons that consider multiple destination

[1] I use the term "Americas" for the subset of origin countries used in the research. For an overview of this group of countries in the sample, I refer to Appendix B.

countries, by focusing on only one destination country, the US (e.g. Menard & Gary, 2017; Ghani et al., 2018). One particular concern of studies with multiple destination countries is that comparison of migration data is problematic, since different countries use different methods and definitions to measure migration levels. An additional benefit of the one destination approach is that it allows me to factor out any "push factors", such as changes in the restrictiveness of immigration policies, that attract migrants to a destination country by including year fixed effects. The choice for the US specifically is justified by the fact that it constitutes the principal migration destination for the set of countries considered in the research, limiting the 'multilateral resistance' effect trade policy may have on migration to third countries. Simultaneously, this set of countries experienced a period of substantial trade liberalization during the timespan of the research (from 1996-2019), hallmarked by the entry into force of NAFTA in 1995. This gives the research variability in terms of the degree of trade liberalization among and between countries.

The second main contribution of this research to the literature is that it shifts from a focus on regular to irregular migration. Previous research has deployed deviations in migration stocks as dependent variable (e.g. Mahendra, 2014; Campaniello, 2014). Although data quality is high, there are several caveats concerning this variable, such as inclusion of return migration, migration to third countries and legal changes in status of migrants. Focusing on one destination country opens up the possibility to include new types of dependent variables that measure irregular migration: asylum applications and apprehensions by the US border patrol. Despite lower data reliability and coverage, the benefit of these variables is that they do not suffer from the same issues as changes in stocks, since they are based on flow metrics. What is more, analyzing irregular migration is especially crucial from a policy perspective since distinct mechanisms may apply for them and governments seek to limit precisely these flows.

A third channel through which this research distinguishes itself from existing research is by tackling the issue of simultaneity bias related to assessing the causal link running from trade to migration. Multiple studies confirm that migration increases trade flows between home and destination country by lowering transaction costs and preferences for goods from the home country (Gould, 1994; Genc et al., 2011). Many empirical studies disregard this reverse causality issue (e.g. Akkoyunlu, 2009; Ghani et al., 2018). To overcome this problem, I use average weighted tariffs, which is likely to influence firms' decision to export without directly

influencing migration flows, as an instrument for total trade. One limitation of my approach is that it does not rule out the possibility that other features of FTAs besides increasing trade flows, such as dispute settlement mechanisms or maintaining certain trade barriers, influences the results. Thus, the results should be interpreted in a broader sense as also reflecting the structure of FTAs between the US and Americas.

For my empirical strategy, I rely on a gravity model-based approach, in which border apprehensions and asylum applications are both used as dependent variables and population, trade and distance are the key explanatory variables. In addition, I apply a set of control variables commonly used in the migration literature in subsequent specifications of the model. The baseline model uses a two-staged-least-squared (2SLS) approach, in which trade is instrumented by average weighted tariffs. I deploy origin-country- and year-fixed effects to account for any unobserved heterogeneities. The robustness of the results is checked by aggregating deeper lags, splitting imports and exports, distinguishing between agricultural and non-agricultural trade and dividing the sample based on income level.

The results point to a complementary relationship between trade and migration. A one percent increase in bilateral trade between origin country and the US is accompanied by a 0.0404 and 0.0272 percent rise in asylum applications and border apprehensions respectively. Although statistically significant, the economic magnitude of this effect is marginal, and as such should also not be interpreted as indicative of trade protection as effective strategy to limit migration flows. Pre-existing migration stocks, natural disasters or GDP per capita are found to be far more important determinants of migration flows. Noteworthy, the structure of FTAs between the US and the Americas may play an important role in the outcome of the results. Suggestive evidence of this is that agricultural trade provokes a six times larger response in asylum applications than non-agricultural trade, and US agricultural exports specifically prove to be an important determinant of rising migration flows. This relates to unfavorable trading terms for the agricultural sector in the Americas in many FTAs, including trade protection of key American sectors and unfair competition by cheap subsidized US agricultural products.

The paper is structured as follows. First, I provide a background to the topic by giving an overview of trade liberalization between the Americas and the US. Next, I shine light on the most salient theoretical and empirical literature on the causal relationship between trade and

migration. Subsequently, I describe my empirical strategy and data. Following that, the results are presented, which are substantiated by several robustness checks. Finally, I conclude by critically reflecting on my results.

Background

This research focuses on trade liberalization between the US and the Americas, which is particularly interesting since there have historically existed high outflows of migration from the Americas to the US, while both parties have engaged in a period of trade liberalization in the last few decades. This section reviews the distinctive context of trade liberalization between the US and the rest of the Americas to understand how this may have impacted migration patterns in the region.

Content of FTAs between US and Americas

Since the 1990s, there has been a proliferation of free trade agreements between the US and the Americas. Kickstarted by the infamous NAFTA agreement between the US, Mexico and Canada in 1995, agreements with Chile (2005), Honduras, Nicaragua, El Salvador, Dominican Republic, Costa Rica & Guatemala[2] (2006), Peru (2007) and Colombia & Panama (2012) were concluded over the years. Several other countries in the region also experienced trade liberalization with the US, albeit not formally laid down in an FTA. The Inter-American Development Bank (IDB) (2018) calculates that between 1990 and 2016 average tariff cuts in the region were 56 percent. A focus on FTAs was part of the Washington Consensus, a neoliberal policy doctrine that emerged in the second half of the 1980s across the Americas as a response to poor economic performance. Other policy recommendations included macroeconomic prudence, privatization, deregulation and flexible exchange rates.

In econometric analyses, a multitude of different policies adopted simultaneously is problematic, since it becomes difficult to isolate the effect of one specific policy. Most policies that were part of the Washington Consensus were implemented during the 1980s. Although varying in timing and intensity across countries, the initial reforms concentrated on economic stabilization by managing inflation through stricter monetary policy, cutting public budgets and

[2] Collectively known as the CAFTA-DR trade agreement

increasing the tax base (Williamson, 2004). For example, economic activity of state-owned enterprises in Latin America dropped by half from 1985 to 1995 (Chong & López-de-Silanes, 2005). Limited tariff reductions were implemented during the end of the 1980s, yet trade liberalization through free trade agreements only really picked up at the end of the 1990s and the start of the 2000s. This heralded a new era of policies in which the objective was to integrate economies into the global economy. A reason for this delay is that for many countries free trade agreements served as a signal to commitment to other neoliberal policies of the Washington Consensus to attract foreign direct investment (FDI). As such, I consider the timeframe of my economic analysis sensible (1996-2019), starting when the first FTAs were concluded. Trade liberalization certainly is not the only policy change, with a focus on FDI inflows as most noteworthy. Nonetheless, the intensity of other reforms associated with the Washington Consensus is much lower during the time period of the analysis, limiting the distortionary impact these reforms may have on the results.

What generally stands out among this set of FTAs is the power difference between the United States and other signatories in terms of economic size, export capacity, technological development and agricultural production. This imbalance created an enormous amount of bargaining power for the United States in the trade negotiation process, allowing it to pressure for rules perceived to benefit the US and its private sector. In an empirical assessment, Freund (2003) confirms that there exists limited reciprocity in so-called "North-South" free trade agreements, with richer and larger countries being able to extract larger trade concessions from poorer and smaller countries. Tariff reductions were indeed significantly larger on US exports than on imports, as can be observed in Figure 1, showing the development of pooled average tariffs over time. In part, this pertains to the fact that the US had already previously granted many countries preferential trading access through the Caribbean Basin Initiative and the US Generalized System of Preferences. In 1993, prior to NAFTA coming into force, 50 percent of Mexican exports already entered the US duty free (Villareal & Fergusson, 2014). Higher tariff reductions on US exports have translated into higher growth compared to US imports, of which Figure 2 gives preliminary evidence for the signatories of the CAFTA-DR agreement.

A particular aspect of trade protection that is sustained in all agreements by the US is domestic subsidies for production and export, specifically in the agricultural sector. Vice versa, the agreements entailed the removal of agricultural price supports and subsidies by Latin American

governments (Villareal & Fergusson, 2014; IDB, 2018). Walia (2020) argues that Latin American markets have been swamped with cheap subsidized US agricultural exports, threatening food security in rural areas and provoking the displacement of millions of farmers and Indigenous people. She estimates that 1.3 million Mexican farmers were pushed into bankruptcy in the years following NAFTA adoption. Another example of unfair trade practices embedded in the agreements is that tariff barriers and rules of origin-restrictions were continued for several sensitive sectors. In the sugar sector, in which Latin American countries enjoy a comparative advantage, the US maintained prohibitively high tariffs. In contrast, other signatories were not allowed to exclude any product from tariff phase out (Salamanca, 2009; Jaramillo & Lederman, 2006). In addition, a subset of strict non-tariff barriers, such as traceability and testing requirements, on exporting processed and industrialized products to the US remained in place, which further hampers the export capacity of especially those products on which value can be added.

What then explains the policy rationale for accepting a deal on unfavorable conditions by Latin American countries? Trade-enhancing policies in force, such as the Caribbean Basin Initiative, mainly existed due to US' benevolence and were not legally binding regulations. Thus, the US Trade Representative could threaten to remove existing trade privileges if countries did not comply, effectively coercing countries into agreeing to less favorable terms decided by the US (Garcia, 2008). As mentioned before, the agreements also constitute an external commitment that imply limited government intervention in the economy. As such, Levy (2009) explains that a key function of the US-Peruvian FTA was to lock in broader liberal economic reforms part of the Washington Consensus to ultimately stimulate FDI inflows. Especially in weak institutional environments, this supports governments' credibility. Lastly, FTAs also reinforced the interests of the region's economic business elite, the same group who had the political power to sway the decision-making process in favor of them (Finley-Brook, 2012).

To further boost investment, the set of FTAs between the US and the Americas included "deep integration" regulations, which protect investors' rights through dispute settlement mechanisms. These mechanisms give multinational companies enhanced power over signatory governments. Globally, Latin American and Caribbean countries are among the most affected by such arbitration. Investors have won 70 percent of their cases against these countries, obliging them to pay 20 billion dollars to multinationals over the last decade (Walia, 2020).

This erodes the sovereignty of the state and hence its capability to protect citizens' rights, to provide necessary services or even to maintain social order (Finley-Brook, 2012). Notably left out of the negotiations were provisions that covered the free movement of persons and migrant labor, nor provisions on labor rights and environmental rights, as these topics were deemed too controversial (Andreas, 2013).

Impact of FTAs between US and Americas

A common trend throughout the set of FTAs is a heterogeneous impact on rural and urban population. Following the ratification of the CAFTA-DR agreement, many small-scale Central American farmers could no longer compete with subsidized prices from large multinationals. Many indebted farmers across the region lost their lands to multinationals or large agribusinesses focused on monoculture export-oriented commercial crops such as palm oil, sugar and the mining industry (Finley-Brook, 2012). An analogous shift has occurred in Mexico after NAFTA's entry into force, where many displaced farmers have taken jobs in US owned apparel factories that moved to Mexico after NAFTA. In *maquillas* or apparel factories, laborers often work long hours under poor working conditions for minimal wages**.** Real wages for Mexico were identical in 2012 as in 1994, growing only 2.3 percent over 18 years, and barely above their level of 1980 (Weisbrot et al., 2014).

The region's urban population, net food consumers, benefitted through lower prices of agricultural staples. A report by the Food and Agricultural Organization (FAO) (2020) of the United Nations estimates that removing trade protection has represented an average reduction of 4.4 to 8.7 percent of the total costs of a nutrient adequate diet for the CAFTA-DR signatories. Even so, the report also notes that increased dependency on volatile international markets may contribute to food insecurity among the poor. Key beneficiaries of FTAs have been export-oriented companies and US multinationals. In Mexico, a sharp rise in foreign direct investment to Mexico, increasing from $15.2 billion in 1993 to $92.8 billion in 2019 (Chatzky et al., 2020), was mainly geared towards export promotion. Regional inequality has accelerated following NAFTA-implementation, with the industrial north benefitting from this growth in FDI and rising wages, while the agrarian south failed to compete with US agricultural imports (Guillen, 2014). Carlos Barreda (2008), a Honduran economist, argues that the gains of trade liberalization in the region were concentrated in the hands of the oligarchic minority who counts

on the resources and privileges that the State grants to them, and therefore further exacerbated land and wealth inequality.

In conclusion, this overview of trade liberalization between the US and the Americas demonstrates that the gains from trade have been unequally distributed, mainly serving the interests of US companies and the local elite. Meanwhile, the plight of the most vulnerable further deteriorated because of the economic disruption caused by FTAs, which could have potential ramifications for migration.

Literature review

Before I turn to the empirical analysis, it is pivotal to understand what the theoretical and empirical literature suggests about the relationship between trade and migration. This section summarizes the most salient literature surrounding this topic.

Theoretical literature on trade and migration

The first to document on the link between international trade and international migration is the famous economist Robert Mundell (1957). He posits that trade and migration are perfect substitutes in a traditional Heckscher-Ohlin framework. Neoclassical trade theory is based on the premise that international trade emerges from differences in factor abundance between countries. Under autarky, this means that variations in factor endowments translate into differences in goods prices across countries. Opening up to free trade provokes a convergence of factor prices between countries, as both production factors can move freely across different sectors within a country. In addition, free trade is associated with welfare gains for both countries. Consequently, free trade reduces monetary incentives to emigrate to richer countries through an increase in welfare and converging wages between countries.

