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THREE ESSAYS ON POPULATION DYNAMICS, TRADE AND GROWTH

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THREE ESSAYS ON POPULATION DYNAMICS, TRADE AND GROWTH

DISSERTATION

A dissertation submitted in partial
fulfillment of the requirements for
the degree of Doctor of Philosophy
in the College of Business and
Economics at the University of
Kentucky

By
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Lexington, Kentucky

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ABSTRACT OF DISSERTATION

THREE ESSAYS ON POPULATION DYNAMICS, TRADE AND GROWTH

Changes in immigration patterns and differential fertility choices shape the economies of both developed and developing countries. However, these changes affect the economies of developed and developing nations in different ways. This study aims to understand the changes in population dynamics, brought about by differences in cross–country differential fertility choices and migration patterns, and how these changes affect economic development via the channels of international trade and cross–country human capital accumulation.

Chapter 1 discusses the background, data and literature on the patterns and composition of immigration and international trade, which are further explored in Chapter 2 for the world sample and in Chapter 3 for the U.S. and its trade partners.

Chapter 2 employs data on refugee and immigrant stocks for the years 1990–2005, and compares the extent to which refugees and immigrants differentially affect trade (exports and imports) with their home countries. The main contributions of Chapter 2 are: the high–dimensional fixed effect estimation of the immigrants' and refugees' effect on trade—a technique not previously applied within the immigration and trade literature; differentiation between the effect of immigrants and refugees on trade in commodity and differentiated product types for the world sample; and, finally, expanding the sample size beyond the countries and years considered in the previous studies. Chapter 2 provides the first evidence of the differential refugee–immigrant trade effect for the world sample, using the high–dimensional fixed effect estimation, which controls for unobserved events correlated with both trade and migration decisions over time. I find that immigrants have a small positive (1.27%) effect on differentiated exports to their home country, while refugees do not affect trade. I find no evidence of immigrants or refugees affecting imports. These findings are different from the previous research, which relied on using the augmented gravity approach and estimated the effect of immigrants on trade to be anywhere between 4–6 percent on exports and 5–7 percent on imports, respectively. Controlling for time–varying multilateral resistance terms is one of the main contributions of the paper, as it allows for a better estimation of the effect of immigration on trade, and, contrary to previous research, finds little evidence of immigrants' and refugees' effect on trade with their home countries.

Chapter 3 analyzes the effect of immigrants and refugees on U.S. trade with their home countries. More specifically, it explores the relationship between U.S. exports to 125 and imports from 100 immigrant and refugee countries of origin for the years 1990–2005. I find that immigrants have a positive effect on differentiated exports (0.3%) and have a negative effect on imports (affecting imports in differentiated products more). I do to find an effect of refugees on either U.S. exports or imports from their home countries.

Finally, Chapter 4 explores the cross–country differences in educational attainments, taking differential fertility rates into account. Differential fertility rate is the difference between fertility rates of women with high educational attainment and women with low educational attainment. In a country where differential fertility is high, lower–educated women have more children than highly educated women but, due to the highly persistent intergenerational transmission of human capital, the many children born to lower–educated women also tend to have less education, decreasing the future aggregate educational attainment and, potentially, reducing growth. In contrast, in a country with initially lower differential fertility, the children of less educated women still receive less education (compared to the children of highly educated women), but since they do not represent a large enough fraction of the population, the decrease in the future aggregate level of human capital is not as stark. We document that and increase in differential fertility has a positive effect on future primary enrollment ratios, and is negatively correlated to the total average years of schooling.

KEYWORDS: Immigration; Refugees; Trade; Differential Fertility, Human Capital Accumulation

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Date: July 27, 2017

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1.1 Introduction

Changes in immigration patterns and differential fertility choices shape the economies of both developed and developing countries. However, these changes affect the economies of developed and developing nations in different ways. This study aims to understand the changes in population dynamics, brought about by differences in cross–country differential fertility choices and migration patterns, and how these changes affect economic development via the channels of international trade and cross–country human capital accumulation.

Chapter 1 discusses the background, data and literature on the patterns and composition of immigration and international trade, which are further explored in Chapter 2 for the "world sample" and in Chapter 3 for the U.S. and its trade partners.

Chapter 2 employs data on refugee and immigrant stocks for the years 1990–2005, and compares the extent to which refugees and immigrants differentially affect trade (exports and imports) with their home countries. The main contributions of Chapter 2 are: the high–dimensional fixed effect estimation of the immigrants' and refugees' effect on trade—a technique not previously applied within the immigration and trade literature; differentiation between the effect of immigrants and refugees on trade in commodity and differentiated product types for the world sample; and, finally, expanding the sample size beyond the countries and years considered in the previous studies. Chapter 2 provides the first evidence of the differential refugee–immigrant trade effect for the "world" sample, using the high–dimensional fixed effect estimation, which controls for unobserved events correlated with both trade and migration decisions over time. I find that immigrants have a small positive (1.27%) effect on

differentiated exports to their home country, while refugees do not affect trade. I find no evidence of immigrants or refugees affecting imports. These findings are different from the previous research, which relied on using the augmented gravity approach and estimated the effect of immigrants on trade to be anywhere between 4–6 percent on exports and 5–7 percent on imports, respectively. Controlling for time–varying multilateral resistance terms is one of the main contributions of the paper, as it allows for a better estimation of the effect of immigration on trade, and, contrary to previous research, finds little evidence of immigrants' and refugees' effect on trade with their home countries.

Chapter 3 analyzes the effect of immigrants and refugees on U.S. trade with their home countries. Investigating the U.S. trade separately is relevant and important for a number of reasons. First, the World Trade Organization (WTO) ranks the U.S. as the world's top import country and the second largest export economy in the world, behind only China. Currently the U.S. accounts for almost 14% of total world imports and nearly 10% of total world exports, ranking first in commercial services and second in merchandise exports worldwide. Second, the U.S. remains the leading destination for immigrants, hosting a diverse group of almost fifty million international migrants which account for 19 percent of all immigrants worldwide. In addition the United Nations High Commissioner for Refugees (UNHCR) estimated that out of the 27 countries who who offered resettlement to over 100,000 refugees seeking sanctuary in 2014, the U.S. has granted entry to 73% of those refugees. The growing number of immigrants and refugees residing in the U.S. combined with a comprehensive list of its trade partners and high trade volumes suggest that we should investigate the relationship between immigration and trade for the U.S. separately and in more detail, paying closer attention to the fact that these two distinct migrant types may affect U.S. trade relations in different ways. Chapter 3 documents that immigrants have a positive effect on differentiated exports (0.3%) and have a negative effect on imports

(affecting imports in differentiated products more). I do to find an effect of refugees on either U.S. exports or imports from their home countries.

Finally, Chapter 4 explores the cross–country differences in educational attainments, taking differential fertility rates into account. Differential fertility rate is the difference between fertility rates of women with high educational attainment and women with low educational attainment. In a country where differential fertility is high, lower–educated women have more children than highly educated women but, due to the highly persistent intergenerational transmission of human capital, the many children born to lower–educated women also tend to have less education, decreasing the future aggregate educational attainment and, potentially, reducing growth. In contrast, in a country with initially lower differential fertility, the children of less educated women still receive less education (compared to the children of highly educated women), but since they do not represent a large enough fraction of the population, the decrease in the future aggregate level of human capital is not as stark. We document that and increase in differential fertility has a positive effect on future primary enrollment ratios, and is negatively correlated to the total average years of schooling.

1.2 Background on Immigrants and Refugees

International migration plays an important role in political, economic and social development and is a high–priority topic for both developing and developed countries. The recently increased focus of the policymakers towards worldwide migration has been, for the most part, limited to the context of the immigrants' effect on the host countries' labor market. In contrast, Chapter 2 and Chapter 3, investigate the economic benefits of migration via a channel of trade cost reduction, acknowledging that migrants are potential facilitators of foreign trade.

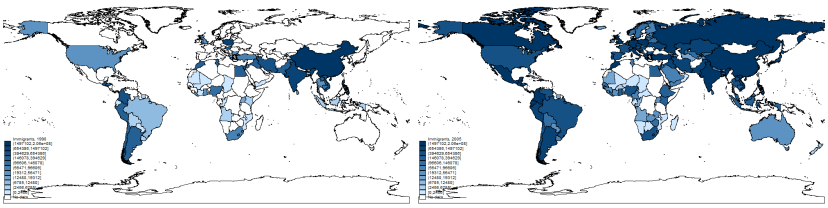
The vast majority of migrants leave their home countries in search of better economic and social opportunities, others are forced to flee due to various types of

crises—like the current mass movement of refugees. In 2015, the number of people living outside their country of origin has reached 244 million people, or about 3.3 percent of the world's population and constitutes a 41 percent increase compared to 2000. This number includes almost 20 million refugees, which represents the highest level of forced displacement on record (UNPF (2015)). Such continuous and rapid increase in worldwide migration further underscores the importance of studying and understanding the differences in the economic implications of various immigrant types.

The reasons for immigration vary by immigrant types. UNESCO defines a "migrant" as "a person for whom the decision to immigrate is taken freely and the underlying reasons, guiding this decision, are those of "personal convenience" and not a compelling intervention of any external factors." Even though the choices for immigration may be constraining, immigrants have more freedom in deciding on both: the country choice of their future permanent residence and the timing of their decision to immigrate. The migration choices of refugees, displaced or compelled to leave their countries for a variety of reasons, are much different. A "refugee", is a person who, "owing to well–founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable, or owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it."(UNPF (2015)).[1] Both

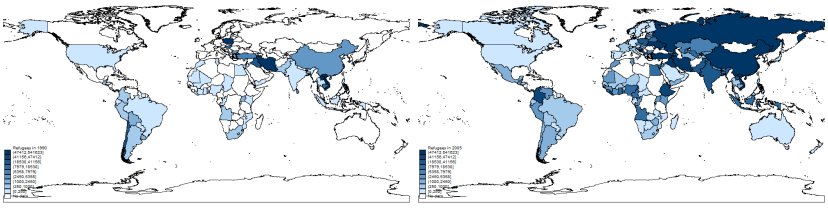
[1]Subsequent international documents and agreements (Cartagena Declaration on Refugees and the Convention Governing the Specific Aspects of Refugee Problems in Africa) have expanded this definition to include persons fleeing the general effects of armed conflict and/or natural disaster. A crucial requirement to be considered a "refugee" is crossing an international border. People forcibly displaced from their homes and cannot or choose not to cross a border are not refugees. Internally displaced people, unlike refugees, do not have special rights, status or recognition specific to their situation in international law.

Figure–1



(a) Immigrant Stock Country Origins, 1990

(b) Immigrant Stock Country Origins, 2005



(c) Refugee Stock Country Origins, 1990

(d) Refugee Stock Country Origins, 2005

Figure 1.1: World Immigrant and Refugee Stock (1990, 2005)

Note: Refugees and Immigrants from over 130 countries of origin residing in Australia, Belgium, Canada, Denmark, Finland, Germany, Hungary, Iceland, Italy, Norway, New Zealand, Spain, Sweden or USA.

definitions are an indication that immigrants and refugees are two distinct migrant types, and thus their effect on the economy, including the effect on trade with their home countries, may also be different.

The choice of host countries differs for immigrants and refugees. About two thirds of all worldwide migrants live in only 20 countries, with the United States being the top migrant host country (hosts 19% of all migrants), followed by Germany and Russia, both hosting around 5% of world migrants, and Saudi Arabia (4%). United Kingdom, Canada, France and United Arab Emirates are all permanent host countries for about 3% of world immigrants (UNPF (2015)).

In contrast, over half of all worldwide refugees come from only three countries—Syria (4.9m), Afghanistan (2.7m), and Somalia (1.1m) and a little over half a million refugees, as of 2015, reside in the U.S. The relatively smaller fraction of refugees residing in the U.S. is not surprising, since the vast majority of refugees tend to

resettle in the countries more immediate (both in geographical and cultural proximity) to their region, like Egypt, Jordan, Turkey and Lebanon.

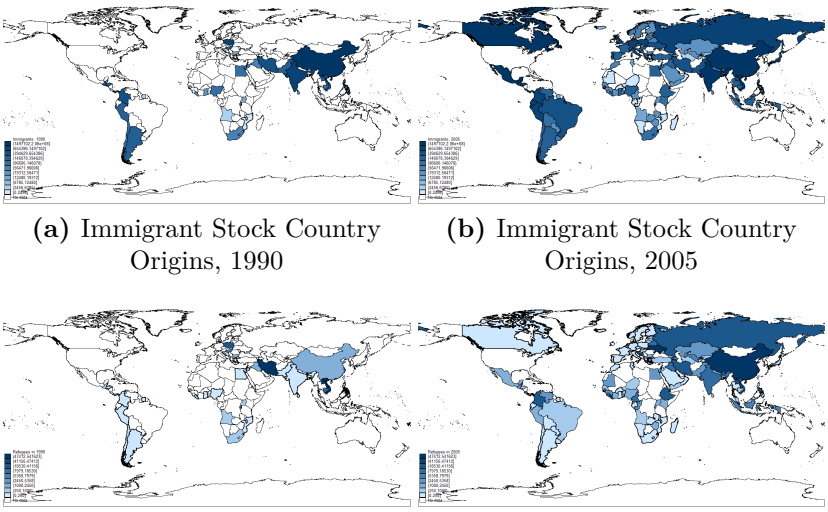
If we consider immigration specifically to the U.S., the immigrants from Mexico constitute the largest group (almost 30%) of all the immigrants currently residing in the United States. The United States also hosts about 4.5% of immigrants from India, Philippines and China, which both account for about 4% of U.S. immigrants, and Vietnam (3.2%).

According to the Congressional Budget Office (CBO) report, in 2004 one in seven workers in the U.S. was born in a different country. Among the most important reasons influencing immigration to the U.S. are family reunification, prospects of better employment opportunities, and humanitarian needs.

In the U.S. especially, immigration policy remains a heavily debated and controversial topic with the U.S. Commission on Immigration Reform (1990–1997) seeking to limit legal immigration to the U.S. to approximately 550,000 immigrants a year. However, despite the Commissions' efforts, in 2010 one million immigrants obtained legal permanent resident status in the U.S.. This trend is likely to continue to and even increase in the future calling for a more detailed investigation of the immigrant's effect on the U.S. economic and trade relations. Important for such analysis is the acknowledgment of the fact that not all migrants granted entry and residency in the U.S. are the same, hence the way they may affect the U.S. economy may differ based on their immigrant status. One example of a different immigrant sub–group are refugees. This group differs in the motivation and timing of their relocation as well as the choice of the new home country destination. United States has always hosted refugees, however due to the increased forced displacement of people from countries like Syria, Turkey, and Afghanistan, over 50,000 new refugees were admitted to the U.S. in 2005 alone.

The maps provide a visual picture of the changes in composition and residency of

Figure–2



(a) Immigrant Stock Country Origins, 1990

(b) Immigrant Stock Country Origins, 2005

(c) Refugee Stock Country Origins, 1990

(d) Refugee Stock Country Origins, 2005

Figure 1.2: U.S. Immigrant and Refugee Stock (1990, 2005)

Note: Refugees and Immigrants from over 100 countries residing in the U.S. in 1990 and 2005.

immigrant and refugee stocks over time. Figures 1 (1.1a and 1.1b) show the maps of immigrants from 134 origin countries in 1990 and 2005, respectively. Similarly, panels 1.1c and 1.1d show the refugees from 134 countries in 1990 and 2005. Whereas Figure 2 (1.2a and 1.2b) displays the immigrants and (1.2c and 1.2d) the refugees residing in the U.S. in 1990 and 2005.