This notion is based on a "perfect" neoclassical trade model, yet new trade theory criticizes this by relaxing some of its assumptions. Markusen (1983) asserts that a fundamentally flawed assumption of the Heckscher-Ohlin framework is that trade is solely based on relative factor endowments. If trade emerges due to other reasons, such as differences in technology or economies of scale, then the nature of the relationship between trade and migration can change. Both technological superiority and economies of scale induce increased productivity and

therefore higher wages. Labor may then move to countries that can achieve superior technology and economics of scale, and thereby increase migration rates between dissimilar countries.

Aside from differences among countries that engage in trade, internal processes can also be relevant in understanding the effect of trade liberalization on migration. Adjustment costs associated with economic change are neglected in the standard neoclassical model, that suggests that production factors can move freely across sectors (Mundell, 1957). In reality, following trade liberalization many workers are displaced and entire sectors may collapse (Aguiar et al. 2007). For most laborers, it is not an option to simply move from a dying sector to a thriving industry, as this involves significant retraining costs. As workers must search for new occupation, the reluctance to move is lower. The extent to which a country limits this type of migration then crucially depends on its ease of moving production factors across sectors and cushioning the negative impact of trade liberalization (Zi, 2017). Thus, the relationship between migration and trade may be complementary if adjustment costs are considered.

Schiff (1994) adds two distinct features to the neoclassical model that individuals experience when considering to migrate: migration costs and information asymmetries. Neoclassical trade theory assumes that there are no costs associated with migrating, whereas migrating involves significant costs, such as transportation costs and informational costs. Trade may then improve transportation links between home and destination countries, hence lowering migration costs. In addition, increased trade between two countries indicates stronger connections, which could reduce migrants' informational barriers to migrate (McKenzie, 2017). Complementarity between trade and migration is then greater when baseline migration costs are high, as the binding constraint to migrate is larger.

Multiple studies point to an inverted U-shaped relationship, also known as the "migration hump hypothesis", between income and migration (Clemens, 2014; Dao et al., 2018). At low levels of GDP per capita, capabilities to migrate are low due to resource constraints, while at higher levels the monetary incentive to migrate decreases. As trade liberalization generally raises average income per capita, its effects on migration may then depend on baseline-level of income. An empirical assessment finds that migration and rising income levels are positively correlated up till around a level of $8,000 per capita, while at higher levels of income the relationship reverses (Clemens, 2014). However, this study is based on between-country

estimates, and there exists considerably less evidence for within-country estimates. Benček & Schneiderheize (2020) question the very existence of the migration hump, as they find a negative relationship between income and emigration in a fixed effects panel data set. To position itself in this debate, the migration hump hypothesis will be analyzed in the context of trade liberalization in this paper.

The aforementioned studies do not explore how trade liberalization affects migration flows per skill type. Lopez & Schiff (1998) argue that tariff reductions may provoke a disproportionally larger emigration rate of unskilled laborers. For the unskilled, rising wages due to trade liberalization may lift credit constraints to migrate, whereas incentives for the skilled to migrate remain unchanged. In contrast, Acharrya et al. (2019) proclaim that trade liberalization could raise the rate of emigration of skilled workers due to a concomitant decrease in their respective wages vis-à-vis unskilled laborers. This result stems from the assumption that unskilled labor is relatively abundant in migrants' origin countries. Production of goods that utilize this production factor intensively will experience larger growth following trade liberalization, thus increasing the demand for unskilled labor simultaneously. Another reason why trade liberalization could precipitate an outflow of the high-skilled is the need for trade facilitation between both countries, especially if richer countries foment such skilled immigration (Faini, 2004).

In addition to the skill level of migrants, trade liberalization may have differing impacts depending on which sectors are affected by it. As there exist limited alternative job opportunities in rural areas, agricultural tariff liberalization is more susceptible to increased migration than industrial tariff liberalization (de Haas et al., 2019). Rural farmers that become displaced may be compelled to migrate in search for new employment opportunities. Conversely, workers in the manufacturing sector can often find new occupations without having to move. An analysis by Villareal & Hamilton (2012) on internal migration patterns in Mexico following economic liberalization reveals that displaced rural workers were significantly more likely to emigrate than urban workers. The level to which rural-urban migration then spills over into cross-border migration relies on factors such as budgetary constraints and the availability of domestic employment opportunities (de Haas and Fransen, 2018).

Although neoclassical trade theory predicts that trade and migration are substitutes, several authors have challenged this assertion by relaxing its assumptions, pointing out that the relationship may also be of complementary nature. Thus, there appears to be a complex relationship between trade and migration based on several factors. For the remainder of the paper, I will focus on three important factors that shape this relationship: adjustment costs associated with trade liberalization, migration costs and the effects of trade on income levels.

Empirical literature on trade and migration

Few empirical studies have been conducted on the connections between trade policy and migration. This paucity of empirical literature stems from several reasons. Firstly, there exists no direct mechanism through which trade liberalization impacts migration. As reviewed in the previous section, the relationship is influenced by a complex system of indirect factors. This creates the associated risk of overcontrolling for outcome variables of trade liberalization. Secondly, the literature has identified substantial endogeneity issues, most prominently simultaneity bias. Migration affects trade flows in the opposite direction, because migrants lower transaction costs between the respective origin and destination countries, by for example reducing communication costs (Gould, 1994). Furthermore, migrants may increase the demand in the destination country for goods produced in the origin country (Genc et al., 2011; Parsons, 2012). Thirdly, data on migration flows is limited at best, as there exist concerns over the reliability of cross-country comparisons and the difficulty of estimating irregular migration flows. What follows in this section is a review of the literature that hitherto has been carried out in this research field.

The most used method to analyze the relationship between trade and migration flows is a gravity model approach (Ghani et al., 2018; Menard & Gary, 2017; Campaniello, 2014). Ghani et al. (2018) consistently estimate that trade and migration are complements but fail to rule out the possibility of reverse causality, as both variables are simultaneously decided in their regressions. In addition, migration and trade flows are based on five-year averages, which is far too long of a time span to find any generalizable estimates. Menard & Gary (2017) recognize the bidirectional relationship between migration and trade by using a simultaneous-equation modeling approach. Their paper finds no significant effect of destination-to-home country trade on migration, while home-to-destination trade is negatively associated with migration flows. This suggests that higher trade flows from origin to destination countries can indeed contribute

to limiting migration flows. One limitation is that they utilize unemployment rates as a control variable in regressions, which may constitute a bad control since improved labor market conditions are an outcome variable of increased trade flows between countries.

Whereas the foregoing studies focus on trade and migration flows between home and destination countries, Campaniello (2014) analyzes the effects of trade liberalization on migration between the Mediterranean partnership countries and the EU specifically. She attempts to solve the simultaneity issue between trade and migration by considering two instrumental variables: average tariff levels and bilateral exchange rate volatility, arguing that migration has no impact on both variables and their effect on migration only operates through increased bilateral trade. Her findings indicate that there exists substantial complementarity between trade flows and migration. Enhanced information becoming available about the destination country is the suggested reason for this result, although not controlling for pre-existing migrant communities may bias her results, since they could also provide information to prospective migrants. In an assessment of Turkish migration flows to Germany, Akkoyunlu (2009) also finds a complementary relationship between trade and migration. Their explanation is that development of trade linkages between both countries decreases costs associated with migrating, such as by improving transport and telecommunications connections.

Several studies have analyzed the impact of NAFTA on migration flows from Mexico to the US (Mahendra, 2014; Melchor del Rio & Thorwarth, 2009). Mahendra (2014) utilizes a synthetic control method, in which a control group based on a combination of Latin American countries is constructed to assess the counterfactual scenario of Mexico not joining NAFTA. Their results are in line with the migration hump hypothesis advocated by Clemens (2014). Migration levels from Mexico to US surged immediately following NAFTA implementation and witnessed a decline after fifteen years, as Mexico's GDP per capita had steadily risen. A novelty in Melchor del Rio & Thorwarth's work is that they utilize border apprehensions as a proxy variable for irregular migration flows. Moreover, to account for simultaneity bias, their work relies on a distributed lag method that allows for the fact that economic change associated with trade liberalization may be distributed over several time periods. Their findings indicate a positive relationship between trade flows and irregular migration, with an additional one billion dollars in bilateral trade provoking an influx of illegal migrants by 71,000.

In sum, the empirical literature points largely in the direction that trade and migration are complements. Still, the literature suffers from various empirical issues that this study will address. Firstly, few studies attempt to rule out the possibility of simultaneity bias. To eliminate potential reverse causality issues, this study will focus on average weighted tariff as an instrument for total trade flows. Moreover, the analysis will consider several lags of this variable, to deal with the fact that the impact of trade policy changes may materialize later. Secondly, studies tend to focus on regular migration flows by using changes in migrant stocks as dependent variable. This is problematic for several reasons, as will be explained later. Instead, this study will focus he shift away from regular to irregular migrants. This is interesting from a policy perspective, as public policy is primarily focused on deterring irregular migration flows. Thirdly, most studies consider only one estimator for migration flows, which is problematic considering data reliability issues surrounding migration metrics. This paper checks for the robustness of results by considering two dependent variables: border apprehensions and asylum applications.

Methods and data

Empirical strategy

The empirical strategy is based on a basic gravity model for migration. The gravity model has been deployed extensively throughout the migration literature (e.g. Ghani et al., 2018; Menard & Gary, 2017; Campaniello, 2014). The level of migration between two countries is likely to rise with size of the country and decrease with distance between them. Due to its high explanatory power, the gravity model is an adequate instrument to test the marginal influence of additional variables, such as trade liberalization in this analysis (Gen et al., 2011). This results in the following baseline empirical specification:

$$(1)\ lnMIG_{it} = \beta 1 lnPOP_{it-1} + \beta 2 lnD_i + \beta 3 lnTRADE_{it-1} + \beta 4 X_{it-1} + \alpha_i + \gamma_t + \varepsilon_{it}$$

in which subscripts *i* and *t* concern country of origin and year respectively. All explanatory variables are lagged by one period to account for simultaneity bias and the fact that variables may not instantly have an impact on migration rates. The first variables in the equation cover standard variables in gravity models; $lnPOP_{it-1}$, related to population size and lnD_i, distance

between the US and the specific country. My main variable of interest is $lnTRADE_{it-1}$, a trade specific variable in period t-1. In my initial analysis, the trade variable is total trade flows between countries. Due to simultaneity concerns, I deploy an instrumental variable approach in subsequent regressions, in which average weighted tariffs are used as an instrumental variable for total trade flows between countries. X_{it-1} is a vector that captures control variables related to conditions in migrants' home countries. For my baseline regressions, I use OLS pooled estimators with robust standard errors. To deal with the problem of heteroskedasticity due to within-group correlations I cluster the standard errors at the country-of-origin level in all regressions. In subsequent regressions, year- and origin-fixed effects ($\gamma_t$and α_i respectively) are added. Distance does not vary over time and is therefore excluded from the set of regressions that includes origin-fixed effects. Origin fixed effects capture any unobserved, time-invariant factors that impact migration, such as historical ties or geographical boundaries.

The research concentrates on one country of destination, the US. A principal reason for this is that there is limited comparability of national migration statistics across countries (Raymer et al., 2013), which renders a cross-country analysis difficult. Analyzing the US and the set of countries from the Americas is particularly interesting because the US conducted a series of free trade agreements with countries in this region throughout the time period (1996-2018) of the research, that being Canada & Mexico (1995), Chile (2004), Honduras, Nicaragua, El Salvador, Dominican Republic, Costa Rica & Guatemala (2006), Peru (2007) and Colombia & Panama (2012). As such, there exists considerable variability in the degree of trade liberalization within and between countries, which is crucial for the explanatory power of the research.

Because of the choice to focus on one destination country, the unit of interest for this research necessarily becomes migrants' origin countries. Hence, no destination country "pull factors" that attract migrants to a certain destination, such as job opportunities or the restrictiveness of immigration policies, are included in the specification. Time-variant changes in destination country conditions, such as a new president or a business cycle contraction in the US, will be captured by year fixed effects. One underlying assumption is that these pull factors have a similar effect on migrants from all countries in the sample. I argue that there exists substantial homogeneity in treatment of migrants from the countries in the sample. For example, no countries from the region bar Venezuela (albeit only for governmental officials) were included

in the Trump travel ban, which prohibited inhabitants from a group of countries from entering the United States altogether (Gladstone & Sugiyama, 2018). Still, there may exist differences between countries in their susceptibility to pull factors, such as migrants from high-income countries being less affected by more stringent migrant policies than low-income countries. GDP per capita is utilized as control variable to partially capture this effect.

A particular area of concern when considering only one destination country is multilateral resistance to migration. Multilateral resistance is related to the influence of third countries in determining migration flows between two countries (Anderson & Van Wincoop, 2003). Thus, if this analysis would only concern dyadic variables and ignore the influence of alternative migration destinations, this could bias the results. Multilateral resistance is limited for this research, because the US has little "competition" from alternative migration destinations for the set of countries under consideration. Out of all migration movements in the Americas, 74 percent have the US as final destination (OECD, 2017). One strategy to account for multilateral resistance is by including year fixed effects in the analysis, as these capture any changes in alternative migration routes throughout the region. Additionally, year fixed effects may be interacted with origin fixed effects to create consistent and estimable effects (Cameron & Poot, 2018; Ortega & Peri, 2013). However, this is not possible considering the focus of this research on only one destination country, since deploying interaction effects removes all variance. As an additional method of checking for multilateral resistance, I perform a specific robustness test that replaces the dependent variable with total asylum applications in Canada and Spain, the two principal migration destinations from countries in the sample after the US.

Another potential source of endogeneity is omitted variable bias associated with sending country conditions or "push factors", that may influence migrants' decision to move. If these factors are not accounted for, it may appear there is a link between trade liberalization and migration because they are both affected by these variables. As such, I consider a set of "push factors" as control variables which is commonly used throughout the migration literature, such as natural disasters, conflict and GDP per capita (e.g. Berthélemy et al., 2009, Moore & Shellman, 2007; Clist & Restelli, 2020; Menard & Gary, 2017). There may also exist specific connections between the sending and receiving country, such as diaspora effects. This could potentially influence both trade and migration movements, as migrant networks may improve

trade connections between origin and destination country and decrease adjustment costs for new migrants.

One issue that arises with the inclusion of potential control variables is that some variables are arguably endogenous, as they may constitute important transmission channels through which trade liberalization influences refugee flows and could therefore create a downward bias on the size of the trade coefficient. Unemployment rates are an example of this, which are anticipated to serve as an avenue through which tariff liberalization has an impact on migration patterns. Therefore, the set of control variables is limited to those variables that are used extensively throughout the migration literature. Still, this does not exclude the possibility that even these variables may consist avenues through which trade liberalization impacts migration.
As mentioned in the literature review, there exist a multitude of mechanisms through which trade liberalization may affect migration, such as decreasing wage differentials, loosening migratory budget constraints and the adjustment costs associated with trade liberalization. Through what specific causal mechanisms trade influences migration is beyond the empirical scope of this analysis, but taken together the results can provide preliminary evidence as to which of these effects dominates over others.

Countries and timespan

I test for the effect of trade liberalization on migration using panel data of bilateral trade variables and migration flows between the United States and sending countries from the Americas. The dataset covers 25 North, Central and South American countries for the period 1995-2019 (see Appendix A for a full list of the countries). I concentrate on these years, since data is not more broadly available for the main variables of interest. These years concern a period of substantial trade liberalization between the US and the sending countries. Other neoliberal reforms related to the Washington Consensus were in force already or implemented more gradually, rendering it an appropriate time period to analyze for the research.

This set of countries is considered since the US constitutes the principal migration destination for these countries, and there exist limited alternative destinations in the region. Unlike in Europe, transit migration to third countries, which could potentially bias the results, is not a severe issue for the US (Clist & Restelli, 2020). An estimated 74 percent of all migrants move to the United States in this region, with intraregional migration (10 percent) and Spain (8

percent) as the next most popular destinations (OECD, 2017). In addition, for most countries in the sample the US is also the main trading partner. Hence, trade liberalization with the US has a major impact on their economies. Exports to the US range from 75.1 percent of total in Mexico to 0.37 percent for Cuba, and 59.8 percent and 11.4 percent for imports respectively in both countries (OEC, 2021).

Dependent variable

Past empirical research on the links between trade and migration has concentrated on regular migration flows as dependent variable, by using data on variations in the stocks of legally registered migrants or refugees (Campaniello, 2014; Ghani et al., 2018; Dreher et al., 2019). The key advantage of stock data on migrant flows is that there is extensive coverage of this variable over time and across countries, and that data estimates are usually of higher quality since they are based on population censuses (Vogel & Kovacheva, 2011). Therefore, it is the dependent variable of choice for research that attempts cross-country comparisons. This research departs from this approach by using one destination country, allowing it to focus on alternative migration measures related to flows of irregular migrants. Irregular migration is referred to in this research as migrants that reach the United States "outside the regulatory norms of the sending, transit and receiving country (IOM, 2021)". Reliability of data on irregular migration flows is considerably lower, and therefore less commonly used in the literature (Kraler & Reichel, 2011). To account for this, I rely on two dependent variables to increase the robustness of the results: border apprehensions by the US Border Patrol and asylum claims submitted at the end of the year. Both dependent variables are expressed in logarithmic terms to allow for the existence of a non-linear relationship with the independent variables and to reduce potential heteroskedasticity and variance in the error term.

Both variables have strengths. Because both measures are based on flows rather than stocks, they are unaffected by return migration, births or deaths among existing migrants or changes in the residence or status of immigrants. Migrant stocks only include those asylum applications with a positive outcome, whereas asylum claims also capture those applications that are unsuccessful. For deviations in migrant stocks, it may be the case that migrants have long resided in a country before their status as a migrant becomes legal, whereas asylum claims and border apprehensions occur in the same year as a migrant enters the country. This is especially important since the research is interested in the effect of changes in trade policy on migration.

Furthermore, variation in stocks is influenced by return migration and migration to third countries. As negative values could be obtained, confounding the analysis of the empirical results. Focusing on irregular migration is also advantageous from a policy perspective. Deterring irregular (often more low-skilled) migration flows has been a US policy priority for decades, whereas regular and often more high-skilled migration has even been encouraged for some professions (Collins, 2021). The policy rationale from a migration perspective is that trade liberalization provokes an improvement in economic conditions and living standards that should discourage irregular migration flows. In addition, irregular migration is also more important in terms of sheer scale, as the bulk of migration to the US has been irregular in recent years (Budiman, 2020).

There exist several weaknesses for both variables as well. Both border apprehensions and asylum applications represent estimates of the real flow of (irregular) migrants. Including them together gives a more comprehensive picture, since they are both approximations of the total flow at best. The correlation of 0.35 between both variables is substantial, but also small enough to include both asylum applications and border apprehensions as dependent variables in the analysis. Both variables are liable to over-counting as the same individual may apply for asylum or attempt crossing the border several times. This risk is limited regarding asylum applications, as additional claims are not included in the sample if the first application has been filed in the same period (UNHCR, 2020). At the same time, border apprehensions may severely underestimate the total number of irregular migrants, as many migrants may cross the border without being apprehended. Another problem that both variables face is that for some migrants their country of origin is undocumented, which is pivotal information for this research. However, the number of migrants for which the origin country is unknown is very low, with only 1.2 percent for asylum applications and 0.2 percent for border apprehensions.[3] Despite these limitations, I argue that both variables can still be used as indicators of certain trends, especially if the measurement error and the independent variables are not correlated.

Asylum applications distinguishes itself from border apprehensions in that it also partially captures regular migration flows, as it also consists of those migrants that legally moved to the United States, but still await approval of their asylum status. Under the Trump Administration,

[3] This includes the total of migrants from all countries and not merely the total of migrants from the countries of the sample.

denial rates rose markedly compared to the Obama Administration, from 41 percent in 2016 to 72 percent in 2020 (TRAC Immigration, 2021). As denial rates differ substantially across countries, this gives even more reason to focus on flows of irregular migration instead of legally tracked deviations in migration stocks. Border apprehensions, on the other hand, pertains almost exclusively to irregular migration flows, as migrants are being detained due to missing legal migration status.

A specific limitation of the border apprehensions data is its short time frame (2005-2019), leading to a relatively low number of observations, and . What is more, apprehension data is significantly influenced by the effort made to detain migrants, which could make it a problematic indicator to proxy for overall migration movements (Massey & Pren, 2012). However, because of this study's focus on one country, year fixed effects may accurately capture differences in border patrol intensity, so long as deviations do not significantly alter across different sets of countries. One particular concern relates to readmission agreements conducted during the Trump Administration between Mexico and the US, that prevent individuals who arrive at the Mexican-US border from applying for asylum since they are already in a "safe third-country". This agreement concerns all nationals from third countries, and thus does not impact nationals' journey (except for Mexicans) to reach the US overland south differently (Fratzke, 2019). Another possibility is that border patrol intensity varies between different sections at the border, such as marine vis-à-vis overland. The overwhelming majority of migrants (98 percent) crosses the border at the southwestern land border between Mexico and the US, subjecting them to the same border patrol treatment. I compare the trend in apprehensions at the three main border sectors in Figure 3, suggesting a roughly analogous trajectory of border apprehensions at each sector.

Main independent variables of interest

The main independent variable of interest is trade flows. Data on imports and exports is retrieved from World Integrated Trade Solution Database (WITS) of the World Trade Organization (WTO). The dataset uses data reported by the importer, because exporters have a higher propensity to underreport trade because of duties and tariffs (Fouquin & Hugot, 2016). Both imports and exports are aggregated to reach a variable for total trade between origin country and the United States.

However, as mentioned, there exists considerable risk of reverse causality between trade and migration. Therefore, I deploy average weighted tariff between the United States and the sending country as instrument for trade. Data on average weighted tariffs is taken from WITS as well, and available from 1995-2019. This is a similar timespan as the most broadly available dependent variable, asylum applications. In the baseline regressions, I include both tariffs on US exports and imports to predict total trade. In subsequent regressions, I separate imports and exports to observe if there exist any differences.

Gravity model variables

The standard variables of the gravity model are included in the main regressions. Total population in the origin country is obtained from the World Development Indicators (WDI) of the World Bank. I utilize population and not also total GDP, as GDP per capita is one of the additional control variables and population size is more relevant for migration than economic size. Total population is anticipated to correlate positively with migration flows. Moreover, distance is taken from the CEPII GeoDist Database. This database calculates distance between two countries based on bilateral distances between the largest cities of both countries, those inter-city distances being weighted by the size of the city compared to the overall country's population (Mayer & Zignago, 2011). In line with previous literature, both variables are expressed in logarithmic terms, as they are expected to correlate non-linearly with the dependent variable.

Control variables

The broader literature on migration flows has shown that outflows depend on several key push factors, such as the age structure of the population, GDP per capita and political rights and civil liberties (Berthélemy et al., 2009; Parsons & Winters, 2014). What is more, several authors have found a significant effect of natural and manmade disasters and armed conflict on migration levels (e.g., Neumayer, 2005; Laczko & Aghazarm, 2009). Since the research concentrates on one destination country, no control variables are included for the destination country, as these factors are considered to have an equivalent effect across all sending countries.

Firstly, to capture the age structure of the population dependency ratio in the origin country is used, measured as the share of population below 15 as a percentage of total working population. This variable is gathered from WDI. A younger workforce is more prone to migrate in search

for employment, as they newly enter the labour market and are less fixated on staying in one place due to for example family considerations. Moreover, the wage differential also constitutes a stronger motive to migrate for young people, as there is more lifetime income left to accumulate by migrating at a younger age. Therefore, I anticipate the coefficient of dependency ratio to be positive.

Secondly, GDP per capita, also obtained from the WDI, is included to proxy for the overall state of development in the country and the wage differential between the sending country and the US. Higher income provides both more resources and less incentives to leave the country. GDP per capita can also partially capture a different treatment in immigration policies for migrants from high-income countries and low-income countries. I include only the level of GDP per capita and not growth, since growth may be one of the avenues through which trade policy impacts migration. The migration hump hypothesis, proposed by Clemens (2014), posits that GDP per capita is positively associated with migration rates up till a threshold level of $8,000, and for higher levels the relationship becomes negative. To account for this, I split the sample in two groups based on income levels in the robustness checks, one above the threshold and one below the threshold.

Thirdly, I utilize the Political Rights and Civil Liberties Index constructed by Freedom House to account for high levels of political terror and lack of civil rights as reasons for migrating. Both political rights and civil liberties are measured on a one-to-seven scale, with 1 constituting the highest level of freedom, and then added together so that the total score ranges from 2 to 14. I hypothesize that more authoritarian regimes increase migration aspirations, corresponding to a negative coefficient of this variable. Nonetheless, de Haas et al. (2019) argue that this variable could also produce a counterintuitive result, as the desire to migrate may be neutralized by administrative constraints that autocratic regimes put in place to hamper emigration of their citizens.

Fourthly, to proxy for the occurrence of natural and manmade disasters, I include a variable for the number of deaths associated with such events, which is expected to raise migration outflows (Naudé, 2010; Neumayer, 2005). As the variable is expressed in logarithmic terms, I replace all observations that amount to zero by one. Data is taken from the Emergency Events Database

(EM-DAT) compiled by the Centre for Research on the Epidemiology of Disasters (CRED), which includes a list of deadly natural and manmade events each year.

Fifthly, insecurity and crime also constitute principal motives for migrating. Previous literature includes a dummy variable for the occurrence of civil conflict (Clist & Restelli, 2020; Dreher et al., 2018). However, violence in the Americas is largely confined to non-war related insecurity instead of outright civil conflict, such as high rates of homicides due to drug-related violence. Therefore, I include the number of intentional homicides per 100,000 people, as a proxy for overall crime levels, as a control variable instead.

Sixthly and finally, pre-existing migration stocks can have a significant effect on current migration flows, for example through family reunification. What is more, they could have a profound impact on trade flows themselves through facilitating trade and lowering transaction costs (Gould, 1994). Therefore, I use the lagged and logged level of nationals from the sending country living in the US. The variable is lagged, because migration flows would otherwise have a direct impact on the stock level. The relationship is anticipated to be positive, as a larger diaspora attracts more citizens from the respective country by decreasing informational asymmetries on the destination country.

Results

Descriptive statistics

Table 1 (Appendix B) shows a summary of descriptive statistics, while full descriptions and sources are reported in Appendix D. The mean of US border patrol apprehensions is significantly higher than asylum applications, although this partly reflects a couple of large outliers for border apprehensions (Mexico is the biggest outlier, with significantly higher numbers than all other countries). One problem associated with gravity models is that if migration flows amount to zero, these observations will be dropped from the model due to the logarithmic nature of the model. Deleting these from the model becomes a problem if these observations are correlated with the error term. There are no "zero" observations for border apprehensions, and only sixteen for asylum applications, suggesting this is only a limited issue for this research. Therefore, I refrain from using Poisson Maximum Likelihood Estimators in

my base model. Overall, the data is highly balanced, with the notable exceptions of the border apprehensions and homicides. For the border apprehensions variable, limited data availability stems from the fact that the source only starts in 2005. For homicides, lack of data may purposely be withheld by national authorities which could pose a problem for the research, yet I believe the impact on the research to be negligible since this is not the main variable of interest. After merging the dataset, Cuba, the Bahamas and Barbados drop out from the sample due to missing data for some key predictor variables.