All maps show that not only did the total numbers of immigrants and refugees increase over this 15–year period, but the composition of the host countries has also varied over time. The figures are consistent with the statistics on world migration patterns, and provide further support for studying the differential effect of immigrants and refugees on international trade.

1.2.1 Literature on Immigration and Trade

Migration patterns have significant economic consequences for both the sending and receiving countries. These economic consequences are often not clear, and with such unprecedented levels of international migration, we need more reliable studies that identify and analyze the trends and effects of migration across various immigrant categories. Ongoing debates over immigration and trade policies furthermore underscore the importance of a better and more complete understanding of this topic.

Chapter 2 and Chapter 3 contribute to the existing literature in several ways. First, Chapter 2 uses global panel data, allowing me to introduce time–varying multilateral resistance terms (importer–year, exporter–year, and country pair fixed effects). The inclusion of time–varying multilateral resistance terms in Chapter 2, allows me to control for events and policies that are correlated with both trade and immigration over time, thus making the estimates of the immigrant elasticities on trade more robust. For example, an ongoing war in Syria or recent civil conflicts in Angola, Burundi, or Egypt, both reduce trade with those countries but also increase migration out of these countries, leading to a spurious negative correlation. Introducing importer–year fixed effects allows me to capture the variation better than a more traditional use of gravity–type variables like "$Conflict_{jt}$". Similarly, an open border policy change in a host country could lead to both an increase in exports and immigration, resulting in a spurious positive correlation, which I capture with the it exporter–year fixed effect.

Gravity models traditionally rely on dummy variables like "$TradeAgreement_{it}$", to capture the whether the trade partners are part of a trade agreement or "$Conflict_{jt}$" to indicate whether the country is involved in an ongoing conflict. These variables are imperfect since they measure the presence but not the magnitude or intensity of such events. In panel data, the fixed effects approach is preferable since it deals with the measurement problems in such variables better. In addition global panel data

allows me to estimate the "average effect" of immigrants across all countries, instead of relying on a single case study, as has been done in the previous literature.

In Chapter 2, I find a small statistically significant effect of immigrants on differentiated exports: a 10% increase in immigrant stock increases exports to their home country by 1.2% (compared to some of the previous estimates of over 8%); refugees do not have a statistically significant effect on exports. Imports are not statistically affected by either the presence of immigrants or refugees in the host country.

Second, in both Chapter 2 and Chapter 3, I examine the differential effect of immigrants and refugees on trade with their home countries. Previous research has found that immigrants increase host country imports from their respective country of origin because they have preferences for home country goods which are scarce in the new host market. White and Tadesse (2007) refers to this channel as "transplanted home bias". Immigrants also have knowledge of their home country markets and, by exploiting this channel, may increase exports to their home country. Dunlevy (2006) describes this channel as the "information bridge hypothesis", which utilizes immigrants' knowledge of home country business practices, language, and institutional and market differences.

In contrast, refugees are an artifact of an ongoing war, civil or ethnic violence, political unrest, social, racial or religious persecution in their home country, and are placed in their host countries more randomly than immigrants. Therefore, refugees may minimize the endogeneity problem within the immigrant–trade literature. Looking at the differential effect of these two migrant groups separately will allow for a better understanding of the roles that different immigrant subgroups play in influencing their host–home country commercial relationships and aid in the formulation of appropriate social policy. To my knowledge, Chapter 2 is the first attempt to look at the differential effect of immigrants and refugees on trade with their home countries using a world sample (134 origin countries and 14 host countries for the period 1990-

2005). Head and Ries (1998) have performed the analysis of the differential immigrant effect on Canadian trade with 136 partners from 1980–1992. The authors consider refugees as one of the subcategories of immigrants and find no effect of refugees on exports and a positive effect on imports, where imports increase by 0.33% for each 1 percent increase in immigrant stock).

Chapter 3 contributes to the literature on U.S. trade by expanding the sample and time period with data on U.S. exports to 125 and imports from 100 immigrant and refugee origin countries for the period 1990–2005. In addition, I differentiate between exports and imports in commodity and differentiated product types and two types of migrants—immigrants and refugees. Similar analysis for the U.S. and its trade partners was undertaken by Gould and Ruffin (1996) and White and Tadesse (2010). However, my study is different from both of these in a couple of ways. Unlike Gould and Ruffin (1996) I differentiate between immigrant and product types as well as control for the time fixed effects. White and Tadesse (2010) differentiate between the immigrants' and refugees' effect on U.S. trade with their home countries, and finds a pro–trade effect of both immigrants and refugees on U.S. trade with their home countries. While I resort to similar interpolation technique as White and Tadesse (2010) to calculate the stock of immigrants residing in the U.S., I do not construct or interpolate the refugee stocks like they do. Instead, I utilize the refugee stock data provided by the United Nations High Commissioner for Refugees (UNHCR), which makes my measure of refugee stocks more reliable. In their paper, White and Tadesse (2010) classify both asylees and refugees as refugees, however UNHCR as well as the United States Citizenship and Immigration Services (USCIS) define an asylum–seeker

and a refugee differently.[2] Given the differences in the procedures and definitions of asylees and refugees and to better investigate the differential effect of immigrants and refugees on trade, I only account for the persons who are classified by the UNHCR as refugees. In their paper, White and Tadesse (2010) fail to control for any form of conflict in the immigrant or refugees origin country, which may both hinder U.S. trade with those countries and increase the influx of refugees. Since refugees are an artifact of an ongoing war, persecution, civil or ethnic violence, a better way of estimating the relationship would be to control for the presence of an ongoing conflict in the refugees' home country. I introduce a dummy variable "Conflict", which captures the existence of an ongoing conflict in the immigrant and refugees home country. In addition, White and Tadesse (2010) restrict their study to 1996–2001, while I am able to expand the panel and investigate the differential relationship between immigrants and refugees on U.S. trade for 1990–2005 period. Furthermore, I control for country–pair and year fixed effect, while White and Tadesse (2010) only control for time fixed effects.

The results in Chapter 2 and Chapter 3 confirm that immigrants affect differentiated exports more than exports in commodity products. In contrast, I do not find evidence of the immigrants' or refugees' effect on imports for the world sample. However, I observe a negative effect of immigrants on U.S. imports from their home countries. The results on the effect of refugees on trade fall short of statistical significance in both Chapter 2 and Chapter 3. I do not find that refugees affect either

[2]According to the definitions provided by both agencies, an asylum seeker is someone who has filed a petition for sanctuary but has not been granted one yet her or she may already reside on the U.S. territory awaiting the approval for the refugees status. In contrast, a person seeking refugee status may do so only from outside of the U.S. While some refugees may have been asylum seekers at some point in time, unlike asylum seekers, refugees have been granted sanctuary and their requests for relocation were not denied by either the UNHCR or the host country's government. A person may maintain the asylum seeker status until the review of his or her application petition is completed. In contrast, an asylum seeker whose application successfully passed the review and who has been granted sanctuary becomes a refugee.

imports or exports, while Head and Ries (1998) finds that refugees have a positive effect on imports. The differences in my findings could be attributed to a number of things: the fact that I use global panel and investigate the "average" effect of both immigrants and refugees; the use of different estimation technique (Head and Ries (1998) utilizes a gravity approach); as well as the use of different data and time periods.

Numerous studies have examined the relationship between trade and immigration and have found that this relationship is robust to the use of different samples, model specifications, and product types. Genc et al. (2012) provide a detailed review of the most influential and relevant literature on trade and immigration. They summarize 48 papers which have looked at the effect of immigration on trade. There are no papers which have performed the analysis for a global panel of countries and, to my knowledge, Chapter 2 is the first attempt to analyze the differential effect of immigrants and refugees on trade, using a panel of multiple origin and destination countries. The closest paper which has consider immigration and trade relationship for a global panel is Tadesse and White (2015). The authors investigate whether immigrants are associated with a reduction in transaction costs associated with trade. The authors examine data from 174 immigrant home countries and 19 OECD member host countries from 1995–2010 and document that 10% increase in the immigrant stock corresponds to a 1.04% decrease in total bilateral trade costs between the two trade partners. Differentiating between manufactured and agricultural products, Tadesse and White (2015) find that the effect of immigrants on trade cost reduction is pronounced for both product types.

Among the papers which have examined the effect of immigration specifically on U.S. trade, using a panel analysis, are Gould (1994), Jansen and Piermartini (2009), and White and Tadesse (2010). However, both Gould (1994) and Jansen and Piermartini (2009) and White and Tadesse (2010) are not directly comparable to my

study for a number of reasons described below.

Gould (1994) has a smaller sample (around 720 observations) and does not differentiate between commodity and differentiated exports (imports) or between immigrant group types. He reports that immigrants increase aggregate exports by 0.3% (for each 10% increase in immigrant stock) and 0.4% for aggregate imports. The paper controls for country fixed effects, however, does not include time fixed effects. The results reported by Gould (1994) may, therefore, capture the simultaneous growth in immigration and trade, and not the true causal effect of immigration on trade.

Jansen and Piermartini (2009) look at temporary migrants to the U.S. and, using a gravity regression, find that temporary migration has a positive and significant effect on trade and that temporary migration tends to have a stronger and more significant effect on both imports and exports than permanent migration. However, unlike my analysis, they do not differentiate between immigrant categories or product types.

White and Tadesse (2010) consider the differential effect of immigrants and refugees on U.S. trade with their home countries and their analysis is most relevant to what I do in Chapter 3. The authors uncover that immigrants and refugees have a different effect on trade. As mentioned previously, their paper does not include country fixed effects and focuses on a shorter, less recent time period. For the U.S. and its 59 trade partners over the period 1996–2001, the authors document a positive influence of immigrants on U.S. imports and exports and a minimal and insignificant influence of refugees. The authors report that a 1% increase in immigrant results in a 0.27% increase in aggregate exports and 0.13% increase in aggregate imports. White and Tadesse (2010) document that refugees have a small positive effect on non–manufactured exports and a small negative effect on manufactured imports. Non–manufactured exports increase by 0.06%, while manufactured imports decrease by 0.08% for each 1% increase in refugee stock.

Expanding the panel to 1995–2000 and accounting for U.S. exports to 125 and

imports from 100 immigrant and refugee origin countries, I do not find an effect on aggregate exports while differentiated exports increase by 0.3% for each 1% increase in immigrant stock. Additionally I find a negative effect on imports with immigrants decreasing aggregate imports by 0.6% and differentiated and commodity imports by 0.7% for each 1% increase in immigrant stock. Contrary to White and Tadesse (2010) I do not document any effect of refugees on U.S. trade in aggregate, commodity or differentiated products. However, my results are not directly comparable to the findings of White and Tadesse (2010). Unlike my study in which I control for both the country–pair and year fixed effects, White and Tadesse (2010) include only time year dummies and fail to control for country–fixed effects. In addition, I also control for the the existence of an ongoing conflict in the immigrant and refugees home country, to reflect the variation in both trade between the two countries and the out–migration from the immigrant and refugees origin coutures.

In addition Hatzigeorgiou (2010) analyzed the effect of immigration on trade for Sweden and its multiple immigrant origin trade partners. Hatzigeorgiou (2010), using the gravity model, examines the link between migration and trade flows for Sweden and its 180 trade partners between 2002 and 2007 using the gravity approach. The author reports a statistically strong positive immigration–trade relationship, particularly for trade in differentiated goods. Hatzigeorgiou (2010) attributes the pro–trade effect to the immigrants' ability to decrease information costs between Sweden and their home countries. A 1% increase in immigrant stock results in 0.6% increase in aggregate exports to the immigrants' country of origin. Aggregate imports increase by 0.9% for each 1% increase in immigrant stock. The author reports comparable magnitudes for immigrants' effects on trade in differentiated products. I use the augmented gravity approach, controlling for both time and destination fixed effects, and find that immigrants have a small positive effect on differentiated exports (0.3%) and have a negative effect on imports (affecting imports in differentiated products more).

I do not find an effect of refugees on either U.S. exports or imports from their home countries.

Lewer and Van den Berg (2009) examine the importance of six channels through which immigration may influence trade. Using a panel data (16 OECD countries and a large set of immigrant source countries for the years 1991–2000) and a three-stage least-squares (3SLS) model, the authors find that immigration stimulates bilateral trade. Specifically, a 10 percentage point increase in immigrant flow increases total trade between the host and home countries by nearly 5 percentage points. Lewer and Van den Berg (2009) suggest that the three channels that affect the relationship between immigration and trade the most are: foreign direct investment flows to the immigrants' home countries, newly established trade networks between immigrants in origin and host countries, and increases in income per capita in the immigrant host countries.

In addition, Head and Ries (1998) analyzes Canadian trade with 136 trade partners from 1980 to 1992. Head and Ries (1998) use data on Canadian immigrants to examine the effect on trade with their countries of origin. They analyze five categories of immigrants—immigrants as a result of family reunification, refugee–immigrants, immigrant–entrepreneurs, immigrant–investors, and other independent categories and discover that the "other independent" immigrant category, has a significant positive effect on trade. This effect is found to be larger than the "family reunification" effect. The authors report the refugee–immigrant category effect to be significantly lower than any other category of immigrants.

Among cross–sectional studies which have examined the immigrant–trade link are: Dunlevy and Hutchinson (1999), Felbermayr and Toubal (2012), Girma and Yu (2002), Peri and Requena-Silvente (2010), and Rauch and Trindade (2002). Dunlevy and Hutchinson (1999) and Girma and Yu (2002), find that migration creates incentives for domestic host country firms to produce relevant substitutes for the home

products demanded by migrants.

Rauch and Trindade (2002) and Felbermayr and Toubal (2008) do not consider immigration directly, instead they focus on large concentrations of ethnic Chinese immigrants in the host county, and estimate the effect of the global ethnic Chinese network on global bilateral trade. Using the gravity equation and taking the shares of ethnic Chinese population into account, Rauch and Trindade (2002) find that countries with higher fractions of ethnic Chinese residents trade more with each other, and Felbermayr and Toubal (2008) report that high–skilled Chinese migrants contribute more to bilateral trade. Both studies document more trade in differentiated than homogeneous products.

Peri and Requena-Silvente (2010) examine the effects of immigrants on the extensive (effect on the number of transactions) and intensive (effect on the average value per transaction) margins of exports in Italian provinces. The authors report that immigrants increase both the number of transactions and the value per transaction in exports for the receiving host country. The authors highlight that this pro–trade effect is stronger for more differentiated rather than commodity products. In their analysis, they consider 142 countries of origin and 103 Italian host provinces, using a standard gravity regression with origin and destination fixed effects.

The literature is not clear on whether immigrants influence exports more than imports or vice versa. Results reported by Gould (1994) and Girma and Yu (2002) find that immigrants' influence on host country exports is greater than their influence on imports. However, White and Tadesse (2007) and Head and Ries (1998) report pro–import trade effects of immigrants which exceed the pro–export effects. My results for both, the world sample estimates in Chapter 2 and the estimates for the U.S. only (Chapter 3), support the former finding of Gould (1994) and Girma and Yu (2002).

Furthermore, international trade is associated with substantial fixed costs not

limited to transportation costs, but the costs associated with the scarcity or inconsistency of the information about the foreign markets. For example, the culture, legal systems, norms and customs for business transactions may differ across countries, resulting in increased costs of establishing and maintaining exports and imports with the trade partners. Immigrant networks may reduce the information costs and facilitate a more efficient flow of information. Immigrants possess inherent proficiency in the business and cultural customs and norms, as well as tastes preferences in their origin country markets, and may use this information to substantial reduce trade costs, increasing both external and internal margins of trade. It has been previously documented by Rauch (1999), Rauch (2001), Rauch and Trindade (2002), and Tadesse and White (2010) that immigrant networks have a stronger impact on trade in differentiated products. Commodity products (e.g. aluminum alloys, woven fabrics, frozen vegetables, etc.) have more substitutes and common characteristics across countries. In contrast, differentiated products, like radio-telephonic devices, books, or medicaments, to name a few, may be less familiar to migrants and require more familiarization with their applications and use. Since immigrants have the language proficiency, deeper of the home market customs and norms, they can channel this information and familiarization process easier and facilitate more trade in differentiated products. Specifically Rauch (1999) estimates that immigrants increase exports in differentiated product types by 0.86% and in in commodity products types by 0.63% for each 1% increase in stock; Tadesse and White (2010) find that differentiated exports rise by 0.28% and commodity exports by 1.5%, while differentiated and commodity imports by 0.28% and 0.22%, respectively.

To date, the majority of empirical research has not accounted for the fact that the immigrants' influence on the economy may differ by their entry classification. The few empirical studies that do make this distinction are Cortes (2004), Head and Ries (1998) and Khan (1997). Only Head and Ries (1998) examines the differential effect

of immigrants and refugees specifically on trade.

Head and Ries (1998) use data on Canadian immigrants to analyze the effect of immigrants on trade with their countries of origin. They examine five categories of immigrants, including refugee category and document that refugees category effect on Canadian trade is significantly lower than the effect of any of the other four immigrant categories.

Cortes (2004) differentiates between the immigrants and refugees and their human capital investments and wage assimilation. The author utilizes the data from the Integrated Public Use Samples (IPUMS) of the United States Census and documents that refugees initially have lower annual earnings, but their annual earnings grow faster than the earnings of immigrants over time. Cortes (2004) discovers that compared to immigrants, refugees invest more in human capital.

Khan (1997), examines investments in human capital by immigrant and refugee men in the U.S. The author finds that refugees have a higher probability of investing in additional schooling compared to immigrants.

Chapter 2 and Chapter 3 both differentiate between the differential effect of immigrants and refugees on trade, which allows to better understand the roles that these distinct immigrant subgroups play in influencing their host–home country commercial relationships and a better formulation of appropriate social policies.

Finally, the previous literature has focused on gravity equations to estimate trade and migration flows and has provided evidence that the direction of causality runs from immigration to trade. Among some of the factors which may affect the decision to immigrate and trade are the distance between the two trading partners (both geographic and cultural), the presence of previous historical ties, similarities in political systems as well as the overall "openness" to trade and investment between the two countries.

Trade literature has relied on the gravity approach to control for these factors,

however, since most of these factors tend to promote both immigration and trade, the process of establishing the direction of true causality has proved to be challenging and lead to upward bias in estimates of the immigration effect on trade, especially in cross–country studies. The gravity equation doesn't deal well with the issue of heteroskedasticity present in the panel data. Silva and Tenreyro (2006) show that in panel data the use of log–linearized models estimated by OLS (like the augmented gravity approach) leads to biased elasticity estimates. The authors demonstrate that heteroskedasticity affects both the traditional gravity estimation by Tinbergen (1962), as well as the more recently used augmented gravity estimation techniques like Anderson and Van Wincoop (2003). Even the studies that include most of the observable country characteristics, still fail to completely control for the unobserved time–varying variables, leading to biased results.

One way to minimize the effect of unobserved variables is to control for country–pair fixed effects, exporter–time and importer–time fixed effects. The high–dimensional fixed effects estimation (HDFE) technique, proposed by Guimarães and Portugal (2009), has not been previously applied to study the effect of immigration on trade and is one of the main contributions of this paper. The HDFE procedure allows me to introduce more than two fixed effects and have a more detailed and robust estimation of degrees of freedom, especially when there are fixed effects nested within clusters (like clustering on the immigrants' country origins). In addition, it is more robust to addressing the possible collinearity issues within the fixed effects. Changes in institutions, differences in the immigrants' host and home country's economic environments, financial crises or economic booms may affect both trading partners, and the amount of trade and immigration between them. However these changes may not necessarily manifest themselves at the same time, which makes it even more important to introduce the exporter–importer, exporter–year and importer–year fixed effects as additional controls.

In Chapter 2, where I have a panel of multiple origin and destination countries, I estimate the effect of immigrants and refugees on trade using two approaches—a high–dimensional fixed effects estimation, using importer–year, exporter–year, and importer–exporter fixed effects, proposed by Guimarães and Portugal (2009) and tested by Head and Mayer (2013), as well as the, more traditionally used, augmented gravity approach proposed by Anderson and Van Wincoop (2003). In Chapter 3, where the destination is U.S. only, I resort to the more traditional augmented gravity estimation technique, using the time and the destination (immigrant and refugee origin) fixed effects.

1.2.2 Data on Immigrants, Refugees and Trade

Trade data are extracted from the World integrated Trade Solutions (WITS) database, collected and maintained by the World Bank. WITS provides data on the distribution, volume and content of exports and imports by product nomenclature for all trade partners in the world. In Chapter 2, I use the data on exports and imports between 14 immigrants and refugees host countries and 134 countries of their origin for the years 1990—2005. In Chapter 3, I use a bilateral dataset of trade between the U.S. and its 100 import and 125 export partners from 1990-2005. The data for both exports and imports are collected at SITC (Revision 2) 4 digit level codes, which allow me to observe bilateral annual exports and imports in detail, by product type. I then use James Rauch's product classification (Rauch (1999)) to construct bilateral aggregate, commodity and differentiated exports and imports from product types. Rauch categorizes the SITC (Revision 2) industries into three possible product types: differentiated, commodity (homogeneous) and reference priced. Previous literature, which utilized Rauch's classification to construct differentiated and commodity exports and imports, used the differentiated and commodity categories, and did not consider the reference priced category. Here, I also focus on two categories:

differentiated and commodity products.

Data on immigrant stocks are constructed using the UNPF (2015) and Kim and Cohen (2010). Data on immigrant stocks are taken from the United Nations Statistical Database (UNSD) and are available for the years 1990, 1995, 2000, and 2005. I use immigrant flow data from Kim and Cohen (2010) to interpolate intervening years, resulting in bilateral immigrant stock data from 1990—2005. In addition data on refugee stock, which allow me to look at the differential effect of immigrants and refugees on trade, come from the United Nations High Commissioner for Refugees (UNHCR), and contain annual refugee stocks for the years 1990—2005 (UNHCR (2015)).

Data on GDP come are from the Penn World Tables 8.1 and data on standard gravity measures (common language, distance, regional trade agreements) from *The Centre d'Etudes Prospectives et d'Informations Internationales* (CEPII)—a French research center in international economics (Institute for Research on the International Economy, Methodology (2001)).

Data on international and country–specific conflict come from the Center for Systemic Peace. The center maintains data on the major episodes of political violence and warfare (MEPV) between 1946-2014. MEPV defines major episodes of violence as systematic episodes of lethal violence resulting in at least 500 directly–related deaths over the course of the episode. Episodes can range from international and civil wars to ethnic and civil violence, and are assigned a societal–systemic magnitude impact ranging from 0 to 10. Any category which receives a score above 7 is an example of a hypothetical conflict.[3] There are two reasons for this. First, during 1990–2005 there were no conflicts with a severity level above 5.[4] Second, most contemporary warfare

[3]In the time period analyzed in Chapters 2 and 3, there are no conflict episodes with a score above 5.

[4]WWI and WWII, for example, are both assigned a score of 7.

locations lack the necessary military technologies for a conflict magnitude over 7. Using the available conflict categories, I create a dummy variable $(Conflict)_{jt}$, which is assigned a value of 1 if the major episode is greater than 3, otherwise $(Conflict)_{jt}$ is equal to zero.[5]

[5]More detailed explanation of the conflict categories and magnitudes can be found in the Appendix.

Chapter 2 Differential Effect of Immigrants and Refugees on Trade with their Home Countries.

2.1 Introduction

Employing data on refugees and immigrants from 134 countries of origin and 14 destination countries for the years 1990—2005, I compare the extent to which refugees and immigrants differentially affect trade (exports and imports) with their home countries, and provide the first evidence of this differential refugee–immigrant trade effect for the world sample. Using the high–dimensional fixed effect estimation allows me to control for unobserved events correlated with both trade and migration decisions over time. I find that immigrants have a small positive effect on differentiated exports to their home country (1.3%), while refugees do not affect trade. I do not find evidence that immigrants or refugees affect imports.

2.2 Empirical Model Specification

The gravity equation has been the preferred empirical method in international trade and immigration literature Tinbergen (1962). Despite the fact that it provides a good fit for most datasets of regional and international trade, it leads to biased parameter (elasticity) estimates under heteroskedasticity assumptions in panel data.

Here I estimate the effects of immigrants and refugees on trade using two approaches: a high dimensional fixed effects (HDFE) estimation proposed by Guimarães and Portugal (2009) and tested by Head and Mayer (2013) and a more traditional augmented gravity method suggested by Anderson and Van Wincoop (2003).

Using a bilateral data set of exports and imports between 14 migrant–destination countries and 134 countries of their origin over the period 1990—2005, I separate the

effects of immigrants and refugees on trade with their home countries. Controlling for the exporter–year, importer–year and exporter–importer fixed effects accounts for the observable and unobservable time variant trade costs (multilateral resistance terms) between the two trading partners. HDFE estimation absorbs any dynamic forces that may change over time (such as GDPs, population growth, conflict, etc.). and affect both the trade and immigration decisions. This estimation technique has been proposed by Guimarães and Portugal (2009), and tested by Head and Mayer (2013), however, not previously applied within the trade–immigration literature. I also estimate the model using a more traditional augmented gravity approach with exporter, importer and time fixed effects, proposed by Anderson and Van Wincoop (2003).

An equation for exports with multilateral high–dimensional fixed effects takes the following form:[1]

$$ln(Exports)_{ijt} = \beta_1 ln(Immigrants)_{ijt-1} + \beta_2 ln(Refugees)_{ijt-1} + \beta_3 RTA_{ijt} + \\ + \theta_{it} + \omega_{jt} + \delta_{ij} + \epsilon_{ijt} \quad (2.1)$$

In equation (1) each observation is an immigrant host (i), immigrant origin (j), and year (t) country-pair of exports (imports). $(Exports)_{ijt}$ is the exports (aggregate, commodity or differentiated) from one of the 14 immigrant host countries to one of the 134 immigrant origin countries, $(Immigrants)_{ijt-1}$ is the immigrant stock residing in the host country in the previous year, $(Refugees)_{ijt-1}$ is the refugee stock residing in the host country in the previous year, RTA_{ijt} is a dummy variable equal to 1 if the two trading partners have a regional trade agreement in place in a given year, θ_{it} is the exporter-year fixed effects, ω_{jt} is the importer–year fixed effects, δ_{ij} is the exporter-importer fixed effect, and ϵ_{ijt} is the error term.

[1]Similarly for imports the dependent variable is $ln(Imports)_{ijt}$.

For a robustness check, and to be able to compare my preferred specification to the ones previously used in the literature, I also estimate an augmented gravity equation proposed by Anderson and Van Wincoop (2003), for which I use equation (2) below:

$$ln(Exports)_{ijt} = \beta_1 ln(GDP)_{it} + \beta_2(Conflict)_{jt} + \beta_3(RTA)_{ijt} + \\ + \beta_4 ln(Immigrants)_{ijt-1} + \beta_5 ln(Refugees)_{ijt-1} + \zeta_{ij} + \mu_t + \epsilon_{ijt} \quad (2.2)$$

where each observation is an immigrant host (i), immigrant origin (j), and time (t) country-pair. The estimation yields results comparable to the previous literature.

2.3 Results

2.3.1 Aggregate Exports

Table 2.1: HDFE: Aggregate Exports

	(Exports with no Ref)	(Exports with Ref)
RTA	0.081	0.080
	(0.069)	(0.069)
Imm stock	0.066	0.059
	(0.042)	(0.043)
Ref stock		0.010
		(0.011)
Obs.	5,509	5,509
Exporter-Year fixed effects	Y	Y
Importer-Year fixed effects	Y	Y
Exporter-Importer fixed effects	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Correlation between refugee stock and immigrant stock is 0.085. Both regressions have exporter-year, importer-year and exporter-importer f.e.

Results reported in Table 2.1, where I control for exporter–year, importer–year and exporter–importer fixed effects, show that neither immigrants nor refugees

have a significant effect on exports to their home countries. Introducing additional bilateral controls allows us to control for events that are correlated with both trade and migration patterns over time. The magnitude of the coefficients is similar to Table A.1, but HDFE estimation absorbs most of the variation so the significance is lower. Column 1 of Table 2.1, shows that immigrants do not have an effect on exports to their home countries. When I allow for a differential effect of refugees, the results do not change. This is not surprising, given the presence of high dimensional fixed effect. Any kind of turmoil is likely to increase both the influx of refugees, and a decrease in trade between the two partners. However, $(Conflict)_{jt}$ used in regression (1), only captures one dimension of other variables that may affect the relationship, and the country–year (importer–year, exporter–year) fixed effects may be better at capturing the effect of refugees on exports.

Table A.1 presents the results for aggregate exports from 14 immigrant–host countries to 134 immigrants-origin countries using the augmented gravity regression estimation. Column (2) allows for a differential effect of refuges. Looking at the results in the first column of Table A.1, we see immigrants have a modest effect on exports to their home countries (a 10% increase in immigrant stock in the host country increases the aggregate exports to the country of origin by 0.9%), while refugees have a slight negative effect (a 10 percent increase in refugee stock, decreases exports to their home country by 0.2%). These estimates are much lower than the results reported by Hatzigeorgiou (2010), however, he only considers Sweden and its trade partners, and reports a 6 percent increase in aggregate exports for additional 10 percent increase in immigrants.

2.3.2 Commodity and Differentiated Exports

Previous research has pointed out that immigrants may affect exports in commodity and differentiated product types differently. Rauch (1999), Rauch (2001),

Rauch and Trindade (2002), Dunlevy (2006), White and Tadesse (2007), Tadesse and White (2010) all posit that immigrant networks have a stronger impact on trade in differentiated products.

Commodity products like agricultural products, textiles, and raw materials require less familiarity and additional information in the process of establishing a trade relationship, since most of these products have common characteristics and substitutes across countries. In contrast, differentiated products like apparel, shoes, and electronics may vary more across countries and cultures. Some varieties of differentiated products may be more strongly preferred by some countries and because of variations in product type and quality, network effects may be more important for differentiated products than for commodities. Immigrants through their knowledge of language, customs, and home markets, can decrease the information costs associated with establishing the trade connections in differentiated products and facilitate more trade in these products.