Figures 4 and 5 present scatterplots of trade and migration flows (for both border apprehensions and asylum applications). Both variables are divided by population as this is an obvious factor that influences both variables positively. I observe a positive correlation between trade and both migration variables, which appears to be stronger for border apprehensions than for asylum applications. No conclusions can be drawn based on this scatterplot, since there may still exist many omitted variables that influence both trade and migration, but it provides preliminary evidence that trade and migration are complements.

Figure 6 shows migration data over time for a select number of countries that conducted FTAs with the US during the timespan of the research. The graphs display a similar trajectory for both dependent variables. There are some exceptions: Mexico and Peru experience a different trend for asylum applications and border apprehensions, and 2019 sees a particularly high number of asylum applications for several origin countries. The red-dotted line indicates the entry into force of a free trade agreement. Migration rises sharply in the years after ratification for a few countries, including Dominican Republic, Chile and Guatemala. However, this surge in migration could be the result of other time-varying factors, such as the occurrence of the global financial crisis around the years the agreement entered into force. For other countries, such as Peru, Honduras and El Salvador, no such trend is visible on the short-term. For these countries, unobserved counterbalancing factors could be the reason for an absence of a rise in migration rates after trade liberalization. The effects of trade liberalization on migration can also materialize later, as trade liberalization involved a gradual reduction of tariff rates and the decision to migrate is often not taken spontaneously. Therefore, the results calls for further empirical analysis in the remainder of the paper.

OLS regressions

Tables 2 and 3 (Appendix C) show the results of regressing total trade flows on migration rates. As mentioned before, there exist substantial simultaneity concerns between trade and migration. Hence, this set of regressions only serves to establish a correlation and to obtain a general picture of the dynamics between both variables. Introducing a 2SLS approach in subsequent regressions aims to find a causal relationship.

Columns (1) and (2) of both tables constitute regressions that include only the standard gravity model variables and total trade for both dependent variables. In contrast to the scatterplot, I observe a negative and significant correlation between trade flows and migration. Both population and distance have high coefficient sizes, suggesting their prominence as two factors that influence both trade and migration.

When including the set of additional control variables in columns (3) and (4), the sign of trade flows flips for all regressions and the effect size decreases drastically, suggesting there exists significant omitted variable bias in the initial regressions. Both dependent variables confirm that trade and migration are complements, although this relationship is only weakly significant at the 10 percent level for three out of the four regressions. A one percent increase in trade flows is associated with a 0.027 to 0.245 percent increase in migration levels.

Adding origin fixed effects in columns (4) of both tables notably reduces both coefficient size and statistical significance of the trade variable, which indicates that for within-country estimations migration rates only weakly respond to increases in trade flows. GDP per capita and pre-existing migration stocks are strong indicators of migration rates in all four regressions, as their coefficients are both large and strongly significant. GDP per capita negatively impacts migration rates, which suggests that budgetary constraints to migrate are not binding for most observations. High crime rates and the incidence of natural disasters prove to be consistently important drivers of migration as well, whereas the relationship of political freedoms and age demographics with migration appears to be more ambiguous. The explanatory power of the model is high for both regressions with and without origin fixed effects, which suggests that the set of control variables used in the model is appropriate.

Instrumental variable

Considerable simultaneity bias exists in research on the effects of bilateral trade on migration. Migration may bolster trade through lowering transaction costs and migrants' preference for products from their countries of origin. As such, the set of regressions using total trade flows as main explanatory variable is not adequate for causal inference. To this end, I deploy an instrumental variable strategy, in which average weighted tariffs on both imports and exports from the US are used as instrumental variables for total trade flows between the US and the respective country.

To constitute a valid instrument, two important conditions need to be fulfilled. Firstly, average weighted tariffs need to have a substantial and consistent correlation with total trade flows. Naturally, tariff reductions correspond to higher trade flows between countries. Table 4 presents the results of the first stage regression, which corroborates that there is strong and significant relationship between average weighted tariffs and trade flows. I utilize both average weighted tariff on imports and exports from the US as instruments for total trade flows. Figure 1 shows the development of pooled average weighted tariffs over time, which confirms that there has been significant trade liberalization during the timespan of the research. Tariffs on US exports are consistently larger than US imports, but this gap has shrunk significantly over the years.

Secondly, the instrument needs to affect the outcome variable (migration flows) only through the instrumented variable (trade volumes). This condition is violated if there is a deal attached to tariff liberalization which directly limits migration flows between countries. Thus, I assume that governments decide on overall trade tariffs to affect trade and not migration flows. There exist no instances of free trade agreements between the US and respective countries that directly include provisions that hamper migration flows. Nevertheless, in 2019 the Trump Administration and the Mexican government allegedly struck a deal to curb migration from Mexico. In exchange, Mexico averted punitive US tariffs on its exports (Wilkinson and Bierman, 2019; BBC, 2019). If deals linking migration and tariffs would be more commonplace, this could potentially bias my results. Still, I argue that the primary objective of setting trade tariffs is of economic concern, and that there exists no direct link between trade tariffs and migration rates. At the same time, migration rates must not impact governments' decision to set tariff rates, thereby constituting a violation of simultaneity bias. Migrant

communities may, for example, actively lobby for better trade policies with their home countries. However, since I utilize flow measures for migration and not stock measures, this is not a particular concern for this research, as current migration flows cannot have an influence on lagged average weighted tariff.

There may also occur other concomitant policy developments, indirectly linking tariff reductions to migration rates. As mentioned in the background section, trade liberalization in the region was part of the Washington Consensus, that included further neoliberal reforms. Yet, most policies adopted under the Washington Consensus had already been put in place at the starting point of my economic analysis or developed more gradually, rendering the confounding impact of these policies limited. FTAs also include provisions that go beyond tariff reductions. Dispute settlement mechanisms and provisions to shield certain industries could have more broadly impacted the economy besides growing trade flows. What is more, the agreements provoked an increase in FDI inflows that is also captured by average weighted tariffs. Thereby, I cannot fully rule out the possibility that average weighted tariffs are endogenous instruments of trade flows, indirectly impacting migration through other channels than trade flows. To account for this, I weaken the exogeneity assumption of the instrument by including the same set of control variables in columns (3) and (6) of Tables 5 and 6. This allows for the possibility that both the instrument and outcome variable are affected by the control variables.

In Tables 5 and 6, I present the results of the 2SLS regressions for both dependent variables. Alternative specifications with and without origin fixed effects and control variables are reported alongside their OLS regression counterpart. One concern is that for some countries there only exists limited variability in within-country estimates of weighted average tariffs due to limited trade liberalization with the US, potentially rendering it a weak instrument. First-stage F-statistics range between 10.94-17.76, which is larger than the rule of thumb of 10 indicated in the literature for weak instruments (Stock & Yogo, 2005). I use the Hausman-test to examine the difference between OLS and IV estimations, which corroborates that there exists endogeneity in the OLS estimations (p-values are between 0.000-0.024, rejecting the null hypothesis of trade being exogeneous).

Looking at the main variables of interest, the IV-regressions substantiate the claim that growing trade flows provoke a simultaneous rise in migration flows, as there is a consistently positive

correlation between trade and migration across all specifications. However, the causal effect of trade flows on migration appears to be only marginal, as a one percent increase in trade flows is associated with a simultaneous increase in migration outflows of only 0.017 to 0.085 percent. Adding control variables in columns (3) and (6) of both tables reduces the size of the coefficient, but the coefficients are consistent enough to suggest that the instrument does not suffer from severe endogeneity issues. The size of the effect is also smaller for seven out of eight regressions compared to their OLS regressions. For within-country estimations, the effect appears to be smaller and less significant, losing significance at any level for the border apprehensions regressions. Across the board, asylum applications have a stronger effect size and significance than apprehensions. Distinct timespans for both variables could explain this, as asylum applications could cover years in which migration responds more heavily to trade. In addition, this may also relate to the fact that asylum applications partially capture regular migration flows. Regular migration may be incited following trade liberalization due to growing economic activity between countries. An example of this is the creation of a Mexican affiliate in the US, necessitating Mexican workers to move to the US.

In comparison to trade, the effect of previous migration is estimated to be much larger. A one percent increase in migrants already residing in the US is associated with a 0.939-1.628 percent increase in migration rates from that country. The coefficient size is at least fifteen times larger than for trade flows. With regard to economic factors, a one percent increase in GDP per capita is associated with an almost identical decrease in asylum applications. For border apprehensions the sign is also positive, although smaller and insignificant when including origin fixed effects. This can result from a more welcoming immigration policy towards migrants from higher income countries (e.g. Canadian migrants in the US), yet could also be linked to lower incentives to migrate at higher income levels.

Turning to demographic factors, population expectedly remains an important predictor of migration outflows. Population growth is expected to remain positive across much of Latin America (CEPAL, 2019), which renders this a pivotal factor in explaining the trajectory of future migration flows. Surprisingly, an ageing population correlates positively in the origin fixed effects estimations, yet this may stem from the fact that demographic changes only occur very incrementally. The result may also relate to the method in which the variable is calculated, as the variable is measured as the share of population below 15 as a percentage of total working

population. Instead, the share of workers that newly entered the labor market to total working population could be more relevant, as this group especially is more prone to migrate.

Political freedom explains differences between countries of origin, but it does not appear to be a strong factor in predicting within-country differences in migration outflows. Thus, in the short run improvements or deteriorations in political freedom do not significantly relate to migration rates. This is important from a policy perspective, as fomenting democratic institutions and combating corruption are two focus areas of Western governments to limit migration (Yaboke et al., 2021). Reducing violent crime, however, does appear to be an effective tool to curb irregular migration rates, as asylum applications respond significantly when including both sets of fixed effects.

One limitation of the inclusion of control variables is that they potentially constitute channels through which trade affects migration. For example, the economic disruption associated with trade liberalization could also provoke an increase in crime rates and thereby raise migration rates. Therefore, the coefficient size in the regressions of columns (3) and (6) in tables 5 and 6 is perhaps biased as well. The direction of this bias depends on which variables are more susceptible to this transmission channel effect. Given the initial reduction of the coefficient compared to the regressions without control variables, the coefficients in columns (3) and (6) are more likely to be underestimated than overestimated.

In the remainder of the paper, I will use columns (6) of tables 5 and 6 as a baseline to compare to other specifications. The reason for this is that including both year and origin fixed effects gives the most complete specification, since I am primarily interested in the policy effect of trade liberalization for within-country estimates and not between different sets of countries.

Robustness checks

I now turn to a series of robustness tests, to check whether the results found in the initial analysis are consistent. I augment the baseline model by aggregating deeper lags of trade variables, separating trade in imports and exports and agricultural and non-agricultural trade, using alternative dependent variables and splitting the sample based on income levels.

Aggregating deeper lags

First, I consider the causal impact of trade on migration over a longer time period. Adding different lags to the specification is pivotal, because the effect of tariff liberalization on migration outflows may be delayed depending on the respective mechanism through which it operates. Moreover, migration journeys can often last extensive periods, and may therefore be initiated in a different year than asylum applications are filed or that border apprehensions occur. Migration can be anticipated to spike in the short- to medium-run, as a result of the economic change associated with trade reforms (Mahendra, 2014). Many workers become displaced following tariff liberalization, and some of them may choose to migrate in search for new job perspectives. Furthermore, surges in economic activity following trade liberalization may lift budgetary constraints to migrate. Yet, in the long-term trends can reverse, as trade liberalization brings about the anticipated economic development that pushes income levels above a certain threshold level after which the push factors to migrate diminish.

Tables 7 and 8 show the results of the baseline specification obtained in columns (6) of tables 5 and 6 instead lagging trade variables by between one and five years, maintaining all other covariates the same (lagging them only one period). I deploy such a time frame since policymakers are interested in whether they can influence migration rates with trade liberalization within the foreseeable future. Therefore, the average length of an electoral cycle seems reasonable. In general, results largely confirm the hypothesis that trade liberalization causes short-term peaks in migration rates that dissipate over time. For asylum applications, the coefficient size gradually shrinks and becomes less significant over time, with no statistically significant relationship after four years. For border apprehensions, the positive effect of trade lagged by two years is the most significant statistically and economically, which perhaps constitute a lagged peak of the initial trade liberalization, as migrants do not instantly decide on moving after trade reforms. Interestingly, for the five year-lagged variable there exists a negative relationship with migration rates, which may suggest that increased trade has risen national income to such a level that migration incentives have decreased.

Separating exports and imports

Next, I separate imports (instrumented by average weighted tariff on US imports from country *i*) and exports (instrumented by average weighted tariff on US exports to country *i*) to check for

heterogeneities in the impact of both flows. Tables 9 and 10 show results of US exports and imports for both dependent variables with and without origin fixed effects. For all sets of regressions, trade and migration remain complements. US exports have a larger impact on migration rates than US imports. A potential explanation for this is that US exports replace local production, which has caused unemployment and displacement of workers. I further substantiate this claim in the next robustness check, in which I separate trade in agricultural and non-agricultural trade.