Table 2.2: HDFE: Commodity and Differentiated Exports

	(Comm noref)	(Comm ref)	(Diff noref)	(Diff ref)
RTA	0.152	0.151	-0.010	-0.011
	(0.102)	(0.102)	(0.077)	(0.077)
Imm stock	0.097	0.092	0.127***	0.121**
	(0.062)	(0.063)	(0.047)	(0.047)
Ref stock		0.006		0.009
		(0.016)		(0.012)
Obs.	5,509	5,509	5,509	5,509
Exporter-Year fixed effects	Y	Y	Y	Y
Exporter-Importer fixed effects	Y	Y	Y	Y
Importer-Year fixed effects	Y	Y	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Correlation between refugee stock and immigrant stock is 0.085. All regressions have exporter-year, importer-year and exporter-importer f.e.

HDFE results are presented in Table 2.2 and find that immigrants have a positive

effect on exports in differentiated product types—a 10% increase in immigrant stock results in a 1.27% increase in differentiated exports (1.2% when refugees are accounted for in column 4). The effect of immigrants on differentiated exports is stronger than on commodity exports or aggregate exports, providing further support for the immigrant network channel. Refugees do not have a significant effect on either commodity or differentiated exports.

The augmented gravity results for aggregate exports, reported in Table A.2, are similar to the HDFE results for aggregate exports, reported in Table 2.2, and demonstrate a positive, although smaller, effect of immigrants on differentiated exports. Looking at columns 3 and 4 of the augmented gravity Table A.2, we observe that immigrants alone account for a 1.5% increase in differentiated product types (for each 10% increase in immigrant stock) and when introducing refugees separately in (column 4), we see that this immigrant effect stays the same. I fail to find evidence of an effect of immigrants on commodity exports. This finding confirms the previous literature finding that immigrants affect trade in differentiated type products more. Refugees do not have an effect on differentiated exports, but do have a slight negative effect on exports in commodity products (-0.6%).

2.3.3 Aggregate Imports

According to Head and Ries (1998) immigrants' effect on imports and exports may be different. Immigrants may have a direct impact on imports because of their preferences for goods produced in their home country. This effect is likely to be larger for differentiated rather than commodity products, where there is little reason to prefer products sourced from a specific country and the "specific" variety may be unavailable locally. Since international trade imposes much higher costs than domestic transactions, setting up an export connection requires finding potential markets, accessing distribution channels, and local product demand in foreign environments.

The importer, on the other hand, needs to find a reliable source of the product supply. Both export and import activities require knowledge of local customs, laws, traditions, and markets. These requirements could be facilitated by the immigrants' knowledge of their home countries' language, customs, laws, traditions, and markets. These factors lower the transactions costs for both exports and imports, however they may do so differentially. Elasticities for imports may be higher, because the knowledge of the home market may increase both imports and exports, but preferences for home–country goods increases only imports. Immigrants may also have similar preferences as the native population in the host country, but they may find it easier to set up importing businesses rather than exporting businesses.

Table 2.3: HDFE: Aggregate Imports

	(Imports noref)	(Imports ref)
RTA	0.175*	0.176*
	(0.093)	(0.093)
Imm stock	-0.012	-0.010
	(0.060)	(0.061)
Ref stock		-0.002
		(0.015)
Obs.	4,903	4,903
Importer-Year fixed effects	Y	Y
Exporter-Year fixed effects	Y	Y
Importer-Exporter fixed effects	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Correlation between refugee stock and immigrant stock is 0.085. Both regressions have importer-year, exporter-year and importer-exporter f.e.

Table 2.3, controls for high dimensional fixed effects. Column 1 of Table 2.3 enters immigrant stock separately and finds no significant effect; once we estimate the effect of immigrants and refugees differentially (Column 2), again I do not observe a significant effect of either refugees or immigrants on aggregate imports.

Applying the augmented gravity estimation, results presented in Table A.3, we

observe a pro–trade effect of immigrants (0.9% increase in aggregate imports for each 10% increase in immigrant stock), while refugees have a slight negative effect on aggregate imports (0.3% increase in aggregate imports for each 10% increase in refugee stock). Column 2 of Table A.3 for the augmented gravity estimation reports similar findings to the primary HDFE specification Table 2.3, discussed earlier. Immigrants exhibit a positive effect on aggregate imports resulting in a 1.2% increase in aggregate imports for each 10% increase in immigrant stock, while refugees do not seem to affect imports in aggregate.

2.3.4 Commodity and Differentiated Imports

Table 2.4 reports the results for the commodity and differentiated imports regressions using the high dimensional fixed effects estimation. Controlling for the exporter–year, importer–year and exporter–importer fixed effects, I do not find a significant effect of immigrants on commodity or differentiated imports. When allowing for a differential effect of refugees, there is no evidence of a significant effect on either commodity or differentiated products. Refugees do not have a significant effect on imports in commodity or differentiated products.

Immigrants exhibit a slight positive effect on imports in differentiated products, when using the augmented gravity approach. Table A.4 estimates the regressions using the augmented gravity approach and reports that a 10% increase in immigrant stock is associated with a 1.3% increase in commodity imports from their home country (1.4% when controlling for refugees). There is a slight positive significant effect of immigrants on imports in commodity products types when controlling for refugees separately. A 10 percent increase in immigrant stock in the host country raises commodity imports to the host country by 0.1% in Column 2. Refugees do not have a significant effect on either commodity or differentiated imports to their host country.

Table 2.4: HDFE: Commodity and Differentiated Imports

	(Comm noref)	(Comm ref)	(Diff noref)	(Diff ref)
RTA	0.204	0.200	0.137	0.135
	(0.131)	(0.131)	(0.099)	(0.100)
Imm stock	(0.085)	(0.086)	(0.064)	(0.065)
Ref stock		0.014		0.003
		(0.021)		(0.016)
Obs.	4,903	4,903	4,903	4,903
Importer-Year fixed effects	Y	Y	Y	Y
Exporter-Year fixed effects	Y	Y	Y	Y
Importer-Exporter fixed effects	Y	Y	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Correlation between refugee stock and immigrant stock is 0.085. All regressions have importer-year, exporter-year and importer-exporter f.e.

2.4 Conclusion

Employing data on refugees and immigrants from 134 countries of origin and 14 destination countries for the years 1990—2005, I differentiate between the immigrant and refugee effect on exports and imports in commodity and differentiated products. I find that immigrants have a more pronounced effect on exports rather than imports, affecting differentiated exports more than commodity exports. My results support the findings of Gould (1994) and Girma and Yu (2002) that immigrants' influence on host country exports is greater than their influence on imports. I also confirm the previous literature's suggestion that immigrants affect differentiated product types more via the network effect.

Controlling for importer–year, exporter–year, and exporter–importer fixed effects, I demonstrate that a 10 percent increase in the stock of immigrants exhibits a positive effect on differentiated exports increasing them by 1.3 percent. The magnitude of this effect is almost five times smaller than previously documented, highlighting the importance of using high dimensional fixed effects, which better control for unobserved

time–varying factors that affect both trade and immigration patterns. I fail to find an effect of immigrants on exports in aggregate.

For the HDFE estimates, the results for exports rather than imports may be stronger due to the fact that the longer the immigrant stock resides in the host country, the stronger the immigrant link becomes. Using the HDFE estimation, the effect of the stock of immigrants on aggregate imports, as well as imports in commodities, falls short of statistical significance. The explanation for such finding may be that with time and aging of the immigrant stock, the preferences for home products may weaken or go away completely. Since imports are more likely subject to the immigrants' strong preferences for their home country products, with time this channel of trade may lose importance.

In contrast, refugees do not have a significant effect on exports from their home countries in either commodity or differentiated products. Refugees also do not seem to have a pronounced effect on imports (aggregate, commodity or differentiated). These findings may be attributable to a couple of things. First, the use of time-varying country specific multilateral resistance terms (high–dimensional fixed effects), which allowed me to control for any events correlated with both trade and migration decisions over time, may have captured the variation in the placement of the refugees better than a typical augmented gravity regression. Refugees are also relatively more exogenous than immigrants when considering the decision to relocate, and for that same reason, may be less familiar with the host country markets, culture, language, traditions, etc. Additionally, refugees are a very specific and a much smaller group of migrants. They may not wish to maintain any ties with their home countries, or not have an opportunity to do so, due to an ongoing conflict, or fear of persecution.

Chapter 3 Differential Effect of Immigrants and Refugees on U.S. Trade with their Home Countries.

3.1 Introduction

Employing data on imports from 100 and exports to 125 immigrant and refugee home countries, I provide the first evidence of the differential refugee–immigrant trade effect for the U.S. and its trade partners. This paper finds that immigrants have a positive effect on exports in differentiated product types, increasing the exports in differentiated products by 3.3% for a 10% increase in immigrant stock. I do not find an effect of immigrants on exports in commodities. Immigrants have a negative effect on aggregate imports, with a slightly more negative effect on imports in differentiated products. Refugees, do no have an effect on either exports or imports from their countries of origin.

Among the most relevant papers to this study are Gould and Ruffin (1996), Head and Ries (1998), White and Tadesse (2010) and Tadesse and White (2015). Gould and Ruffin (1996) find that immigrants, residing in the U.S., have a negative effect on aggregate exports—a 10% increase in immigrant stock leads to a 0.3% decrease in exports, while imports rise by 0.4%. Head and Ries (1998), using Canadian trade data with 136 partners from 1980 to 1992, find that a 10% increase in immigrants is associated with a 1% increase in Canadian exports to the immigrant's home country and a 3% increase in imports. White and Tadesse (2010) consider the differential effect of immigrants and refugees on U.S. trade with their home countries for the U.S. and its 59 trade partners over the period 1996–2001. The authors document that an increase in immigrant stock by 1% results in a 0.27% increase in aggregate exports and 0.13% increase in aggregate imports. I do not find an effect on aggregate exports while differentiated exports increase by 0.3% for each 1% increase in immigrant stock.

Additionally I find a negative effect on imports with immigrants decreasing aggregate imports by 0.6% and differentiated and commodity imports by 0.7% for each 1% increase in immigrant stock. My results are not directly comparable to the findings of White and Tadesse (2010) since I differentiate between commodity and differentiated product types, while they estimate the immigrant effect on non–manufacturing and manufacturing exports and imports. White and Tadesse (2010) document that refugees have a small positive effect on non–manufactured exports and a small negative effect on manufactured imports. Non–manufactured exports increase by 0.06%, while manufactured imports decrease by 0.08% for each 1% increase in refugee stock. Contrary to their findings I do not document any effect of refugees on U.S. trade in aggregate, commodity or differentiated products.

This paper contributes to the existing literature in several ways. I expand the sample and time period with data on U.S. exports to 125 and imports from 100 immigrant and refugee origin countries for the period 1990–2005. I also differentiate between exports and imports in commodity and differentiated product types and two types of migrants—immigrants and refugees.

3.2 Empirical Model Specification

This paper is using the augmented gravity approach with exporter, importer and time fixed effects, proposed by Anderson and Van Wincoop (2003). I demonstrate that immigrants increase exports in differentiated product types by 3.3% for each 10% increase in immigrant stock, while I not find any effect on exports in commodities. These findings are aligned with the results in the previous literature and provide further support for the immigrant network channel. Immigrants have a negative effect on aggregate imports, with a comparable negative effects on imports in differentiated products than on commodity imports). Refugees, do no have an effect on either exports or imports from their countries of origin.

The primary equation is presented below:[1]

$$ln(Exports)_{ijt} = \beta_1 ln(GDP)_{jt} + \beta_2 (Conflict)_{jt} + \beta_3 (RTA)_{ijt} + \\ + \beta_4 ln(Immi)_{ijt-1} + \beta_5 ln(Ref)_{ijt-1} + \theta_j + \mu_t + \phi_{ijt} \quad (3.1)$$

where each observation is an immigrant host (i), immigrant origin (j), time (t) pair of aggregate exports from the U.S. to their immigrant origin partner countries in a given year. $(Exports)_{ijt}$ is the exports (aggregate, commodity and differentiated) from the U.S. to the immigrants' and refugees' home country, $(GDP)_{jt}$ is the GDP in the immigrant origin country in a given year, $(Conflict)_{jt}$ is a categorical variable, equal to 1, if the country of immigrants' and refugees' origin is involved in an ongoing political or social unrest, religious or racial persecution, civil, ethnic or violence or war in a given year, $(RTA)_{ijt}$ is a categorical variable equal to 1 if the trade partners are currently part of a bilateral trade agreement, $(Imm)_{ijt-1}$ is the immigrant stock residing in the U.S. in the previous year, $(Ref)_{ijt-1}$ is the refugee stock residing in the U.S. in the previous year, θ_j is the export (immigrant origin) fixed effect, μ_t is time fixed effect, and ϕ_{ijt} is the error term.

3.3 Results

3.3.1 Aggregate Exports

Table 3.1 presents the results for aggregate exports from the U.S. to 125 immigrant and refugee-origin countries. Column (2) allows for a differential effect of refuges. Looking at the results in the first column of Table 3.1, we see that neither immigrants nor refugees have an effect on aggregate exports to their home countries.

Column (2) allows for a differential effect of refuges. Looking at the results in the

[1]Similarly for imports the dependent variable is $ln(Imports)_{ijt}$.

Table 3.1: Aggregate Exports from the U.S. to 125 immigrant-origin countries.

	(Exports no Ref)	(Exports with Ref)
Real GDP immi origin	0.117	0.114
	(0.083)	(0.082)
Conflict immi origin	0.101	0.100
	(0.089)	(0.090)
RTA	-0.001	0.006
	(0.083)	(0.081)
Immigrant stock	0.002	0.028
	(0.101)	(0.108)
Refugee stock		-0.010
		(0.012)
Obs.	1,035	1,035
Year fixed effects	Y	Y
Destination fixed effects	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Correlation between refugee stock and immigrant stock is 0.032.

first column of Table 3.1, we see that neither immigrants nor refugees have an effect on aggregate exports to their home countries. White and Tadesse (2010) report that a 1% increase in immigrant stock results in a 0.27% increase in aggregate exports. The differences between our findings could be attributed to my use of country–pair fixed effects which capture the time–invariant characteristics of the trade partners better than the controls like $Seaport_j$ or $English_j$ used by White and Tadesse (2010). Similar to my findings the authors do not find any effect of refuges on aggregate exports.

3.3.2 Commodity and Differentiated Exports

Previous research has pointed out that immigrants may affect exports in commodity and differentiated product types differently. Rauch (1999), Rauch (2001), Rauch and Trindade (2002), Dunlevy (2006), White and Tadesse (2007), Tadesse and White (2010) posit that immigrant networks have a stronger impact on trade

in differentiated products. Commodity products have more substitutes and common characteristics across countries. Differentiated products may be completely unknown or have a lot of asymmetric information associated with them. Since immigrants possess the knowledge of language, customs, and home markets, they can exploit this asymmetric information and facilitate more trade in these differentiated products.

Table 3.2: Commodity and Differentiated Exports from the U.S. to 125 immigrant-origin countries.

	(Comm noref)	(Comm ref)	(Diff noref)	(Diff ref)
Real GDP immi origin	0.147	0.140	0.127	0.122
	(0.112)	(0.112)	(0.109)	(0.107)
Conflict immi origin	0.105	0.101	0.150	0.146
	(0.115)	(0.116)	(0.125)	(0.125)
RTA	-0.178**	-0.160**	0.122	0.137
	(0.077)	(0.077)	(0.130)	(0.125)
Immigrant stock	-0.164	-0.103	0.280**	0.333***
	(0.163)	(0.172)	(0.110)	(0.108)
Refugee stock		-0.022		-0.020
		(0.020)		(0.013)
Obs.	1,035	1,035	1,035	1,035
Year fixed effects	Y	Y	Y	Y
Destination fixed effects	Y	Y	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Correlation between refugee stock and immigrant stock is 0.032.

Once exports are disaggregated into commodity and differentiated product types, the results change slightly, and are reported in Table 3.2. Immigrants have a slight positive effect on differentiated exports on their own (a 10% increase in immigrant stock results in a 2.8% increase in differentiated product exports to the country of their origin). When introducing refugees separately, we do not observe refugees affecting exports in differentiated products, while immigrants do exhibit a positive effect, increasing differentiated exports by 3.33% for each 10% increase in their stock in the host country. The results for differentiated products are comparable to the findings

of White and Tadesse (2010), who report a 2.9% increase in manufacturing exports increase for each 10% increase in immigrant stock and consistent with the previous literature's finding that immigrants affect exports in differentiated type products more than in commodities. In contrast to White and Tadesse (2010), who report that non–manufacturing exports increase by 1.9% for each 10% increase in immigrant stock, I do not find that immigrants affect commodity exports.

3.3.3 Aggregate Imports

Table 3.3: Aggregate Imports to the U.S. from 100 immigrant-origin countries.

	(Imports noref)	(Imports ref)
Real GDP immi origin	0.600***	0.603***
	(0.144)	(0.144)
Conflict immi origin	−0.212	−0.210
	(0.129)	(0.130)
RTA	1.110***	1.102***
	(0.417)	(0.419)
Immigrant stock	−0.612***	−0.641***
	(0.154)	(0.160)
Refugee stock		0.010
		(0.019)
Obs.	1,028	1,028
Year fixed effects	Y	Y
Origin fixed effects	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Correlation between refugee stock and immigrant stock is 0.027.

According to Head and Ries (1998) immigrants' effect on imports and exports may be different. Immigrants may have a direct impact on imports because of their preferences for goods produced in their home country. This effect is likely to be larger for differentiated rather than commodity products, where there is little reason to prefer products sourced from a specific country and the "specific" variety may be

unavailable locally. Since international trade imposes much higher costs than domestic transactions, setting up an export connection requires finding potential markets, accessing distribution channels, and local product demand in foreign environments. The importer, on the other hand, needs to find a reliable source of product supply. Both export and import activities require knowledge of local customs, laws, traditions, and markets. These requirements could be facilitated by the immigrants' knowledge of their home countries' language, customs, laws, traditions, and markets. These assets lower the transactions costs for both exports and imports, however they may do so differentially. Elasticities for imports may be higher, because the knowledge of the home market may increase both imports and exports, but preferences for home–country goods increases only imports. Immigrants may also have similar preferences as the native population in the host country, but they may find it easier to set up importing businesses rather than exporting businesses.

In Table 3.3, which presents the regression results for the aggregate imports I find that immigrants have a negative effect on aggregate imports, lowering aggregate imports by 0.6% for each 10% increase in the immigrant stock. This is also true for the results reported in Column 2 of Table 3.3 where we observe a differential effect of immigrants and refugees. In contrast, White and Tadesse (2010) report a positive effect with immigrant stock increasing aggregate imports by 1.3% for each 10% increase in stock. However, the authors find that refugees lower aggregate imports by 0.5% as a result of a 10% increase in refugee stock.

3.3.4 Commodity and Differentiated Imports

Table 3.4 reports a negative significant effect of immigrants on imports in differentiated product types while refugees again fail to exhibit significant effect on imports in both commodities and differentiated products.

Columns 1 and 2 of Table 3.4 demonstrate that immigrants have a negative effect

Table 3.4: Commodity and Differentiated Imports to the U.S. from 100 immigrant-origin countries.

	(Comm noref)	(Comm ref)	(Diff noref)	(Diff ref)
Real GDP immi origin	0.815***	0.816***	0.326**	0.330**
	(0.218)	(0.216)	(0.129)	(0.129)
Conflict immi origin	-0.161	-0.160	0.019	0.022
	(0.213)	(0.214)	(0.161)	(0.161)
RTA	-0.006	-0.008	1.079***	1.069**
	(0.153)	(0.154)	(0.416)	(0.419)
Immigrant stock	-0.723**	-0.731**	-0.689***	-0.726***
	(0.308)	(0.329)	(0.152)	(0.163)
Refugee stock		0.003		0.013
		(0.027)		(0.020)
Obs.	1,028	1,028	1,028	1,028
Year fixed effects	Y	Y	Y	Y
Origin fixed effects	Y	Y	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Correlation between refugee stock and immigrant stock is 0.027.

on commodity imports decreasing them by 7.3% for each 10% increase in immigrant stock. Similarly, immigrants lower imports in differentiated products by 7.1% for each 10% increase in immigrant stock. Refugees, on the other hand, have no effect on commodity or differentiated imports from their home counties. The results do not demonstrate that there is a distinction between commodity and differentiated goods or inclusion of refugees with the point estimates consistent for all types of imports to the coefficient estimates reported in Table 3.3. In contrast, White and Tadesse (2010) uncover that immigrants increase manufacturing imports by 3% and refugees lower manufacturing imports by 0.8% as both of their stocks in the U.S. rise by 10%. The authors do not report any effect of immigrants or refugees on non–manufacturing imports.

Theoretically, the unobserved bilateral factors, captured by country–pair fixed effects, may be either positively or negatively correlated with immigrant networks.

Empirically estimated negative effect of immigrants on aggregate, commodity and differentiated imports, however, may be indicative of an increased host–country production of the products, which immigrants previously imported from their origin countries and now produce locally. Most immigrants and refugees come from less developed countries, where the variety and product sophistication is much lower compared to the host country. Over time, when the stock of immigrants in the host country grows, it may be more reasonable to establish the production of both differentiated and commodity products locally, due to the higher demand by a substantially large stock of immigrants. Establishing production of differentiated products locally, justified by the substantial local demand may result in lower demand for differentiated product imports from the immigrants' home–countries. For example, the largest immigrant stock residing in the U.S. is from Mexico and not surprisingly, there is a diverse and substantially large chain of Mexican stores located in the U.S., catering to the local demand for authentic (differentiated) Mexican products.

Commodity products, on the other hand, are similar across countries, and thus the effect of immigrants may be less pronounced. In addition, the host country market offers a variety of local commodity product alternatives, the use and application of which is familiar to the foreigners. The abundance of commodity product substitutes offered in the local host markets, makes the costs associated with importing commodity products from the immigrants' home–country unreasonably high, resulting in lower imports.

3.4 Conclusion

Employing data on refugees and immigrants from over 100 countries of origin residing in the U.S. over the period of 1990—2005, I differentiate between the immigrant and refugee effect on exports and imports in commodity and differentiated products.

My results for immigrants are contrary to the findings of White and Tadesse

(2010), who also differentiate between the immigrants' and refugees' effect on U.S. trade and document a positive effect of immigrants on U.S. imports and exports. I do not uncover any effect of immigrants on exports and find a negative effect on imports with immigrants decreasing aggregate imports by 0.6% and differentiated and commodity imports by 0.7% for each 1% increase in immigrant stock. On the other hand, White and Tadesse (2010) document a 0.27% increase in aggregate exports and 0.13% increase in aggregate imports for a 1% increase in immigrant stock. The authors differentiate between manufactured and non–manufactured exports and imports, while I consider a wide variety of product differentiation, thus the results of our studies may not be directly comparable.

However the results of our studies are more aligned on the effect of refugees on U.S. trade with their home countries, suggesting that the effect of refugees is smaller compared to the effect of immigrants. White and Tadesse (2010) finds that non–manufactured exports increase by 0.06%, while manufactured imports decrease by 0.08% for each 1% increase in refugee stock, while I do not find any effect of refugees on exports or imports.

The positive effect of immigrants on differentiated exports is comparable to previous literature estimates, however, the negative effect on imports has not been previously documented. The negative impact of immigrants on differentiated imports may be attributed to the fact that as the stock of immigrants grows in the host country over time, substantially increasing the local demand for differentiated products, the domestic production of differentiated products in the host country increases, while the differentiated product imports from the immigrants' home country fall. Similarly, there is a wide variety of commodity product alternatives available in the host country market. These products, their use and application are also familiar to immigrants, thus making it unreasonably costly to import these products from the immigrants' home–country, resulting in lower commodity imports.

Chapter 4 Effect of Differential Fertility on Cross–Country Human Capital Accumulation

4.1 Introduction

Despite the expansion of educational opportunities through the internationally agreed Millennium Development Goals (MDGs) project, UNESCO Institute for Statistics (2006) report found 124 million children and youth were out of school and 757 million adults, two thirds of whom are women, could not read or write. Human capital, however, plays a central role in neoclassical models of long–run economic growth and is a fundamental empirical determinant of income levels. Given the importance of educational attainment for economic development, it is important to understand its determinants.

This paper focuses on the role of differential fertility as a determinant of future educational attainment. Differential fertility rate is the difference between fertility rates of women with high educational attainment and women with low educational attainment. In a country where differential fertility is high, low–educated women have more children than highly educated women but, due to the intergenerational transmission of human capital, one can expect the many children born to low–educated women to also have low education, which will lower future aggregate educational attainment, (potentially) reducing growth. In the opposite case, when differential fertility is lower, the fertility difference is not as stark and, even though, the children of less-educated women will still receive less education (compared to the children of highly educated women), they do not constitute a large enough fraction of the population to substantially reduce the future aggregate level of human capital and, in turn, slow down economic development (De La Croix and Doepke (2003)). Our hypothesis is that, all else equal, a higher differential fertility has a negative effect on the future human

capital accumulation (which may lead to lower economic growth).

Additionally, differential fertility rates can have a different effect on human capital accumulation, depending on the initial level of human capital. In a country with low initial human capital level, less–educated women will, on average, have a lot more children, than more highly–educated women. The children of less–educated women will then, in turn, achieve low levels of education and, due to their large majority, they will lower the aggregate level of future human capital. In contrast, in a country that starts off with a higher initial level of human capital, less educated women will have lower educated children, but the educational attainment of these lower educated children will not be significantly lower than the level of education of children of highly educated women, due to the overall lower proportion of lower educated children.

Important for our analysis of educational attainment is the consideration of public provision of education within a country. Provision of public education allows for better access to schooling for children of both rich and poor families and may result in an overall higher level of human capital within a country. In a country where differential fertility is high, public provision of education may play an even more important role in increasing future educational attainment, by making schooling more accessible for poor families. The effect of public education provision on differences in cross–country human capital accumulation has not been empirically tested, however, it has been shown that public provision of education increases economic growth. For example, De la Croix and Doepke (2004) argue that in countries with highly unequal human capital, public provision of education reduces differential fertility rates, and increases economic growth.

Finally, higher initial levels of income inequality within a country are positively correlated with total differential fertility rates, which may lead to lower levels of future

human capital.[1] If a country has lower levels of inequality, differential fertility rates may not be as important in predicting future human capital levels, because more people can get a better education. However, if a country is more unequal, differential fertility rate is expected to have a negative effect on future educational attainment. Chiu (1998) in their theoretical model demonstrate that higher income inequality leads to lower human capital accumulation and economic growth.

This paper contributes to the existing literature in a couple of ways. First, it empirically tests the underlying hypothesis of De La Croix and Doepke (2003) that differential fertility is a determinant of future educational attainment. Second, it adds to the literature on the determinants of human capital accumulation, by broadening the scope of the empirical analysis with a cross–country sample of 61 developed and developing countries.[2]

4.1.1 Literature Review

The level of human capital in a country can be affected by a variety of factors and, consequently, there are many papers which have examined human capital accumulation. Among some of the papers are: Becker and Tomes (1976) looking at human capital formation in the presence of credit frictions; Chiu (1998) analyzing human capital accumulation and economic growth, taking income inequality into account; Boucekkine et al. (2002) and De La Croix and Doepke (2003) on the relationship between demographics and schooling; Castro and Coen-Pirani (2012), Rangazas (2000), and Restuccia and Urrutia (2004) on schooling across time in the United States.

Many of these papers, however, do not explain differences in schooling and/or returns to schooling across countries, and the few papers that examine cross–country

[1] Correlation coefficient between differential fertility rate and the Gini coefficient is 0.47.

[2] The sample drops to 48 countries when the regression is estimated using the primary enrollment ratio as a measure of future educational attainment.

schooling differences, like Manuelli and Seshadri (2005) and Hendricks (2010), fail to account for cross–country fertility rate differentials. For example, Manuelli and Seshadri (2005) find that schooling is related positively to wages and that differences in wages lead to large differences in schooling across countries. Hendricks (2010) analyzes the relative difference in the share of skilled–to–unskilled labor as a determinant of future human capital investment and finds that within–industry skill differences account for the majority of the cross–country differences in educational attainment. However, Hendricks (2010) uses individual level data aggregated to the country level and only has 28 countries in his sample.

In contrast to the large literature on the determinants of human capital, the literature on how differential fertility affects human capital accumulation, is rather small. Among the papers that have examined differential fertility and how it is related to educational attainment are De La Croix and Doepke (2003) and Kremer and Chen (2002).

De La Croix and Doepke (2003) explain differences in growth rates across countries, using total differential fertility rates (DTFR), and find that differential fertility has a statistically significant, negative effect on economic growth in a sample of developed and developing countries. The authors specify that differential fertility is a function of income distribution, and it tends to increase with income inequality, thus, countries with higher inequality tend to have less human capital and slower growth rates. In countries with higher income inequality, poor parents tend to have more children and invest less in their education, disproportionately increasing the number of children with low education. This further widens the differential fertility rate, and lowers the average level of education within a country. However, De La Croix and Doepke (2003) do not explicitly show that the negative effect of DTFR happens through the human capital accumulation channel.

Kremer and Chen (2002) build a theoretical model with an assumption that chil-

dren of educated (high skilled) workers are more likely to also become educated, and this contributes to the growth of the fertility differential within a country. This growth in DTFR, disproportionately increases the fraction of the unskilled (low educated) labor force, decreases their wages, and leads those workers to face lower opportunity cost of having additional children. Kremer and Chen (2002) show that this leads to a vicious cycle. The authors find that fertility rate differentials are greater in countries with more income inequality, but there are multiple equilibria, suggesting that increasing access to education (more generous provision of free public education) may lead to the reduction of the fertility rate differential and income inequality. However, lack of public education provision and the presence of credit frictions may reduce the educational attainment.

The importance of accounting for human capital differences has also been highlighted in explaining cross-country growth rates in some of the seminal papers like Mankiw et al. (1992) and Hall and Jones (1999). Mankiw et al. (1992) test the predictive power of the Solow growth model in a cross–country setting and demonstrate that augmented Solow model, that accounts for accumulation of human capital, explains not only cross–country differences in the standards of living, but also convergence in the standards of living. Hall and Jones (1999) show that differences in capital (both physical and human) offer only a partial explanation of cross–country differences in income per capita. The authors attribute differences in capital accumulation, productivity and economic growth to the differences in institutions and government policies across countries.