The imports variable is less significant and has a low F-statistic (slightly below the rule of thumb of 10) in columns (3) of tables 9 and 10. Trade liberalization in the region involved a larger decrease in tariffs on US exports than on imports. Consequently, there has been lower variation in import tariffs than export tariffs. The lower size effect of imports could also be the result of counterbalancing forces. On the one hand, increased US imports reduces informational barriers to migrate and may require citizens of the home country to migrate to the US to strengthen trade links. On the other hand, rising incomes due to higher exports to the US can provide an impetus for laborers to remain in the home country. My findings are contrary to those by Menard & Gary (2018), which found an insignificant effect of imports by Northern countries and a negative effect of exports to Northern countries. This discrepancy may be partly explained by their inclusion of unemployment rates, an outcome variable of trade or "bad control", biasing the coefficients in their regressions. Moreover, since they focus on regular migration instead of irregular flows, budgetary constraints to migrate may be less relevant.

Agricultural trade and non-agricultural trade

I check whether there exist any differences when splitting the trade variable into trade flows of agricultural products and non-agricultural products. This distinction is made since drops in agricultural tariffs are hypothesized to provoke a higher pressure to migrate, due to limited alternative employment opportunities in rural areas when becoming unemployed (de Haas et al., 2019; Villareal & Hamilton, 2012). In addition, the US still has heavy subsidy programs in place for many of its key agricultural export products. As a result, Latin American markets were flooded with cheap agricultural products from the US (Hansen-Kuhn & Murphy, 2019). This was detrimental for rural population that failed to compete with these prices and experienced income declines. The non-agricultural sector, on the other hand, benefitted from lower food prices. To check for this, I split trade and tariff variables in an agricultural part and a non-

agricultural part. World Integrated Trade Solution considers chapters HS01 to 24 and HS50 to HS53 as agricultural products.

The results, projected in Tables 11 and 12, largely confirm this hypothesis with larger coefficient sizes and higher significance for agricultural trade than non-agricultural trade. Strikingly, comparing columns (3) and (4) in Table 11 the within-country estimated effect of an increase in agricultural trade on asylum applications is found to be more than six times larger than for other trade. This result suggests that the rural population in the Americas was disproportionally negatively affected by trade liberalization and more inclined to migrate as a result. Whether this stems from greater exposure to competition from the US or a higher propensity to migrate following unemployment in rural areas is uncertain. One caveat of this result is that the instruments are relatively weak compared to other regressions, with most specifications reporting an F-statistic below 10.

To further substantiate the hypothesis that competition from US agricultural companies has contributed to surging migration flows from the Americas to the US, I check whether higher US agricultural exports put more pressure on migration flows than US agricultural imports. The results are presented in Table 13, and indeed point to the fact that US agricultural exports are an important determinant for surges in both border apprehensions and asylum applications. US agricultural imports, on the other hand, do not seem to provoke a meaningful increase in both migration variables, as they are only significant for asylum applications without country fixed effects. Thus, these findings indicate that the positive effect of trade on migration seems to be driven primarily by export-oriented growth of agricultural companies in the US, that outcompete small-scale farmers in the Americas, forcing them to migrate in search for alternative employment.

Replacing dependent variables

I replace dependent variables with three alternative dependent variables in Table 14. Firstly, I use the deviation in regular migration stocks, as this dependent variable has been used commonly throughout the migration literature (Ghani et al., 2018; Dreher et al., 2019). By comparing the coefficients with the two dependent variables covering irregular migration, I can verify whether there exist any peculiarities for irregular migration compared to regular migration. One problem is that there exist a substantial number of negative values for the

deviation in stock variables, which may be caused by return migration or migration to third countries. Negative values cannot be captured by logarithmic variables. Other research utilizes time series data, or time periods of five years, limiting the potential for negative observations. This further substantiates the use of flow variables, instead of relying on changes in stocks variables. To solve this problem, I switch the dependent variable to the percentual change in migrant stocks, refraining from using a logarithmic variable. This limits the comparability with the other migration measures, but the direction and significance of the relationship is still of interest. As deviations in migrant stocks depend partly on lagged migrant stocks, I lag the migrant stocks control variable by two periods in these regressions.

Columns (1) and (2) of table 14 give no support that trade flows and deviations in migrant stocks are complements. If anything, trade decreases regular migration stocks, although this result is not statistically significant. One explanation for this could be that irregular migration primarily involves low-skilled workers, whereas regular migration constitutes more high-skilled migrants. As credit constraints following trade liberalization may be lifted for low-income workers, no such constraint existed previously for those with higher incomes. Additionally, access to information about destination countries can be less relevant for the high-skilled, as they already possess sufficient information to determine their migration decision prior to trade liberalization. However, this contrasts with earlier findings in Tables 5 and 6, in which the positive effect of trade was larger for asylum applications than border apprehensions. Asylum applications are assumed to consist partly of regular migration flows (the part of applications that is approved). This deviation could stem from the fact that return migration is included in deviations in migration stocks. The prospect of improved economic conditions may nudge migrants to return to their home country.

Next, I replace dependent variables with asylum applications for Canada and Spain respectively, the two most popular alternative migration destinations for the set of countries of the sample. The reason for including these dependent variables is to check for multilateral resistance, as it could be that an increase in migration rates to the US merely reflects it becoming a more attractive destination compared to others. The specifications in columns (3) and (4) of table 14 suggest that there is a multilateral resistance effect for Canada, as the sign of the trade variable is opposite to those for US trade. Higher trade flows to the United States indicate lower migration rates to Canada at the 1% and 10% significance level respectively. The coefficient

size of this effect is, however, very marginal, as a one percent increase in trade to the United States is associated with a 0.003-0.008 percent decrease in asylum applications to Canada. A reason for this could be that increased trade improves information and transportation links to the US, rendering it a more attractive migration destination compared to Canada. As shown in column (5), movements to Spain are complementary to trade liberalization between the US and the origin country, although only significant for the regressions without origin fixed effects. An explanation for the discrepancy between Spain and Canada is perhaps that the US and Canada "contest" over a similar pool of migrants that travel overland and therefore possess less financial resources. Migrating to Spain necessarily requires transatlantic travel and is therefore a possibility for only a specific group of migrants. Rising incomes due to trade liberalization may have lifted budget constraints for migrants to travel to Spain.

Testing the migration hump hypothesis

Finally, to test the migration hump hypothesis I split the sample in two groups according to income level with results reported in table 15. For below $8,000, Clemens (2014) finds a positive relationship between income and migration, while this trend reverses above this threshold. Research by Benček & Schneiderheize (2020) rejects the existence of such a trajectory. For below threshold income levels, a positive correlation between trade and migration remains, which is consistent with the migration hump hypothesis, but it is insignificant for border apprehensions and only weakly for asylum applications. The low statistical significance of the results may be partly attributed to smaller sample size, with the group below $8,000 being significantly smaller than the group above. Another reason for the weaker statistical significance could be that Clemens' findings are based on a cross-sectional sample, whereas this analysis looks at within-country estimates. This suggests that migration patterns only very weakly respond to changes in income within countries. For above-threshold levels countries, the migration hump hypothesis predicts negative vales. I find a more ambiguous pattern with different signs for the asylum applications and border apprehensions variables. One reason for this could be that $8,000 is not an accurate cut-off point and the "hump" is located at a higher level of income. What is more, this negative effect of higher income could be counterbalanced by improved information or transportation links between origin and destination country, decreasing costs to migrate. Thus, my results find only limited support for the existence of a migration hump and suggest that other channels through which

trade liberalization affects migration, such as adjustment costs and changes in migration costs, are important determinants in determining migration choices as well.

Conclusion

In response to mounting migration rates, policymakers in Europe and the US are increasingly searching for innovative approaches to limit such flows. This paper has analyzed whether trade policy constitutes an effective strategy to decrease migration flows by investigating the relationship between trade liberalization and migration from the Americas to the US. The argument advanced by politicians is that trade liberalization brings about economic development that decreases incentives to migrate. This research has debunked this idea as the effect of increased trade flows on migration is instead found to be marginally positive. A one percent increase in bilateral trade between origin country and the US is associated with a 0.0404 and 0.0272 percent growth in asylum applications and border apprehensions respectively. Other factors, such as pre-existing migration stocks, natural disasters or GDP per capita, appear to be far more important drivers of migration flows. Carefully designing FTAs in a more inclusive manner could still prove to be beneficial, as the paper finds that conditions attached to trade liberalization may impact migration.

The paper provides several explanations why trade and migration are found to be complements. Aggregating deeper lags of the trade variable suggests that the effect of trade on migration is highest on the short term and dissipates over time, which probably relates to the adjustment costs associated with trade liberalization. Perhaps unsurprisingly, US exports trigger larger migration outflows from the Americas than US imports, which pertains to increased competition by competitive US firms. Strikingly, the effect of agricultural trade on asylum applications is estimated to be more than six times larger than for non-agricultural trade. More specifically, US agricultural exports prove to be the primary determinant of the positive relationship between trade and migration. This finding connects to the design of FTAs between the US and the Americas. Interests of US corporates and the local business elite seem to dominate, as subsidies and trade barriers remained in place for several strategic sectors. Many small-scale farmers in the Americas became displaced following trade liberalization, as they failed to compete with cheap subsidized agricultural imports from the US.

When addressing the relationship between trade policy and migration it is essential to understand the plethora of different mechanisms through which this relationship operates, and how these interact with each other. I identify three key channels through which trade liberalization impacts migration patterns. Firstly, there operates an income effect, where trade raises migration rates at lower rates of GDP per capita due to lifting of budget constraints. This trend reverses at higher levels of income as incentives to migrate are lower. Secondly, trade decreases costs to migrate, as information and transportation connections are improved between countries, thereby increasing migration flows. Thirdly, adjustment costs associated with the economic disruption of trade liberalization may affect certain groups disproportionally, increasing their propensity to migrate.

One limitation of the research is related to the choice of instrument. Although accounting for simultaneity bias, average weighted tariff is not an ideal instrument. Average weighted tariffs could suffer from endogeneity issues, as they may impact migration through other features related to free trade agreements, such as the inclusion of dispute settlement mechanisms that limit states' sovereignty. Free trade agreements also served to attract FDI inflows to the respective country, which could also partially be captured in the results of the paper. Therefore, the results could be interpreted as the general impact of FTAs on migration. A promising result is that the coefficients on the trade variable change only slightly when including a set of control variables, suggesting that average weighted tariffs is a relatively strong instrument. Even so, including control variables creates the additional risk of overcontrolling for certain variables, as they may constitute transmission channels through which trade influences migration.

Despite the specific focus on one destination country, I believe that the external validity of this paper is high, meaning that similar lessons can be drawn for other popular migrant destinations that engage in trade liberalization with migrants' origin countries. Even though the results pertain to a more specific American context, they provide a general warning that FTAs between origin and destination countries should be carefully designed in light of migration considerations. Related situations exist in which larger, more developed countries may assert dominance over smaller, less developed countries to appropriate favorable trade conditions. For example, the EU has concluded (though not ratified yet) free trade agreements with several African nations from which many migrants embark on journeys to Europe.

With regard to avenues for further research, it would be highly beneficial to this strand of literature if regional level data on migration within countries of origin became available. Such data could be combined with information on trade exposure per region. The primary benefit of that type of research would be that origin country conditions would be the same and therefore would further limit endogeneity concerns. Furthermore, it would be highly interesting to investigate micro-level data on individual migrants. Migrating ultimately constitutes an individual decision based on a variety of factors, that may be best explored at the individual level and not with aggregate level data. Finally, further research should explore innovative approaches that isolate the different mechanisms through which trade policy impacts migration, to get a better understanding of which effect dominates over others.

In conclusion, free trade agreements between migrants' countries of origin and destination would profit from a more inclusive design. Bargaining positions of destination countries are exploited to create unequal agreements that primarily benefit the most privileged in society at the expense of more vulnerable groups. To have a truly meaningful impact on development, free trade should be equitable, refrain from exceptions based on strategic business interests and compensate the losers of trade liberalization. Nevertheless, exporting goods while not simultaneously exporting people may ultimately prove to be a pipe dream, as the trend towards increasing globalization dictates patterns of both trade and migration.