In addition, Apostolova-Mihaylova (2014) evaluates the effect of differential fertility rates on economic growth, taking the levels of educational attainment into account. She finds that differential fertility rates matter for economic growth. In a sample of 68 countries, a country that is highly unequal and has higher fertility rates of women with lower education, benefits from the higher differential fertility rate and has a

higher economic growth rate. However, for more equal countries, higher levels of differential fertility disproportionately increase the proportion of unskilled–to–skilled labor, leading to lower economic growth. Apostolova-Mihaylova (2014) finds that highly unequal countries are typically poor and have higher ratios of unskilled–to–skilled workers. For such countries an increase in the relative proportion of unskilled labor may have a positive effect on growth rates. In contrast, developed countries have lower inequality and relatively higher skilled labor force, but an increase in differential fertility rate decreases the share of skilled labor, and has a negative effect on future growth rates.

The issue of endogeneity between income inequality and human capital has been addressed within the growth literature by a variety of methods, including, but not limited to, using lags and IVs. Empirical literature on the determinants of human capital, however, has failed to control for the initial level of income inequality within a country. Chiu (1998), in his theoretical model, demonstrates that higher income inequality leads to lower human capital accumulation and economic growth. The author utilizes an overlapping-generations model with income and talent heterogeneity. In his model higher initial income inequality leads to lower aggregate human capital accumulation. The author argues that the children of poor and rich parents are born with similar talents, but the children born into rich families have more education than the children born into poorer families, leading the children of "rich" parents to have better opportunities to develop their innate talent. Assuming a redistribution of wealth from "rich" to "poor" the author documents that the aggregate level of human capital increases. Aggregate levels of human capital are one of the important determinants of economic growth, and Chiu (1998) demonstrate that an exogenous increase in income inequality, lowers the aggregate level of human capital and causes a decrease in economic growth.

4.2 Data

Cross–country differential fertility rates were calculated using the total fertility rates (TFR) by women's educational attainment from Kremer and Chen (2002). TFR in Kremer and Chen (2002) is interpreted as the expected number of children per woman conditional on her living until the end of her reproductive years and adhering to age–specific fertility schedule. The original data on TFR come from the Demographic and Health Survey (DHS) and from the World Fertility Survey (WFS). Total Differential Fertility Rate (DTFR) used in this paper is calculated as in De La Croix and Doepke (2003) and is equal to the difference between the total fertility rate (TFR) of women with low educational attainment and women with high educational attainment in a given country. Differential fertility ranges from -0.6 in Trinidad and Tobago in 1987, to 5.1 in Ecuador in 1979.[3]

Data on GDP per capita come form the Penn World Tables Version 9.0 (PWT). Data on the total levels of educational attainment come from Barro and Lee (2013). As a measure of future educational attainments I use both the total average years of schooling and the primary school enrollment ratios. Data on Gini coefficients come from the Deininger and Squire (1996) high quality Gini coefficient dataset, which has become a primary source of cross–country data on income inequality. Deininger and Squire (1996) do not have Gini coefficients available for all of the countries and years in my data. I use the earliest available Gini coefficient for each period. As a proxy for the public provision of education we use government expenditure on education as a percentage of GDP. Data on the government expenditure on education as a

[3]Both DHS and WFS measure fertility rates by the mother's education level differently across countries. In WFS, fertility rates are reported by "low" and "high" levels of education. The "low" education category refers to the education levels somewhere between zero and six years of schooling, depending on the country, while the definition of "high" may be above seven or above ten years of schooling. In DHS, the categories correspond to primary and secondary levels of schooling, but all of these are also measured differently across countries.

percentage of GDP come from the World Development Indicators (WDI) data. The WDI do not have government expenditure on education available for all the countries and years in our data. For the countries for which the initial government expenditure on education is available it is measured at the beginning of the period, otherwise within the period. More detailed variable descriptions are included in the Appendix.

I define two periods in our analysis of the effects of differential fertility on human capital accumulation. Period 1 is 1974-82 and period 2 is 1985-93. DTFR is not measured in consistent years across countries, and we use the earliest observation of the differential fertility during the period 1974-78 for period 1 (1974-82), and during 1985-90 for period 2 (1985-93). Initial levels of human capital (average years of schooling and primary schooling enrollment ratios) are measured in 1975 and 1985, however, our variable of interest—the predicted level of human capital is measured in 1995 for period 1 and in 2005 for period 2. The predicted human capital is measured using the average years of schooling as well as the primary schooling enrollment ratios (for a robustness check). Both variables used as measures of predicted human capital are measured in 1995 and 2005. Initial levels of GDP per capita are measured in 1974 and 1985. Descriptive statistics are reported in Table A.14.

4.3 Empirical Model Specification

The baseline specification is presented below:

$$(HK)_{it} = \beta_1(DTFR)_{it-1} + \beta_2(HK)_{it-1} + \beta_3 ln(GDPcap)_{it-1} + \theta_i + \mu_t \quad (4.1)$$

where HK is is the total average years of schooling or primary enrollment ratio in country (i) at time period (t) (where t corresponds to either 1995 or 2005) as a function of explanatory covariates: $(DTFR)_{it-1}$ is the initial total differential fertility rate, $(HK)_{it-1}$ is the total average years of schooling at the beginning of the period,

$ln(GDPcap)_{it-1}$ is the initial GDP per capita at the beginning of the period, θ_i is the country fixed effect, and μ_t denotes a time period fixed effect.

In addition to the baseline specification outlined above, we also estimate regressions with: $((GovtExpEducGDP(\%))_{it-1})$ as a proxy for the public provision of education, the initial level of income inequality $((Gini)_{it-1})$, an interaction term between the initial level of human capital and differential fertility rate $((HK * DTFR)_{it-1})$, and between the Gini coefficient and differential fertility rate $(Gini * DTFR)_{it-1})$. Results and discussion of all empirical specifications are outlined in the next section.

4.4 Results

Table 4.1 presents the results for all regression specifications using total average years of schooling to measure educational attainment, while Table 4.2 reports the results with the primary enrollment ratios as a measure of educational attainment. Discussion of the results begins with Table 4.1.

Column (1) of Table 4.1 presents the baseline model specification (equation 1), which does not include any interaction terms. All five regression specifications demonstrate that the differential fertility rate is negatively correlated with the future average years of schooling. In column (3), where I control for the initial level of income inequality, the coefficient on DTFR is negative and statistically significant at 10%, suggesting that as the differential fertility rate increases by one child during period 1 or period 2, it is associated with a 0.2 year decrease in the average years of schooling 15 to 20 years later at the end of the respective period. Column (5), where I introduce and interaction term between the initial level of income inequality and DTFR, reports that the direction of the relationship between the initial DTFR and future average years of schooling varies based on the initial level of income inequality within a country. In countries with the initially higher income inequalities (Gini coefficients above 58.8), DTFR is correlated positively with the future average years of schooling.

Table 4.1: Panel Estimation with Fixed Effects. Dependent Variable is Total Average Years of Schooling.

	(1)	(2)	(3)	(4)	(5)
DTFR	-0.095	-0.128	-0.202**	-0.235	-0.647**
	(0.118)	(0.132)	(0.092)	(0.172)	(0.318)
IniEducTotal	0.852***	0.917***	0.836***	0.823***	0.858***
	(0.124)	(0.115)	(0.110)	(0.130)	(0.106)
LnRGDPcap	0.881	0.588	0.297	0.229	0.249
	(0.579)	(0.552)	(0.362)	(0.532)	(0.428)
GovtExpEducGDP(%)		-0.150	-0.209	-0.210	-0.144
		(0.165)	(0.137)	(0.141)	(0.157)
Gini coeffcient			-0.050**	-0.052**	-0.057***
			(0.023)	(0.024)	(0.017)
DTFRxIniEducTotal				0.010	
				(0.038)	
DTFRxGini					0.011
					(0.008)
Obs.	61	61	61	61	61
Prob>F (DTFR+DTFRxIniEducTotal)				0.12	
Prob>F (DTFR+DTFRxGini)					0.04
Period fixed effects	Y	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1.

In contrast, countries with initially lower income inequalities (Gini coefficients below 58.8), exhibit a negative correlation between the initial differential fertility rate and educational attainment 15 to 20 years later.

Using the government expenditure on education as a proxy for public provision of education in column (2), I do not find that it has a statistically significant effect on the future educational attainment. The effect of this proxy variable is quantitatively similar across all five specifications. These results are contrary to my original hypothesis that public education provision may result in an overall higher level of human capital within a country, especially for highly unequal countries. One explanation for such results could be that the government expenditure on education as a percentage

of GDP, may be an imperfect proxy for the public provision of education within a country as well as across countries, since this variable does not specify whether this expenditure goes towards primary education, secondary, or both. Another explanation may be that changes in the government education expenditures may take a long time to affect the average years of schooling within a country, and, given that both panels are fairly short (at most 20 years), we do not the observe the effect yet.

As demonstrated theoretically by Chiu (1998) the level of initial inequality within a country has a negative effect on its future human capital accumulation. Countries with higher levels of inequality also have higher total differential fertility rates.[4] For example, Ecuador has a high Gini coefficient of 67.8 and a high differential fertility rate of 5.1 at the beginning of period 1. Ecuador also has on average 4.3 years of schooling at the beginning of period 1, and 6.2 years of schooling at the end of the period 1. In contrast, Denmark has a low Gini coefficient of 31 and a low differential fertility rate of 0.35 at the beginning of period 1. Denmark has on average 6.5 years of schooling at the beginning of period 1, and 8.5 years at the end of period 1.

Column (3) of Table 4.1 demonstrates that the initial level of inequality within a country has a statistically significant negative effect on future levels of human capital. The results are aligned with the findings of Chiu (1998). Column (3) additionally demonstrates that an increase in the differential fertility rate by 1 child is associated with a 0.2 year decrease in future educational attainment. The negative relationship between DTFR and educational attainment is more likely a correlation rather than a causal effect. The time periods used in the analysis are relatively short, with both panels spanning at least 15 and at most 20 years, and the decrease in educational attainment is unlikely to be the direct result of a changing differential fertility rate.

If a country has lower levels of inequality, total differential fertility rates may

[4]The correlation coefficient between the differential fertility rate and the Gini coefficient is 0.45 and between initial years of schooling and the Gini coefficient is -0.19.

not be as important in predicting future human capital levels, because more people can get a better education, and we would expect the coefficient on DTFR to be low and statistically insignificant. However, if a country is more unequal (has higher Gini coefficients), differential fertility rate is expected to be negative and statistically significant. Failure to include a Gini coefficient measure in the regressions may lead to omitted variable bias, since the Gini coefficient is correlated with both the differential fertility rate (0.47) and the average years of schooling (a correlation coefficient of -0.23). In addition Chiu (1998) theoretically demonstrated a negative relationship between the income inequality and human capital accumulation.

The coefficients on the differential fertility rate and the interaction term between the Gini coefficient and DTFR, reported in column (5) of Table 4.1, are jointly statistically significant at 5%. However, the direction of the relationship between DTFR and average years of schooling changes depending on the initial level of income inequality within a country. For more unequal countries with income inequality levels greater than 58.8, the differential fertility is positively related to the future educational attainment. In contrast, for more equal countries with Gini coefficients below 58.8, differential fertility is negatively related to the future level of human capital. One explanation for this may be that differential fertility rate in more equal countries increases because higher–educated women have fewer children, and, as a result, the overall number of children in those countries decreases, lowering educational attainments. The vast majority of the countries in the sample are relatively more equal with Gini coefficients below 58.8, and only Ecuador, Guatemala, Malawi, and Zimbabwe have Gini coefficients above 58.8, implying that only in these four highly unequal countries an increase in differential fertility is positively related to average years of schooling.

Finally, countries with higher level of initial education like the United Kingdom or Norway (initial years of schooling at the beginning of period 1 are 7.9 and 8.4,

respectively), also have lower differential fertility rates (DTFR in period 1 is 0.43 for the United Kingdom and 0.54 for Norway). The children born to less educated women in those countries, still have lower levels of education, however, the difference between their education levels and that of highly educated children is smaller, due to the fact that there are simply disproportionately fewer of them. However, in countries like Niger or Mali, which have an initial education level of 0.5 years of schooling at the beginning of period 2, and much higher fertility rate differentials (DTFR in period 2 for Niger is 2.5 and for Mali 2.3), lower educated women will have lower educated children, whose educational attainment will be significantly below the education level of highly educated children, and due to the dis-proportionally higher fraction of these children, lead to lower educational attainment in aggregate. The results in column (4) of 4.1, however, suggest that differential fertility does not have a statistically significant effect on future educational attainment, even after allowing for a heterogeneous marginal effect based on the initial educational attainment.

To summarize, Table 4.1 demonstrates that the initial level of income inequality (measured by the Gini coefficient) plays an important part in determining future levels of education. Furthermore, the relationship between the initial differential fertility rate and future educational attainment varies based on the initial level of income inequality within a country, with more unequal countries exhibiting a positive correlation with the future educational attainment and less unequal countries a negative correlation between the initial level of differential fertility and future educational attainments.

So far we have discussed the effect of differential fertility rates on the total average years of schooling, however, in the short run, primary enrollment ratios may be better at capturing the effect of the exogenous changes in differential fertility rates on future educational attainment for two reasons. First, the time periods used in our analysis may not be long enough to capture the effect of changes in differential fertility rate

on average years of schooling (the panels are only 15–20 years long). Second, average years of schooling reflect the average educational attainment of all adults, so changes in educational attainment during that period may not necessarily reflect the increase in educational attainment of the children born during that period, but rather reflect the total change in educational attainment averaged together with the older generation. Primary enrollment ratios, on the other hand, respond to changes in DTFR more quickly and may be better at capturing the relationship between differential fertility and educational attainments.

Table 4.2 reports the results with the primary enrollment ratio as a measure of educational attainment. Columns (1)–(3) of Table 4.2, demonstrate that differential fertility has a strong positive effect of future educational attainment. This positive relationship between the differential fertility rates and primary enrollment ratios could be representative of a short–term effect. More specifically, an increase in differential fertility can be driven by either increased fertility of lower educated women or decreased fertility of highly educated women. In the first case, the new children of lower educated women are likely to at least be enrolled in primary school, thus increasing the enrollment ratios. However, whether they will attain higher levels of education and have an effect on the average years of schooling in the longer run is more uncertain. In the second case (decreased fertility of highly educated women) the relationship is less clear. The total number of children decreases, thus we should expect to see a corresponding decrease in the primary enrollment ratios. Since the number of children born to lower educated women in this case remains the same and some of them may remain enrolled in primary school, the total primary school enrollment ratios should decrease due to the overall lower number of children born to higher–educated mothers. The inconsistency of these two lines of reasoning may suggest that the differential fertility most likely is increasing as a result of increased births to lower–educated women, rather than decreased births to higher educated

women.

Table 4.2: Panel Estimation with Fixed Effects. Dependent Variable is Total Primary Enrollment Ratio.

	(1)	(2)	(3)	(4)	(5)
DTFR	6.668***	7.896***	8.351***	7.272	-0.826
	(1.820)	(1.918)	(2.618)	(6.388)	(2.741)
IniEducTotal	9.967***	8.547***	8.760***	8.358***	8.997***
	(1.435)	(1.522)	(1.546)	(2.862)	(1.353)
LnRGDPcap	-0.235	4.401	5.070	3.606	8.751
	(12.209)	(9.485)	(9.817)	(14.025)	(8.778)
GovtExpEducGDP(%)		3.252**	3.544	3.353	5.234**
		(1.517)	(2.232)	(2.595)	(2.144)
Gini coeffcient			0.131	0.027	0.057
			(0.405)	(0.763)	(0.176)
DTFRxIniEducTotal				0.202	
				(1.066)	
DTFRxGini					0.220***
					(0.066)
Obs.	48	48	48	48	48
Prob>F (DTFR+DTFRxIniEducTotal)				0.18	
Prob>F (DTFR+DTFRxGini)					0.82
Period fixed effects	Y	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Using the government expenditure on education as a percentage of GDP as a proxy for the public provision of education has a positive effect on primary enrollment ratios. Kremer and Chen (2002) demonstrated theoretically that fertility rate differentials are greater in more unequal countries and reported the presence of multiple equilibria, suggesting that a more generous provision of free public education may lead to the reduction in differential fertility rates and income inequality as a result. My findings suggest that increasing government expenditure on education by 1 percentage point results in 5.2 percentage point increase in primary school enrollment (when controlling for the differential effect of DTFR based on the initial level of income inequality within

a country).

The results in column 3 of Table 4.2, imply that increasing differential fertility by 1 child increases the primary enrollment ratio by 8.35 percentage points, after controlling for the government expenditure on education,. The difference between this finding and an insignificant effect of this control variable on the total average years of schooling (reported in column (2) of Table 4.1), could be because changes in the government education expenditures affect enrollment rates more quickly than they affect average years of schooling.

Initial level of income inequality is not a significant predictor of future primary enrollment rates (columns (3)–(5)). Column (5) allows for a heterogeneous marginal effect of DTFR based on the initial level of income inequality within a country and does not find it to be a determinant of future primary enrollment rates (DTFR and $DTFRxGini$ are not jointly statistically significant). Contrary to the results in Table 4.1, where the variable of interest is the total average years of schooling, the relationship between DTFR and primary enrollment ratios does not depend on the initial level of income inequality.

The regression estimates reported in columns (4)–(5) of Table 4.2, do not find that differential fertility has a statistically significant effect on future educational attainment, even after allowing for a heterogeneous marginal effect based on the initial educational attainment or initial income inequality level.

4.5 Conclusion

This chapter empirically tested the underlying hypothesis of De La Croix and Doepke (2003) that differential fertility is a determinant of future educational attainment and the theoretical prediction of Chiu (1998) that higher initial income inequality leads to lower aggregate human capital accumulation.

De La Croix and Doepke (2003), previously found that differential fertility matters for economic growth, however, they did not explicitly show that the negative effect of DTFR happens through the human capital accumulation channel. Chiu (1998) have predicted that highly unequal countries have lower future levels of human capital, but have not empirically tested this prediction.

The main finding is that the initial differential fertility rate is negatively correlated to the future average years of schooling, while the relationship between the differential fertility rate and primary enrollment ratio is positive. This difference in the effect of differential fertility on future educational attainment may be attributed to the presence of short–term and log–term effects. Primary enrollment ratios are more responsive to changes in differential fertility rates and capture the short–term effect on educational attainments, while the reflection of the changes in differential fertility rates on the average years of schooling takes a longer time and may be more indicative of a long–term effect.

The relationship between the differential fertility rate and primary enrollment ratio is positive, indicating that in the short–term primary enrollment ratios may increase as a result of increased fertility of lower educated women, whose children are likely to at least receive a minimum level of education and be enrolled in primary schooling. On the other hand, in the long–term the correlation between differential fertility and the average years of schooling is negative, suggesting that the relationship between DTFR and educational attainments in the long run depends on whether the new children of lower educated women will attain higher levels of education past primary schooling, which is less certain. Interestingly, the correlation between differential fertility and the average years of schooling is negative for more equal countries (Gini coefficients below 58.8) and is positive for less equal countries (Gini coefficients above 58.8). In contrast, differential fertility does not have a statistically significant effect on future educational attainment when controlling for a heterogeneous marginal effect

based on the initial level of educational attainment.

Kremer and Chen (2002) in their theoretical paper suggest that a more generous provision of public education may reduce differential fertility rates and, as a result the income inequality within a country. I find that a 1 percentage point increase in government expenditure on education results in 5.2 percentage point increase in primary school enrollment (when controlling for the heterogeneous marginal effect of DTFR based on the initial level of income inequality within a country).

A secondary result is confirming the prediction of Chiu (1998) that the initial level of income inequality (measured by the Gini coefficient) has a negative and significant effect on future total average years of schooling.

Appendix A

A.1 Chapter 1 Appendix

Data Description

1). World Trade Data. Data on world bilateral exports and imports by SITC (Revision 2) 4–digit level codes come from the World integrated Trade Solution (WITS) database (`https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx`). Data in WITS originally come from the United Nations Commercial Trade database, but are downloaded from the WITS website due to more "friendly" download procedures. Raw data files contain bilateral export and import data by year and 4 digit product types by industry codes. Export and import values are in millions of 2005 U.S. Dollars.

2). Gravity Measures. Data on bilateral distance, common official primary language, trade agreements come from (CEPII) *The Centre d'Etudes Prospectives et d'Informations Internationales*—a French Institute for Research on the International Economy (`http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp`). CEPII offers a "square" gravity dataset for all world pairs of countries, for the period 1948 to 2006, allowing the estimation of international trade flows as a function of GDP, population and trade costs. An official or national language is defined as a language spoken by at least 20% of the population of a country (Mayer and Zignago (2011))). If the destination and the origin have a common official language, the independent variable "common official language" is defined to equal 1; otherwise, the variable equals 0. Geographical distance is defined as the distance (in kilometers) between the two capital cities. Distances between each country pairs in the data were calculated from the cities' longitude and latitude using the great circle formula (Mayer and Zignago

(2011)).

3). Real GDP Data. Data on the real GDP come from the Penn World Tables (PWT 8.1), which contains information on relative levels of income, output, inputs and productivity, covering 167 countries between 1950 and 2015 (`http://www.rug.nl/ggdc/productivity/pwt/pwt-releases/pwt8.1`).

4). Product Classification Data. James Rauch data contain a categorization of SITC (Rev.2) industries according to three possible product types: differentiated, reference–priced or commodity (homogeneous) (`http://econweb.ucsd.edu/~jrauch/research_international_trade.html`). In Rauch's data there are two classifications "conservative" and "liberal". "Conservative" category contains: 16,607 differentiated product types, 3,512 homogeneous or commodity product types and 8,119 reference price products. "Liberal" category contains: 15,687 differentiated products, 5,030 homogeneous and 7,521 reference price products. According to Rauch and Trindade (2002) a reference price category includes products which can not be identified by either the brand or the producer. The reference price category therefore allows to further disintegrate the commodities into homogeneous commodities, for which the prices are available on the organized exchanges and commodities for which the prices are not quoted on organized exchanges, thus making them relatively more differentiated. The information contained in the price changes of the homogeneous commodity products is enough to make the decision on the profitability of trade transaction, meaning that these products are familiar across countries, cultures, markets, etc. and the immigrants' knowledge is less likely to play a trade–enhancing part. On the other hand, commodities which lack the reference price possess enough differentiation that they may require and benefit from the additional information beyond the price to reveal the information regarding the profitability of the trade transaction (these are the products which may be affected more by the immigrant "network"). I use the "conservative" sample and the reference price category to assign the reference

priced products to either commodities or differentiated as defined and proposed in Rauch and Trindade (2002). In both Chapter 2 and Chapter 3 I use these product categories to collapse bilateral exports and imports in aggregate, commodity and differentiated exports and imports.

5). Immigrant Stock Data. Data on immigrants come from two sources. Data on immigrant stock by destination and origin at five year intervals (1990–2005) come from the United Nations Department of Economic and Social affairs (UNDES), collected and updated by the United Nations (`http://www.un.org/en/development/desa/population/publications/database/index.shtml`). To supplement the intervening years, I also use data on immigrant flows, provided by Kim and Cohen (2010), and interpolate the immigrant stock data for the remaining intervening years (assuming constant "outflows" over the five year increments). A more detailed description of each source of immigrant data as well as the interpolation procedure is described below.

5a). Immigrant Stock from UNDES. The total sample size for the UN immigrant stock is 31,444 observations, 7,786 observations in each of the five year increments, that is 7,786 observations in 1990, in 1995, 2000 and 2005 respectively. For the whole sample, 888 or about 38.75% of those observations are zero. In the UNDES data, zero (0) indicates that the value of the stock of immigrants is either zero, rounded to zero or that data are not available. All the estimates of the stock data refer to the mid–point (1 July) of each year indicated, thus making it a set of mid–year estimates of the total international migrant stock by origin and destination for 1990, 1995, 2000, and 2005. The data on migrant stock may also indirectly contain information on refugee stock. The coverage of refugees in population censuses is uneven and some countries, when granting refugee status, count refugees in their population census as any other international migrant.

5b). Immigrant Inflow Data from Kim and Cohen (2010). Kim and Cohen (2010)

exclude the data on immigrant inflows from Croatia, Hungary, and United Kingdom because there are too many missing values for those countries, thus, in my analysis I also do not account for those counties. Whenever a country reported zero migrants, Kim and Cohen (2010) excluded it from their analysis.

5c). Interpolating UNDES Immigrant Stock Data with Kim and Cohen (2010) Immigrant Flow Data. I use the stock data for 1990, 1995, 2000, and 2005 and then interpolated the missing numbers for immigrants 1991–2004, using the flow data from Kim and Cohen (2010), to match the stock data from the UNDES. Since we are dealing with inflows but not so much outflows (including deaths, etc.), I assumed constant outflows over each five year interval to arrive at the estimate of the immigrant stock available from UNDES migrant stock data for 1990, 1995, 2000 and 2005.

6). Refugee Stock. The data on the stock of refugees come from the United Nations High Commissioner for Refugees (UNHCR). Refugee statistics are generally based on individual registration records, kept by the government of the host countries (`http://popstats.unhcr.org/en/time_series`).

7). Major Episodes of Political Violence and Warfare (MEPV). Data on conflicts come from the Major Episodes of Political Violence (MEPV) and Conflict Regions, 1946-2014 collected by the Center for Systemic Peace (`http://www.systemicpeace.org/`). MEPV defines major episodes of political violence as systematic episodes of lethal violence resulting in at least 500 directly–related deaths over the course of the episode. Episodes include international wars, civil wars, and ethnic violence, and are assigned a societal-systemic magnitude impact ranging from 0 to 10. Categories 8–10 are hypothetical in the current data set, since most contemporary warfare locations lack the necessary military technologies for conflict magnitudes over 7. I use ACTOTAL to create $(Conflict)_{jt}$. If the magnitude score of ACTOTAL is greater than 3, I assign a 1 to the variable $(Conflict)_{jt}$, otherwise $(Conflict)_{jt}$ is equal to zero.

A.2 Chapter 2 Appendix

A.3 Appendix

World Exports Regression Results: Augmented Gravity Approach

Table A.1: Augmented Gravity Aggregate Exports

	(Exports with no Ref)	(Exports with Ref)
Real GDP imm origin	0.251***	0.246***
	(0.072)	(0.072)
Real GDP imm host	1.261***	1.238***
	(0.250)	(0.250)
Conflict imm origin	0.026	0.024
	(0.048)	(0.048)
RTA	-0.022	-0.035
	(0.035)	(0.035)
Imm stock	0.077**	0.098***
	(0.034)	(0.035)
Ref stock		-0.020***
		(0.007)
Obs.	5,509	5,509
Exporter*Importer fixed effects	Y	Y
Destination fixed effects	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Correlation between refugee stock and immigrant stock is 0.085. Both regressions have year and exporter-importer f.e.

Table A.2: Augmented Gravity Commodity and Differentiated Exports

	(Comm noref)	(Comm ref)	(Diff noref)	(Diff ref)
Real GDP imm origin	0.039	0.023	0.354***	0.353***
	(0.078)	(0.078)	(0.081)	(0.080)
Real GDP imm host	1.402***	1.331***	1.071***	1.066***
	(0.384)	(0.384)	(0.268)	(0.268)
Conflict immi origin	0.007	-0.000	0.077	0.076
	(0.061)	(0.061)	(0.055)	(0.055)
RTA	-0.015	-0.055	-0.017	-0.020
	(0.050)	(0.048)	(0.038)	(0.038)
Imm stock	-0.055	0.013	0.151***	0.156***
	(0.053)	(0.052)	(0.036)	(0.036)
Ref stock		-0.063***		-0.004
		(0.010)		(0.008)
Obs.	5,509	5,509	5,509	5,509
Exporter*Importer fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Correlation between refugee stock and immigrant stock is 0.085. All regressions have year and exporter-importer f.e.

World Imports Regression Results: Augmented Gravity Approach

Table A.3: Augmenetd Gravity Aggregate Imports

	(Imports noref)	(Imports ref)
Real GDP imm host	0.221	0.193
	(0.288)	(0.287)
Real GDP imm origin	0.422***	0.416***
	(0.102)	(0.101)
Conflict imm origin	-0.079	-0.081
	(0.053)	(0.053)
Regional Trade Agreement	0.106*	0.089
	(0.061)	(0.061)
Imm stock	0.091**	0.122***
	(0.040)	(0.040)
Ref stock		-0.029***
		(0.010)
Obs.	4,903	4,903
Year fixed effects	Y	Y
Importer*Exporter fixed effects	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Correlation between refugee stock and immigrant stock is 0.085. Both regressions have year and importer-exporter f.e.

Table A.4: Augmented Gravity Commodity and Differentiated Imports

	(Comm noref)	(Comm ref)	(Diff noref)	(Diff ref)
Real GDP immi host	0.149	0.138	0.434	0.421
	(0.369)	(0.369)	(0.344)	(0.342)
Real GDP immi origin	0.402***	0.399***	0.406***	0.403***
	(0.137)	(0.137)	(0.100)	(0.100)
Conflict immi origin	-0.020	-0.021	-0.100*	-0.101*
	(0.062)	(0.062)	(0.053)	(0.053)
RTA	0.035	0.029	0.110*	0.102*
	(0.075)	(0.076)	(0.061)	(0.062)
Imm stock	0.093	0.105*	0.129***	0.143***
	(0.057)	(0.057)	(0.048)	(0.048)
Ref stock		-0.011		-0.014
		(0.013)		(0.012)
Obs.	4,903	4,903	4,903	4,903
Year fixed effects	Y	Y	Y	Y
Importer*Exporter fixed effects	Y	Y	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Correlation between refugee stock and immigrant stock is 0.085. All regressions have year and importer-exporter f.e.

A.3.1 Descriptive Statistics: World Exports

Full Sample

Table A.5: Aggregate Exports Full Sample Descriptive Statistics.

	Mean	S.D.	Min	Max
Aggregate Exports (thousands of USD)	1,854,178	12,978,540	6	362,876,032
Commodity Exports (thousands of USD)	436,254	2,891,009	0	75,639,502
Differentiated Exports (thousands of USD)	1,417,924	10,269,398	1	288,179,645
Real GDP immi origin(mill 2005USD)	403,280	1,153,605	122	12,564,300
Real GDP immi host(mill 2005USD)	2,320,246	3,762,094	75,686	12,564,300
Distance (in km to most populated cities)	6,837	3,938	81	18,825
Regional Trade Agreement	0.12	0.32	0.00	1.00
Conflict immi host	0.01	0.12	0.00	1.00
Conflict immi origin	0.16	0.37	0.00	1.00
Common offical primary language	0.14	0.35	0.00	1.00
Immigrant stock	62,356	385,466	1	10,309,054
Refugee Stock	1,812	12,856	1	350,000

Note: N=7,027. Statistics are for a total of 14 countries of export origin and 134 import destinaitons over the period 1990-2005.