Appendix

Appendix A – List of countries used in the dataset

Argentina
Belize
Bolivia
Brazil
Canada
Chile
Colombia
Costa Rica
Cuba
Dominican Republic
Ecuador
El Salvador
Guatemala
Guyana
Haiti
Honduras
Jamaica
Mexico
Nicaragua
Panama
Paraguay
Peru
Trinidad and Tobago
Uruguay
Venezuela

Appendix B – Figures

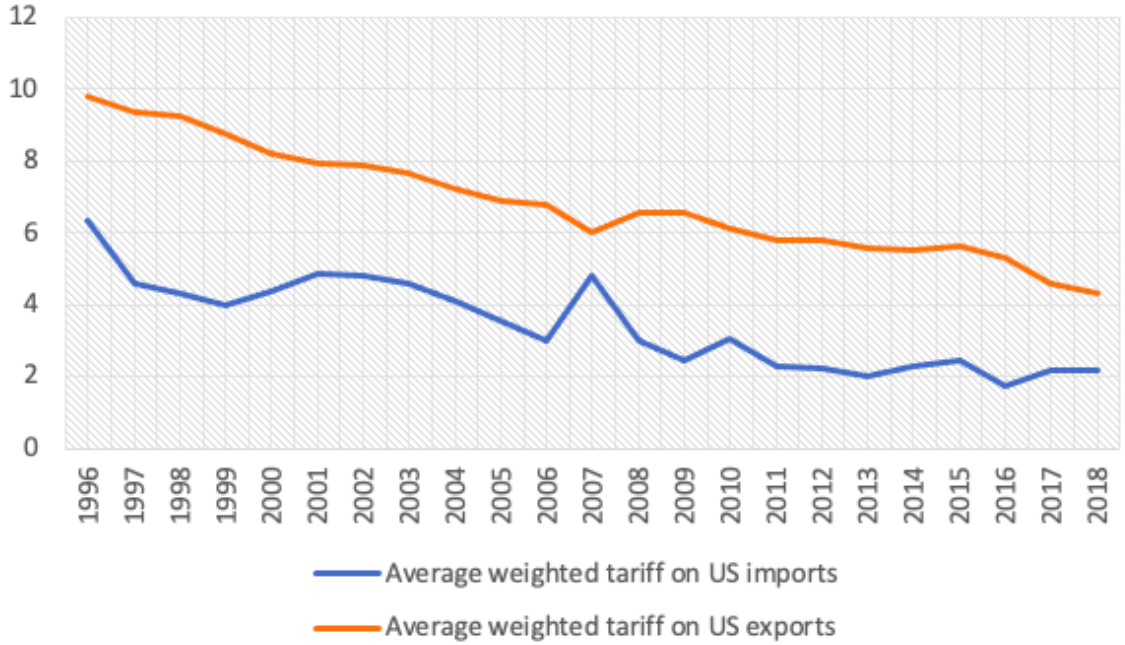

Figure 1 *- Development of average weighted tariffs over time. Note: tariffs of all countries in the sample are pooled, and based on this, an average is taken.*

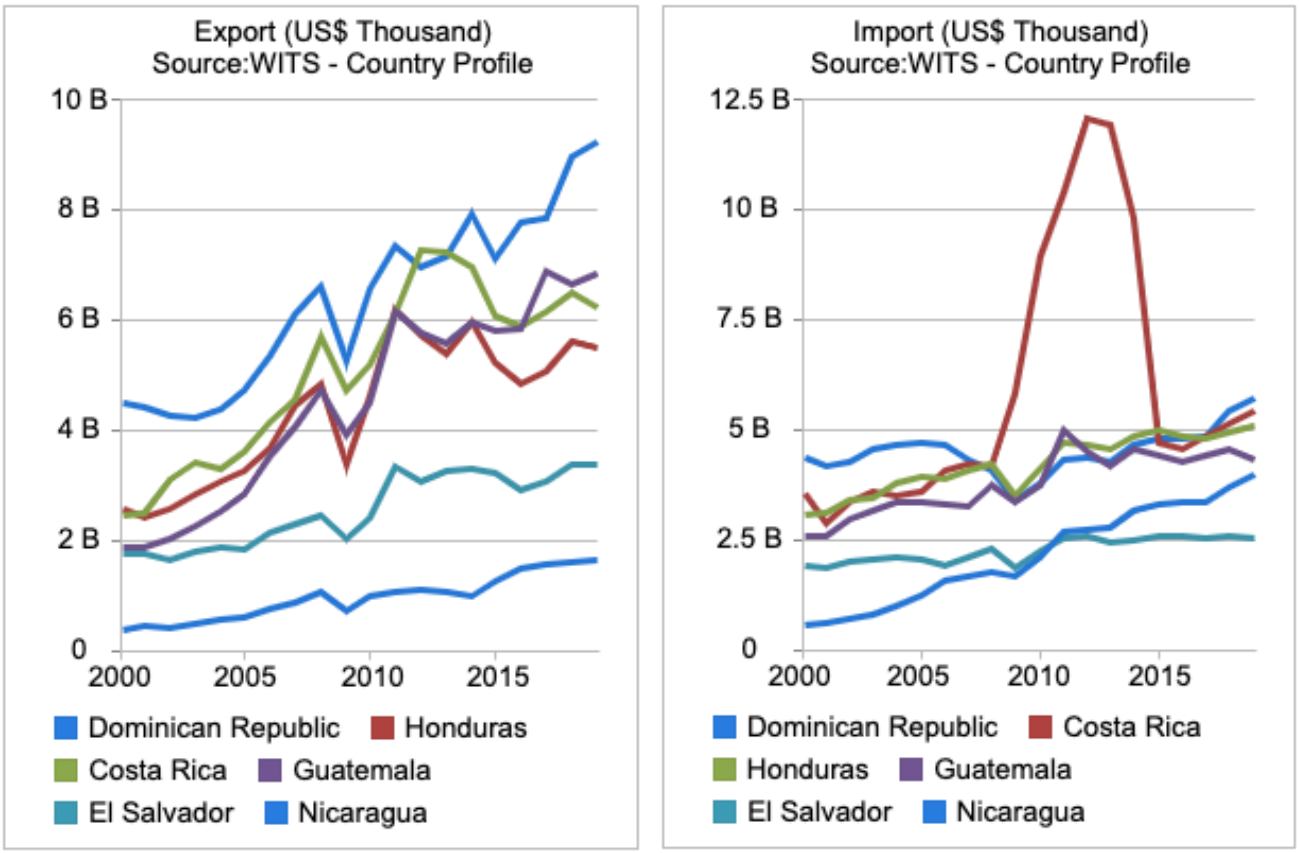

Figure 2 *– US exports and imports from Central America 2000-2019 (World Integrated Trade Solution). Note: The CAFTA-DR agreement was concluded in 2006.*

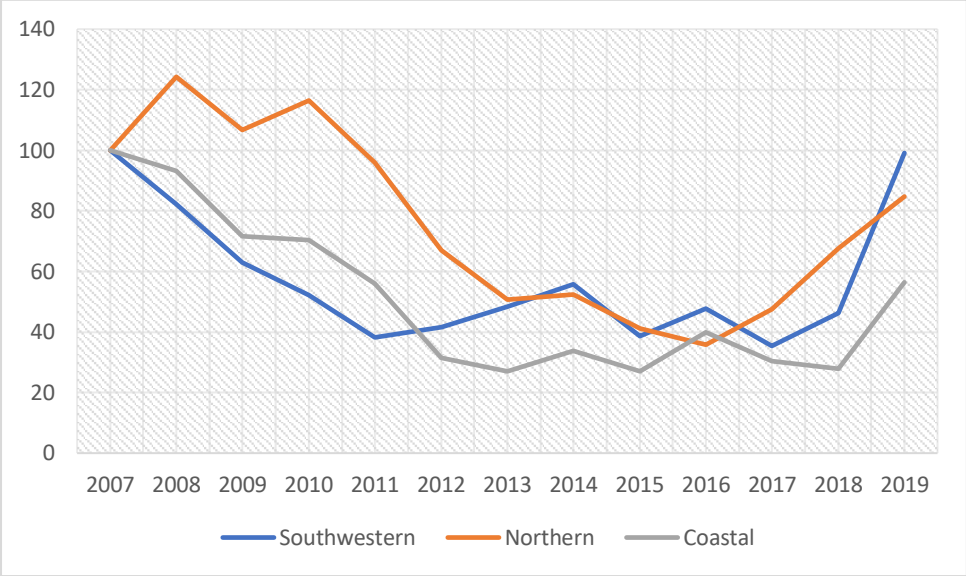

Figure 3 *- US border patrol apprehensions at each sector of the border. Note: 2007 is base year*

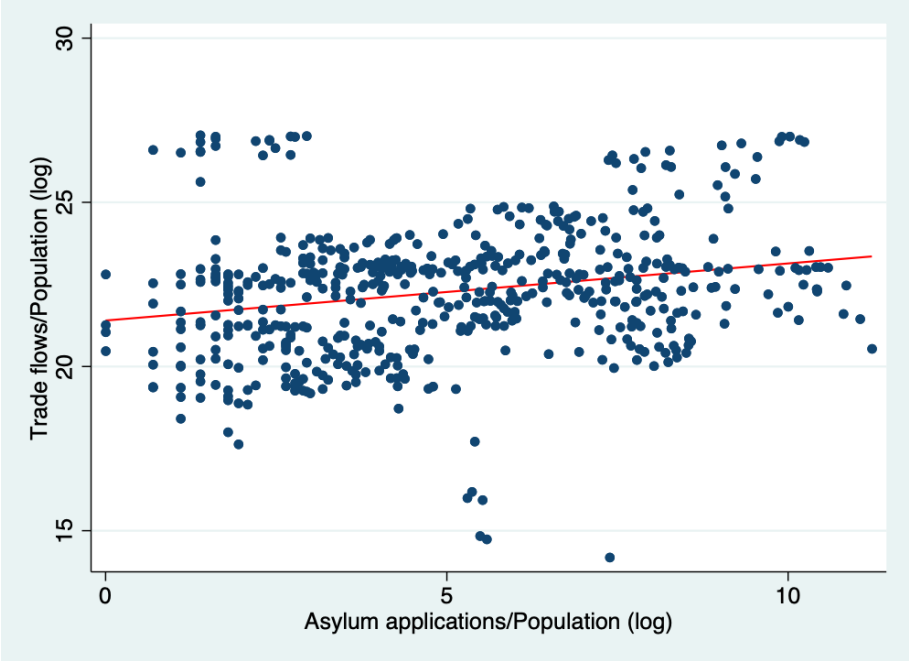

Figure 4 *- Correlation between asylum applications (over population) and trade flows (over population) from the Americas to the United States (1997-2019). The red line represents the line of best fit.*

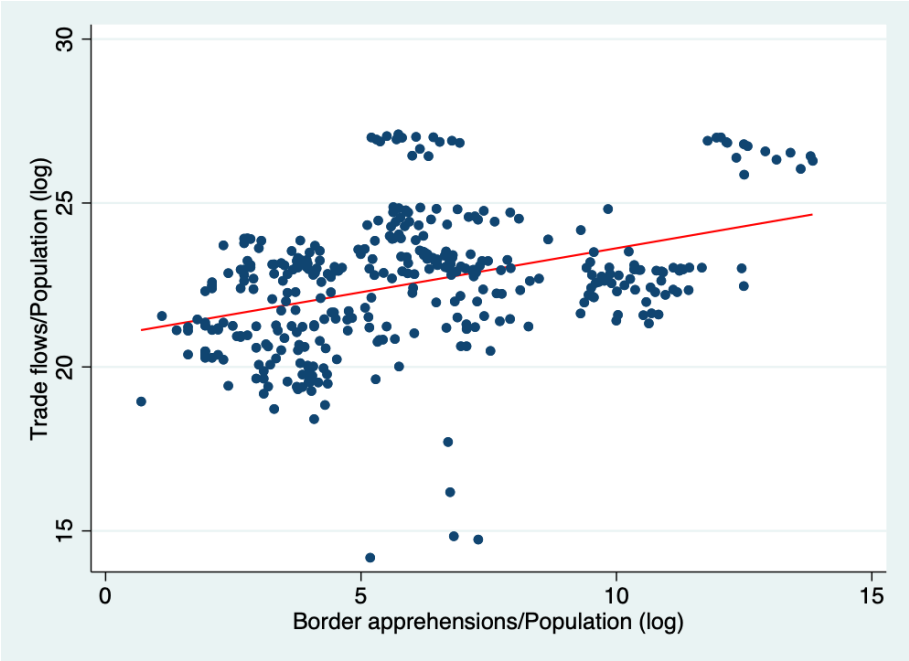

Figure 5 *- Correlation between border apprehensions (over population) and trade flows (over population) from the Americas to the United States (1997-2019). The red line represents the line of best fit.*

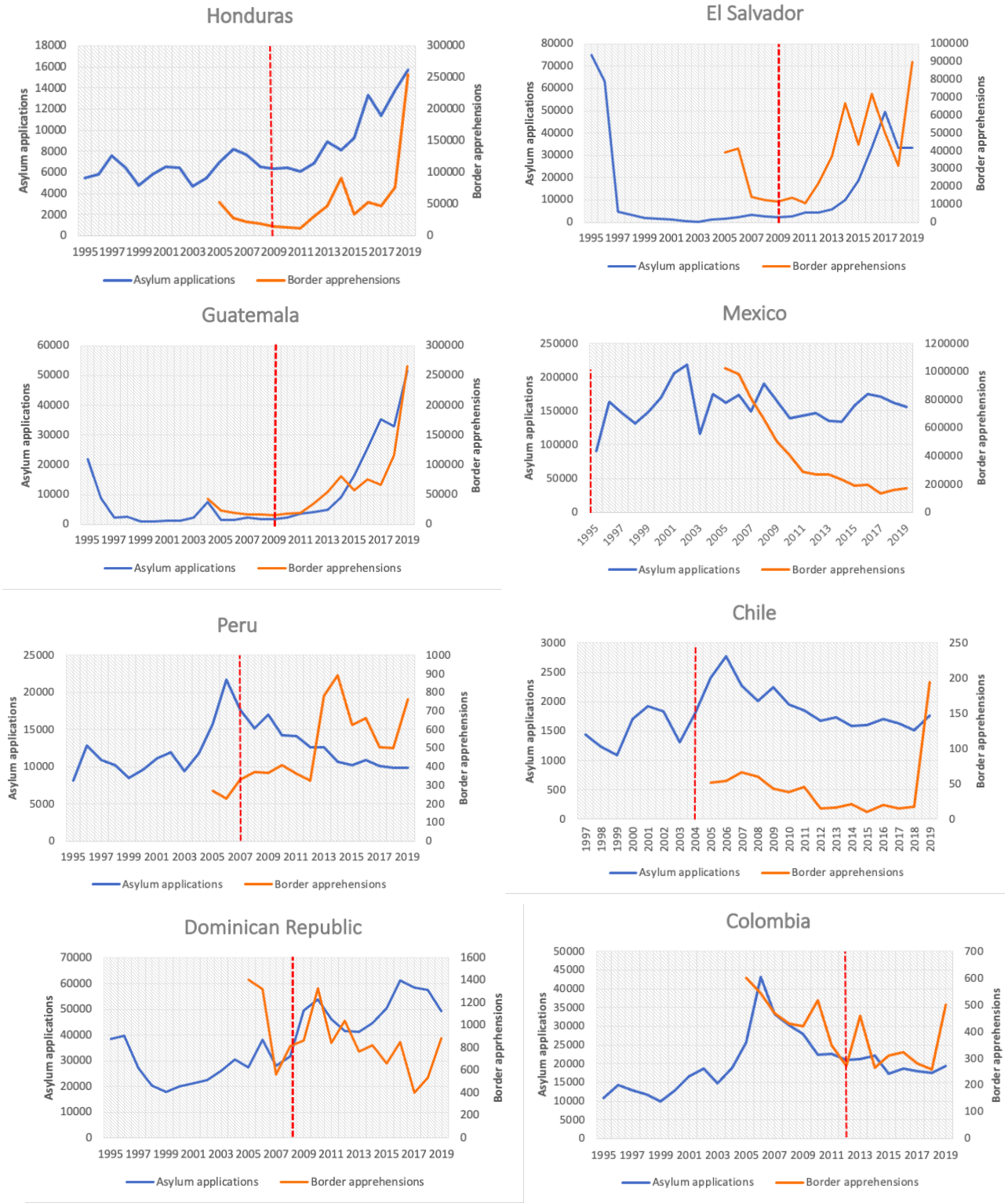

Figure 6 *– development of asylum applications and border apprehensions over time for sample of countries (1996-2019). The red dotted line represents the entry into force of a free trade agreement between the respective country and the United States.*

Appendix C – Regression tables

Table 1– Descriptive statistics of dataset *Note: Data on trade and population are expressed in millions. Data on trade and GDP per capita are expressed in US dollars. Distance is in kilometers.*

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Asylum applications	563	2,306	7,227	0	75,138
Migrant stocks	579	787,122	2,013,000	9,279	11,750,000
US Border Patrol apprehensions	398	23,390	100,753	2	1,024,000
Trade	588	32,500	96,700	1.392	590,000
Population	588	23.19	3.971	0.187	213,0
GDP per capita	588	11,903	8,386	2,057	49,007
Age dependency ratio	588	51.07	15.24	23.35	90.38
Natural disaster deaths	588	515.5	9,166	0	229,526
Tariff on US imports	551	2.849	3.846	0	22.87
Tariff on US exports	548	6.896	3.544	0	16.51
Distance	588	4,461	2,275	1,155	8,890
Homicides [per 100,000 people]	481	22.27	20.46	1.442	141.7
Political rights & civil liberties	588	5.608	2.790	2	14

Table 2: Trade-augmented gravity model of migration

Dependent variable: log asylum applications				
	(1)	(2)	(3)	(4)
Population [log]	1.273***	2.460**	0.204***	1.050**
	(0.102)	(1.041)	(0.05)	(0.428)
Trade [log]	-0.586***	-0.0922*	0.125*	0.0404*
	(0.102)	(0.0512)	(0.0637)	(0.0213)
Distance [log]	-2.450***		-1.063***	
	(0.235)		(0.405)	
Age dependency ratio			0.0256**	-0.110**
			(0.0113)	(0.0532)
GDP per capita [log]			-0.960***	-1.099*
			(0.266)	(0.621)
Freedom rights			0.281***	0.0837
			(0.0704)	(0.0983)
Natural disasters [log]			0.153**	0.220***
			(0.0725)	(0.0553)
Homicides			0.0264***	0.0325***
			(0.00392)	(0.00910)
Migrant stocks [log]			1.144***	1.065**
			(0.155)	(0.533)
Year fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	No	Yes	No	Yes
Observations	544	544	441	441
R-squared	0.457	0.882	0.805	0.902

Robust, clustered standard errors in parentheses. All explanatory variables are lagged by one year unless otherwise specified.
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Trade-augmented gravity model of migration

Dependent variable: Log border apprehensions				
VARIABLES	(1)	(2)	(3)	(4)
Population [log]	1.321***	6.476***	0.782***	6.290
	(0.0945)	(1.939)	(0.210)	(6.529)
Trade [log]	-0.360***	-0.0601*	0.245***	0.0272*
	(0.0944)	(0.0355)	(0.0928)	(0.0613)
Distance [log]	-3.550***		-0.780*	
	(0.263)		(0.462)	
Age dependency ratio			0.129***	-0.109*
			(0.0151)	(0.0560)
GDP per capita [log]			-1.479***	-0.0615*
			(0.462)	(0.327)
Freedom rights			0.530***	-0.109
			(0.0882)	(0.134)
Natural disasters [log]			0.196**	0.203***
			(0.0966)	(0.0547)
Homicides			0.0273***	0.000841
			(0.00657)	(0.0130)
Migrant stocks [log]			1.131***	0.792***
			(0.184)	(0.171)
Year fixed effects	Yes	Yes	Yes	Yes
Origin fixed effects	No	Yes	No	Yes
Observations	358	358	325	325
R-squared	0.545	0.942	0.867	0.965

Robust, clustered standard errors in parentheses. All explanatory variables are lagged by one year unless otherwise specified.
*** p<0.01, ** p<0.05, * p<0.1

Table 4: IV - results of the first stage

Independent variable: log trade flows	
VARIABLES	
Average weighted tariff (USA)	-0.0385***
	(0.0103)
Average weighted tariff (other)	-0.0210**
	(0.0103)
Population [log]	0.900***
	(0.0560)
Distance [log]	-1.514***
	(0.127)
Age dependency ratio	-0.00619
	(0.00919)
GDP per capita [log]	0.996***
	(0.250)
Freedom rights index	-0.0415
	(0.0470)
Natural disaster deaths	1.86e-06
	(2.16e-06)
Homicides	0.00586
	(0.00440)
Migrant stocks	-0.0869
	(0.0659)
Observations	420
R-squared	0.736

Robust, clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Estimates of the IV (2SLS) regressions

Dependent variable: asylum applications						
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS	IV	IV	OLS	IV	IV
Population [log]	0.204***	0.535***	0.356***	1.050**	3.604***	1.639
	(0.05)	(0.0770)	(0.0497)	(0.428)	(1.316)	(1.381)
Trade [log]	0.125*	0.0655*	0.0663***	0.0404*	0.0596***	0.0451**
	(0.0637)	(0.0385)	(0.0152)	(0.0213)	(0.0171)	(0.0198)
Distance [log]	-1.063***	-1.505***	-0.688***			
	(0.405)	(0.199)	(0.147)			
Age dependency ratio	0.0256**		0.0196**	-0.110**		-0.0429*
	(0.0113)		(0.00796)	(0.0532)		(0.0250)
GDP per capita [log]	-0.960***		-1.132***	-1.099*		-0.976**
	(0.266)		(0.170)	(0.621)		(0.410)
Freedom rights	0.281***		0.151***	0.0837		0.134*
	(0.0704)		(0.0373)	(0.0983)		(0.0746)
Natural disasters [log]	0.153**		0.0558	0.220***		0.0349
	(0.0725)		(0.0340)	(0.0553)		(0.0297)
Homicides	0.026***		0.0322***	0.0325***		0.023***
	(0.00392)		(0.00272)	(0.00910)		(0.00601)
Migrant stocks $_{t-2}$ [log]	1.144***		0.939***	1.065**		0.962***
	(0.155)		(0.0681)	(0.533)		(0.332)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Origin fixed effects	No	No	No	Yes	Yes	Yes
First-stage F-statistic		13.54	17.76		10.14	10.94
Hausman p-value		0.017	0.011		0.008	0.006
Observations	441	450	420	441	450	420
R-squared	0.805	0.332	0.833	0.902	0.770	0.908

Robust, clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
All explanatory variables are lagged by one year unless otherwise specified. Note: The Two Stage Least Square (2SLS) approach uses Average weighted trade tariffs on U.S. exports and imports as instruments for trade flows.

Table 6: Estimates of the IV (2SLS) regressions

Dependent variable: border apprehensions						
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS	IV	IV	OLS	IV	IV
Population [log]	0.782***	0.342***	0.978***	6.290	-8.300***	1.123***
	(0.210)	(0.0952)	(0.0847)	(6.529)	(2.336)	(0.457)
Trade [log]	0.245***	0.0847**	0.0624**	0.0272*	0.0232	0.0173
	(0.0928)	(0.0369)	(0.0252)	(0.0613)	(0.0150)	(0.0168)
Distance [log]	-0.780*	-2.788***	-0.989***			
	(0.462)	(0.289)	(0.177)			
Age dependency ratio	0.129***		0.0903***	-0.109*		-0.0682***
	(0.0151)		(0.0120)	(0.0560)		(0.0202)
GDP per capita [log]	-1.479***		-1.108***	-0.0615*		0.341
	(0.462)		(0.246)	(0.327)		(0.594)
Freedom rights	0.530***		0.310***	-0.109		-0.0541
	(0.0882)		(0.0602)	(0.134)		(0.0807)
Natural disasters [log]	0.196**		0.0989**	0.203***		-0.0176
	(0.0966)		(0.0413)	(0.0547)		(0.0183)
Homicides	0.0273***		0.0309***	0.000841		0.00689
	(0.00657)		(0.00455)	(0.0130)		(0.00674)
Migrant stocks [log]	1.131***		0.963***	0.792***		1.628***
	(0.184)		(0.0912)	(0.171)		(0.514)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Origin fixed effects	No	No	No	Yes	Yes	Yes
First stage F-statistic		13.67	16.91		10.72	12.05
Hausman p-value		0.024	0.001		0.014	0.007
Observations	325	347	325	325	347	325
R-squared	0.867	0.314	0.831	0.965	0.782	0.968

Robust, clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
All explanatory variables are lagged by one year unless otherwise specified. Note: The Two Stage Least Square (2SLS) approach uses Average weighted trade tariffs on U.S. exports and imports as instruments for trade flows.

Table 7: Robustness checks - lagging trade variables 1-5 years

Dependent variable: asylum applications					
VARIABLES	(1)	(2)	(3)	(4)	(5)
Trade [log] $_{t-1}$	0.0551***				
	(0.0174)				
Trade [log] $_{t-2}$		0.0387*			
		(0.0207)			
Trade [log] $_{t-3}$			0.0342*		
			(0.0177)		
Trade [log] $_{t-4}$				0.0305	
				(0.0193)	
Trade [log] $_{t-5}$					0.00857
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Origin fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	441	433	418	404	396
R-squared	0.908	0.908	0.912	0.919	0.919

Robust, clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
All explanatory variables are lagged by one year unless otherwise specified. Note: The Two Stage Least Square (2SLS) approach uses Average weighted trade tariffs on U.S. exports and imports as instruments for trade flows.

Table 8: Robustness check - lagging trade variables (1-5 years)

Dependent variable: border apprehensions					
VARIABLES	(1)	(2)	(3)	(4)	(5)
Trade [log] $_{t-1}$	0.0173				
	(0.0168)				
Trade [log] $_{t-2}$		0.0318**			
		(0.0138)			
Trade [log] $_{t-3}$			0.00116		
			(0.0139)		
Trade [log] $_{t-4}$				0.00170	
				(0.0171)	
Trade [log] $_{t-5}$					-0.0293*
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Origin fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	325	325	325	325	325
R-squared	0.968	0.968	0.968	0.968	0.968

Robust, clustered standard errors in parentheses. All explanatory variables are lagged by one year unless otherwise specified. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Robustness check - splitting exports and imports

Dependent variable: asylum applications				
	(1)	(2)	(3)	(4)
VARIABLES	US Imports	US Exports	US Imports	US Exports
Population [log]	0.326***	0.269***	0.0105	0.0449
	(0.0550)	(0.0555)	(1.474)	(1.612)
US imports [log]	0.0327**		0.0302	
	(0.0168)		(0.0303)	
US exports [log]		0.0617***		0.0460***
		(0.0158)		(0.0176)
Distance [log]	0.943***	0.909***		
	(0.174)	(0.166)		
Age dependency ratio	0.0262***	0.0145*	-0.0846***	-0.0614*
	(0.00608)	(0.00834)	(0.0295)	(0.0316)
GDP per capita [log]	-0.924***	-1.118***	-0.850**	-0.661
	(0.176)	(0.180)	(0.335)	(0.413)
Freedom rights	0.0889**	0.173***	0.128*	0.103
	(0.0357)	(0.0399)	(0.0753)	(0.0779)
Natural disasters [log]	0.0533	0.0525	0.0220	0.0259
	(0.0353)	(0.0357)	(0.0293)	(0.0306)
Homicides	0.0364***	0.0328***	0.0283***	0.0280***
	(0.00295)	(0.00284)	(0.00610)	(0.00596)
Migrant stocks [log]	1.035***	1.033***	0.553	0.580
	(0.0769)	(0.0736)	(0.400)	(0.401)
Year fixed effects	Yes	Yes	Yes	Yes
Origin fixed effects	No	No	Yes	Yes
First stage F-statistic	11.74	16.43	8.87	13.63
Hausman p-value	0.032	0.019	0.038	0.017
Observations	421	421	421	421
R-squared	0.825	0.838	0.909	0.913

Robust, clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
All explanatory variables are lagged by one year unless otherwise specified. Note: The Two Stage Least Square (2SLS) approach uses Average weighted trade tariffs on U.S. exports and imports as instruments for as instruments for U.S. exports and U.S. imports respectively.

Table 10: Robustness check - splitting imports and exports

Dependent variable: border apprehensions				
	(1)	(2)	(3)	(4)
VARIABLES	US Imports	US Exports	US Imports	US Exports
Population [log]	0.601***	0.722***	4.185**	3.859*
	(0.0814)	(0.0839)	(1.964)	(2.065)
US imports [log]	0.0477**		0.0192	
	(0.0232)		(0.0182)	
US exports [log]		0.164***		0.0382
		(0.0300)		(0.0275)
Distance [log]	-0.473**	-0.407**		
	(0.203)	(0.191)		
Age dependency ratio	0.0419***	0.0840***	-0.0851***	-0.0899***
	(0.00779)	(0.0104)	(0.0229)	(0.0231)
GDP per capita [log]	-1.208***	-1.050***	0.356	0.427
	(0.237)	(0.228)	(0.591)	(0.646)
Freedom rights	0.0932**	-0.285***	-0.0209	-0.0539
	(0.0452)	(0.0616)	(0.0804)	(0.0852)
Natural disasters [log]	0.0939**	0.0854**	-0.00793	-0.0106
	(0.0389)	(0.0361)	(0.0186)	(0.0186)
Homicides	0.0303***	0.0346***	0.00516	0.00544
	(0.00496)	(0.00459)	(0.00667)	(0.00671)
Migrant stocks [log]	1.240***	1.186***	1.619***	1.670***
	(0.0939)	(0.0936)	(0.529)	(0.559)
Year fixed effects	Yes	Yes	Yes	Yes
Origin fixed effects	No	No	Yes	Yes
First stage F-statistic	10.30	12.83	8.31	10.19
Hausman p-value	0.021	0.013	0.027	0.008
Observations	304	304	304	304
R-squared	0.856	0.874	0.967	0.968

Robust, clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
All explanatory variables are lagged by one year unless otherwise specified. Note: The Two Stage Least Square (2SLS) approach uses Average weighted trade tariffs on U.S. exports and imports as instruments for as instruments for U.S. exports and U.S. imports respectively.

Table 11 – Robustness checks - Agricultural and non-agricultural trade (asylum applications)

Dependent variable: log asylum applications				
VARIABLES	(1) Other	(2) Agricultural	(3) Other	(4) Agricultural
Population [log]	0.374***	0.388***	0.941	1.652
	(0.0448)	(0.0452)	(1.392)	(1.411)
Agricultural trade [log]		0.0611***		0.0573**
		(0.0199)		(0.0236)
Other trade [log]	0.0232***		0.00909	
	(0.00861)		(0.00801)	
Distance [log]	0.831***	0.712***		
	(0.146)	(0.140)		
Age dependency ratio	0.0206***	0.0216***	-0.0546**	-0.0249
	(0.00789)	(0.00800)	(0.0248)	(0.0266)
GDP per capita [log]	-0.981***	-1.152***	-1.092**	-0.900**
	(0.167)	(0.182)	(0.430)	(0.413)
Freedom rights	0.155***	0.142***	0.152**	0.129*
	(0.0374)	(0.0380)	(0.0741)	(0.0741)
Natural disasters [log]	0.0467	0.0551	0.0283	0.0320
	(0.0348)	(0.0343)	(0.0302)	(0.0297)
Homicides	0.0324***	0.0328***	0.0258***	0.0248***
	(0.00263)	(0.00270)	(0.00595)	(0.00572)
Migrant stocks [log]	0.993***	1.011***	1.386***	1.285***
	(0.0654)	(0.0652)	(0.377)	(0.365)
Year fixed effects	Yes	Yes	Yes	Yes
Origin fixed effects	No	No	Yes	Yes
First stage F-statistic	10.78	10.21	9.43	8.91
Hausman p-value	0.011	0.024	0.018	0.026
Observations	396	396	396	396
R-squared	0.832	0.833	0.908	0.910

Robust, clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
All explanatory variables are lagged by one year unless otherwise specified. Note: The Two Stage Least Square (2SLS) approach uses average weighted trade tariffs on U.S. exports and imports for agricultural products (HS01-24 and HS50-53) and others (all other HS numbers) as instruments for agricultural trade flows and other trade flows respectively.

Table 12 – Robustness checks - Agricultural and non-agricultural trade (border apprehensions)

Dependent variable: log border apprehensions				
	(1)	(2)	(3)	(4)
VARIABLES	Other	Agricultural	Other	Agricultural
Population [log]	0.865***	0.876***	5.708***	6.061***
	(0.0732)	(0.0791)	(1.598)	(1.580)
Agricultural trade [log]		0.117***		0.0144**
		(0.0325)		(0.00588)
Other trade [log]	0.0274***		0.0205	
	(0.00893)		(0.0285)	
Distance [log]	0.947***	1.104***		
	(0.177)	(0.179)		
Age dependency ratio	0.0891***	0.0832***	-0.0784***	-0.0779***
	(0.0122)	(0.0120)	(0.0225)	(0.0214)
GDP per capita [log]	-0.838***	-1.192***	0.549	0.421
	(0.258)	(0.251)	(0.616)	(0.619)
Freedom rights	-0.304***	-0.294***	-0.0345	-0.0398
	(0.0591)	(0.0601)	(0.0851)	(0.0866)
Natural disasters [log]	0.110**	0.0875**	0.0198	0.0203
	(0.0426)	(0.0412)	(0.0191)	(0.0190)
Homicides	0.0329***	0.0285***	0.00745	0.00726
	(0.00493)	(0.00481)	(0.00676)	(0.00684)
Migrant stocks [log]	0.958***	0.975***	1.431**	1.565**
	(0.0855)	(0.0883)	(0.673)	(0.720)
Year fixed effects	Yes	Yes	Yes	Yes
Origin fixed effects	No	No	Yes	Yes
First stage F-statistic	10.21	9.17	8.76	8.43
Hausman p-value	0.027	0.016	0.009	0.008
Observations	324	324	324	324
R-squared	0.826	0.831	0.968	0.967

Robust, clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
All explanatory variables are lagged by one year unless otherwise specified. Note: The Two Stage Least Square (2SLS) approach uses average weighted trade tariffs on U.S. exports and imports for agricultural products (HS01-24 and HS50-53) and others (all other HS numbers) as instruments for agricultural trade flows and other trade flows respectively.

Table 13: Robustness check – US agricultural exports and imports

Dependent variable:	Asylum applications		Border apprehensions	
VARIABLES	(1)	(2)	(3)	(4)
Population [log]	0.321***	0.876***	0.810***	0.912***
	(0.0560)	(0.224)	(0.102)	(0.235)
US agricultural exports [log]	0.1314***	0.0601***	0.0427**	0.0160**
	(0.0344)	(0.00828)	(0.00990)	(0.00634)
US agricultural imports [log]	0.0358***	0.0164	0.0184	0.00619
	(0.00820)	(0.0148)	(0.0144)	(0.0128)
Distance [log]	0.791***		0.764***	
	(0.172)		(0.200)	
Age dependency ratio	0.0183**	-0.0612*	0.0871***	-0.109***
	(0.00867)	(0.0314)	(0.0121)	(0.0269)
GDP per capita [log]	-0.956***	-1.029**	-0.892***	1.033
	(0.193)	(0.438)	(0.287)	(0.683)
Freedom rights	0.137***	0.100	-0.305***	-0.0508
	(0.0408)	(0.0735)	(0.0678)	(0.0936)
Natural disasters [log]	0.0479	0.0277	-0.104**	-0.00983
	(0.0363)	(0.0316)	(0.0425)	(0.0193)
Homicides	0.0324***	0.0318***	0.0311***	0.00759
	(0.00278)	(0.00566)	(0.00502)	(0.00667)
Migrant stocks [log]	0.966***	0.905**	1.144***	0.761
	(0.0825)	(0.409)	(0.0944)	(0.756)
Year fixed effects	Yes	Yes	Yes	Yes
Origin fixed effects	No	Yes	No	Yes
First stage F-statistic	9.21	9.98	10.45	8.67
Hausman p-value	0.017	0.026	0.018	0.008
Observations	396	396	324	424
R-squared	0.826	0.904	0.848	0.970

Robust, clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
All explanatory variables are lagged by one year unless otherwise specified. Note: The Two Stage Least Square (2SLS) approach uses average weighted trade tariffs on U.S. exports and imports for agricultural products (HS01-24 and HS50-53) as instruments for agricultural trade flows.

Table 14: Robustness check - alternative dependent variables

Dependent variable:	Δ Migrant stocks	Δ Migrant stocks	Canada	Canada	Spain	Spain
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Population [log]	0.559**	0.374	1.707***	0.00656	0.104**	2.512***
	(0.236)	(0.262)	(0.0915)	(1.115)	(0.0427)	(0.603)
Trade [log]	-0.180	-0.199	-0.00789***	-0.00259*	0.0291**	0.00231
	(0.232)	(0.304)	(0.00305)	(0.00142)	(0.0123)	(0.00733)
Distance [log]	0.552***		0.808***		0.844***	
	(0.155)		(0.186)		(0.147)	
Age dependency ratio	0.0639	-0.0335	0.0365***	-0.0996***	-0.0809***	-0.0196*
	(0.0936)	(0.319)	(0.0109)	(0.0166)	(0.00544)	(0.0102)
GDP per capita [log]	0.404	-0.119	-0.378	-0.256	-0.662***	-0.409**
	(0.224)	(0.588)	(0.233)	(0.261)	(0.120)	(0.165)
Freedom rights	0.352	0.896	-0.0185	0.00226	0.192***	-0.0297
	(0.534)	(1.104)	(0.0605)	(0.0446)	(0.0269)	(0.0275)
Natural disasters [log]	0.0612*	0.0159	0.0812*	0.0253	0.0523***	0.00302
	(0.0315)	(0.0135)	(0.0430)	(0.0175)	(0.0190)	(0.0108)
Homicides	0.0396	0.653	0.00372	0.00713*	0.00765***	0.00389*
	(0.0293)	(0.731)	(0.00459)	(0.00396)	(0.00257)	(0.00218)
Migrant stocks [log]			-0.492***	-0.310	0.844***	0.542***
			(0.0912)	(0.204)	(0.0514)	(0.118)
Migrant stocks $_{t-2}$ [log]	1.332**	1.091*				
	(0.571)	(0.641)				
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Origin fixed effects	No	Yes	No	Yes	No	Yes
Observations	451	451	441	441	438	438
R-squared	0.149	0.184	0.698	0.963	0.743	0.940

Robust, clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
All explanatory variables are lagged by one year unless otherwise specified. Note: Dependent variables are percentual changes in migration stocks and asylum applications to Canada and Spain respectively. Note: The Two Stage Least Square (2SLS) approach uses Average weighted trade tariffs on U.S. exports and imports as instruments for trade flows.

Table 25: Robustness checks - splitting sample according to income level

Dependent variable:	Asylum Applications		Border apprehensions	
	>$8000	<$8000	>$8000	<$8000
VARIABLES	(1)	(2)	(3)	(4)
Population [log]	5.321**	3.877*	9.920***	3.859*
	(2.413)	(2.014)	(2.480)	(2.022)
Trade [log]	0.0346	0.0699*	-0.00565	0.0235
	(0.0231)	(0.0354)	(0.0361)	(0.0151)
Age dependency ratio	-0.124***	-0.0442	-0.0342	-0.109*
	(0.0334)	(0.0435)	(0.0288)	(0.0574)
GDP per capita [log]	-0.487	-1.385	-0.121	-0.492
	(0.662)	(0.988)	(0.855)	(1.052)
Freedom rights	0.264***	0.162	-0.130	-0.00282
	(0.0985)	(0.107)	(0.132)	(0.0827)
Natural disasters [log]	-0.00323	0.0796**	-0.0185	0.0175
	(0.0386)	(0.0370)	(0.0269)	(0.0227)
Homicides	0.0527***	0.00543	0.0169	0.00240
	(0.00957)	(0.00587)	(0.0158)	(0.00425)
Migrant stocks [log]	0.690	2.146***	1.713*	0.688
	(0.428)	(0.493)	(0.900)	(0.575)
Origin fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	283	158	221	104
R-squared	0.910	0.943	0.963	0.984

Robust, clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
All explanatory variables are lagged by one year unless otherwise specified. Note: The Two Stage Least Square (2SLS) approach uses Average weighted trade tariffs on U.S. exports and imports as instruments for trade flows.

Appendix D: Data Description and Sources

Variable	Description	Primary Source	Unit
Border apprehensions	Number of illegal border apprehensions detected by U.S. Border Patrol by citizenship (2006-2019)	U.S. Customs and Border Patrol	Detection
Asylum applications	Number of asylum applications filed in United States per origin country	UNHCR	Individual
Migrant stock	Number of foreign nationals residing in United States	OECD	Individual
GDP per capita	Real GDP per capita at purchasing power parity at 2010 constant USD dollars	World Bank, World Development Indicators	USD 2010
Political rights & civil liberties	Political Rights and Civil Liberties indices are both measured on a one-to-seven scale, where 1 represents the highest score and then summed so that the indicator varies from 2 to 14.	Freedom House	Index
Population [log]	Total population, based on the de facto definition of population, which counts all residents regardless of legal status or citizenship.	World Bank, World Development Indicators	Individual
Natural disaster [log]	The total number of casualties for each natural disaster in the specific ime period.	International Emergency Events Database	Individual
Trade	The sum of total exports and imports from/to origin country to/from the United States	World Integrated Trade Solution	USD 2010
Age dependency ratio	Share of total population below 15 as a percentage of total working population.	World Development Indicators	Rate
Average weighted tariff	The average of effectively applied rates weighted by the product import/export shares corresponding to each origin country.	World Integrated Trade Solution	Rate
Homicides	Number of intentional homicides per 100,000 people.	UN Office on Drugs and Crime	Rate
Distance	Distance is calculated based on bilateral distances between the largest cities of both Countries, those inter-city distances being weighted by the size of the city compared to the overall country's population	CEPII GeoDist Database	Kilometres

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