HDFE Sample

Table A.6: Aggregate Exports HDFE Subsample Descriptive Statistics.

	Mean	S.D.	Min	Max
Aggregate Exports (thousands of USD)	1,875,521	13,332,275	29	362,876,032
Commodity Exports (thousands of USD)	444,181	3,010,721	0	75,639,502
Differentiated Exports (thousands of USD)	1,431,340	10,508,132	15	288,179,645
Real GDP immi origin (mill 2005USD)	432,739	1,210,404	383	12,564,300
Real GDP immi host (mill 2005USD)	2,451,594	3,937,212	78,138	12,564,300
Distance (in km to most populated cities)	6,837	3,910	81	18,419
Regional Trade Agreement	0.13	0.33	0.00	1.00
Conflict immi host	0.06	0.23	0.00	1.00
Conflict immi origin	0.28	0.45	0.00	1.00
Common offical primary language	0.14	0.34	0.00	1.00
Immigrant stock	69,875	423,694	8	10,309,054
Refugee Stock	1,712	10,566	1	245,238

Note: N=5,509. Statistics are for a total of 14 countries of export origin and 134 import destinaitons over the period 1991-2005.

A.3.2 Descriptive Statistics: World Imports

Full Sample

Table A.7: Aggregate Imports Full Sample Descriptive Statistics.

	Mean	S.D.	Min	Max
Aggregate Imports (thousands of USD)	2,178,837	12,082,876	0	280,275,840
Commodity Imports (thousands of USD)	591,058	3,176,975	0	111,839,991
Differentiated Imports (thousands of USD)	1,587,778	9,673,213	0	247,635,096
Real GDP imm host (mill 2005USD)	2,468,974	3,863,526	75,686	12,564,300
Real GDP imm origin (mill 2005USD)	420,035	1,153,057	122	12,564,300
Distance (in km to most populated cities)	6,881	3,999	81	18,825
Regional Trade Agreement	0.13	0.33	0.00	1.00
Conflict immi origin	0.27	0.44	0.00	1.00
Conflict immi host	0.05	0.23	0.00	1.00
Common offical primary language	0.14	0.35	0.00	1.00
Immigrant stock	65,643	400,063	3	10,309,054
Refugee stock	1,827	13,075	1	350,000

Note: N=6,493. Statistics are for a total of 14 import destination countries and 134 export origin countries over the period 1990-2005.

HDFE Sample

	Mean	S.D.	Min	Max
Aggregate Imports (thousands of USD)	2,362,923	12,965,310	1	280,275,840
Commodity Imports (thousands of USD)	630,553	3,320,074	0	111,839,991
Differentiated Imports (thousands of USD)	1,732,371	10,492,981	0	247,635,096
Real GDP immi host(mill 2005USD)	2,596,903	4,031,545	78,138	12,564,300
Real GDP immi origin (mill 2005USD)	456,177	1,191,099	383	12,564,300
Distance (in km to most populated cities)	6,854	3,989	81	18,419
Regional Trade Agreement	0.14	0.35	0.00	1.00
Conflict immi origin	0.28	0.45	0.00	1.00
Conflict immi host	0.06	0.24	0.00	1.00
Common offical primary language	0.14	0.35	0.00	1.00
Immigrant stock	75,961	447,943	13	10,309,054
Refugee stock	1,670	10,574	1	245,238

Note: N=4,903. Statistics are for a total of 14 import destination countries and 117 export origin countries over the period 1991-2005.

A.3.3 Robustness Check: Full Sample Augmented Gravity Results

Table A.8: Aggregate Exports Robustness Check.

	(Exports no Ref)	(Exports with Ref)
Real GDP imm origin	0.300***	0.296***
	(0.058)	(0.058)
Real GDP imm host	1.246***	1.226***
	(0.248)	(0.248)
Conflict imm origin	0.175**	0.175**
	(0.068)	(0.068)
RTA	-0.024	-0.037
	(0.035)	(0.035)
Imm stock	0.047	0.070**
	(0.034)	(0.035)
Ref stock		-0.021***
		(0.007)
Obs.	5,899	5,899
Year fixed effects	Y	Y
Exporter*Importer fixed effects	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Both regressions have country-pair and year f.e.

Table A.9: Commodity and Differentiated Exports Robustness Check.

	(Comm noref)	(Comm ref)	(Diff noref)	(Diff ref)
Real GDP imm origin	0.114*	0.101	0.389***	0.388***
	(0.069)	(0.069)	(0.065)	(0.064)
Real GDP imm host	1.463***	1.406***	1.054***	1.050***
	(0.383)	(0.383)	(0.264)	(0.265)
Conflict imm origin	0.194**	0.195**	0.225***	0.225***
	(0.081)	(0.081)	(0.078)	(0.078)
RTA	0.010	-0.028	-0.028	-0.031
	(0.051)	(0.050)	(0.037)	(0.038)
Imm stock	-0.072	-0.005	0.120***	0.125***
	(0.054)	(0.053)	(0.035)	(0.036)
Ref stock		-0.062***		-0.005
		(0.010)		(0.008)
Obs.	5,899	5,899	5,899	5,899
Year fixed effects	Y	Y	Y	Y
Exporter*Importer fixed effects	Y	Y	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Both regressions have country-pair and year f.e.

Table A.10: Aggregate Imports Robustness Check.

	(Imports noref)	(Imports ref)
Real GDP imm host	0.246	0.229
	(0.298)	(0.298)
Real GDP imm origin	0.540***	0.537***
	(0.085)	(0.085)
Conflict imm origin	-0.111**	-0.113**
	(0.052)	(0.052)
RTA	0.125**	0.115*
	(0.060)	(0.061)
Imm stock	0.106***	0.126***
	(0.040)	(0.041)
Ref stock		-0.017
		(0.011)
Obs.	5,339	5,339
Year fixed effects	Y	Y
Importer*Exporter fixed effects	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Both regressions have country-pair and year f.e.

Table A.11: Commodity and Differentiated Imports Robustness Check.

	(Comm noref)	(Comm ref)	(Diff noref)	(Diff ref)
Real GDP imm host	0.065	0.058	0.372	0.370
	(0.380)	(0.379)	(0.349)	(0.348)
Real GDP imm origin	0.530***	0.528***	0.257***	0.256***
	(0.115)	(0.115)	(0.090)	(0.089)
Conflict imm origin	-0.059	-0.059	-0.131**	-0.132**
	(0.063)	(0.063)	(0.054)	(0.054)
RTA	0.055	0.050	0.135**	0.133**
	(0.075)	(0.076)	(0.062)	(0.062)
Imm stock	0.132**	0.141**	0.091*	0.093*
	(0.060)	(0.061)	(0.050)	(0.049)
Ref stock		-0.007		-0.002
		(0.015)		(0.012)
Obs.	5,339	5,339	5,339	5,339
Year fixed effects	Y	Y	Y	Y
Importer*Exporter fixed effects	Y	Y	Y	Y

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. All regressions have country-pair and year f.e.

A.4 Chapter 3 Appendix

Descriptive Statistics: U.S. Exports

Table A.12: U.S. Aggregate Exports Descriptive Statistics.

	Mean	S.D.	Min	Max
Aggregate Exports (thousands of USD)	4,597,715	24,096,064	74	362,876,032
Commodity Exports (thousands of USD)	956,258	4,572,596	3	74,696,391
Differentiated Exports (thousands of USD)	3,641,456	19,593,791	13	288,179,645
Real GDP imm origin (mill 2005US)	265,433	661,796	383	7,522,393
Real GDP U.S. (mill 2005USD)	10,523,400	1,404,502	7,875,283	12,564,300
Distance (in km to most populated cities)	8,667	3,129	548	16,180
Regional Trade Agreement	0.03	0.17	0.00	1.00
Conflict imm origin	0.15	0.36	0.00	1.00
Common official primary language	0.23	0.42	0.00	1.00
Immigrant stock	254,162	896,404	717	10,309,054
Refugee Stock	3,913	20,040	1	245,238

Note: N=1,035. Statistics are for the U.S. and its 125 export partners (immigrant origin countries) over the period 1990-2005.

Descriptive Statistics: U.S. Imports

Table A.13: U.S. Aggregate Imports Descriptive Statistics.

	Mean	S.D.	Min	Max
Aggregate Imports (thousands of USD)	7,771,640	26,503,403	117	280,275,840
Commodity Imports (thousands of USD)	2,035,245	6,781,073	0	111,839,991
Differentiated Imports (thousands of USD)	5,736,394	21,557,796	12	247,635,096
Real GDP U.S. (mill 2005USD)	10,597,302	1,358,858	7,875,283	12,564,300
Real GDP imm origin (mill 2005USD)	313,703	729,885	383	7,522,393
Distance (in km to most populated cities)	8,430	3,168	548	16,180
Regional Trade Agreement	0.04	0.19	0.00	1.00
Conflict imm origin	0.15	0.36	0.00	1.00
Common official primary language	0.24	0.43	0.00	1.00
Immigrant stock	265,876	939,246	797	10,309,054
Refugee stock	4,391	20,315	1	245,238

Note: Statistics are for the U.S. and its 100 import partners over the period 1990-2005. N=1,028.

A.5 Chapter 4 Appendix

A.5.1 Data Description

1. $(HK)_{it}$—Total years of schooling for both sexes for a given country in a given year from Barro and Lee (2013). Ivory Coast does not have $(HK)_{it}$ available in Barro and Lee (2013) and is not part of the sample for the regressions using $(HK)_{it}$.

2. $(PrimEnrollRatio)_{it}$—Total primary education enrollment ratio Barro and Lee (2013). There are no data available for Bangladesh, Botswana, Burundi, Central African Republic, Haiti, Jordan, Lesotho, Liberia, Namibia, Pakistan, Romania, Rwanda, Togo, Zambia. Ivory Coast is not part of the regressions using the average years of schooling (Barro and Lee (2013) lack data), but it is included in the regressions using primary enrollment ratios, since Barro and Lee (2013) have enrollment ratios for it.

3. $(DTFR)_{it-1}$—Differential total fertility rate (difference between fertility rates of women with low level of education and fertility rates of women with high level of education). In this paper, DTFR is measured in different years for different countries but generally towards the beginning and middle of the two periods (period 1 is 1974-1982, and period 2 is 1985-1993). For example, Colombia has a DTFR measure in 1976 and 1986, so the first differential fertility measure will be in period 1, and the second in period 2. Countries for which DTFR is measured only once, like Denmark in 1975 or Burundi in 1987, will only be observed in period 1 or 2, respectively. DTFR is negatively correlated with real GDP per capita (correlation coefficient of -0.33), and with initial level of education (correlation coefficient of -0.3). DTFR is positively correlated with the Gini coefficient, with a correlation coefficient of 0.47.

4. $(HK)_{it-1}$—Initial total years of schooling for both sexes measured at the beginning of the period. The $(HK)_{it-1}$ either total years of schooling for both sexes measured in 1975 or in 1985, a year after the beginning of period 1 and in the exact

year measuring beginning of period 2. The data come from Barro and Lee (2013).

5. $(Gini)_{it-1}$—Initial average income inequality measure ranging from 0 to 100 (0 denotes perfect equality, 100—perfect inequality). Deininger and Squire (1996) do not have Gini coefficients available for all of the countries and years in our data. I use the earliest available Gini coefficient for a given period. For countries when Deininger and Squire (1996) do not have Gini coefficients, we use Ginis from De La Croix and Doepke (2003). For example, if Deininger and Squire (1996) measure Ginis for Bangladesh in 1977 and 1986, Bangladesh appears in both periods (1976 in period 1 and 1986 in period 2). Countries which appear only once, for example, Spain with Gini measured in 1980, appears only in period 1 or 2 (Spain only in period 1) . There are no Gini coefficients available for Sudan at all and for Senegal in period 1.

6. $(GDPcap)_{it-1}$—Initial level of per capita GDP, measured at the beginning of the period, so in 1975 or 1985, respectively. The data come from the Penn World Tables dataset improved and expanded in Feenstra et al. (2015).

7. $(GovtExpEducGDP(\%))_{it-1}$—Initial government expenditure on education as a percentage of GDP, measured at the beginning of the period when available, otherwise within the period. For example for period 1, it is measured in 1974 for Denmark, Spain, and Ghana and in 1977 for Ecuador and in 1979 for Colombia. There are 6 countries for which there are no data available for this variable: Benin, Brazil, Namibia, Romania, Senegal and Sudan. There are 10 countries for which this variable is available only for one of the two periods: El Salvador (period 1), Haiti (period 2), Indonesia (period 2), Liberia (period 1), Mexico (period 2), Niger (period 2), Paraguay (period 2), Peru (period 1), Poland (period 2), Romania (period 2), United States (period 2). Initial government expenditure on education is available at the beginning of the period for 42 out of 48 countries.

Descriptive Statistics Full Sample

Table A.14: Descriptive Statistics.

	Mean	S.D.	Min	Max
EndingPrimEnrollRatio(%)	90.69	13.47	47.33	100.00
EndinghEducTotal	5.52	2.11	0.94	10.07
DTFR	2.26	1.41	-0.60	5.10
IniEducTotal	4.07	1.96	0.54	8.44
RGDPcap (in mil. 2011USD)	6,513	5,802	776	20,508
GovtExpEducGDP(%)	3.68	1.66	0.83	7.42
Gini coeffcient	45.52	10.01	24.20	68.26
DTFRxIniEducTotal	8.25	6.51	-4.52	22.23
DTFRxGini	109.28	79.51	-25.03	345.93

Note: N=61. Statistics are for the full sample of countries for both periods. There are no data on primary enrollment ratios for 13 countries.

Descriptive Statistics by Period

Table A.15: Period 1 (1974-82) Descriptive Statistics. N=29

	Mean	S.D.	Min	Max
EndinghEducTotal	5.60	2.16	1.87	10.07
DTFR	2.18	1.55	0.22	5.10
IniEducTotal	4.09	2.07	0.86	8.44
DTFRxIniEducTotal	7.85	6.20	1.13	21.78
Gini coeffcient	44.04	10.42	24.20	68.00
DTFRxGini	102.43	82.11	5.89	345.93
RGDPcap (in mil. 2011USD)	7,808	6,732	1,043	20,508
GovtExpEducGDP(%)	3.80	1.60	1.13	7.35

Note: Statistics are for the sample of countries from period 1.

Table A.16: Period 2 (1985-93) Descriptive Statistics. N=32

	Mean	S.D.	Min	Max
EndinghEducTotal	4.79	2.10	0.94	9.15
DTFR	2.26	1.13	-0.60	4.20
IniEducTotal	3.41	1.75	0.54	7.54
DTFRxIniEducTotal	7.38	6.09	-4.52	22.23
Gini coeffcient	44.80	9.80	28.90	68.26
DTFRxGini	105.08	66.96	-25.03	259.39
RGDPcap (in mil. 2011USD)	3,493	2,893	776	12,175
GovtExpEducGDP(%)	3.37	1.60	0.83	7.42

Note: Statistics are for the sample of countries from period 2.

A.5.2 Robustness Check by Period

Table A.17: Results by Period. Dependent variable is Total Average Years of Schooling.

	1(a)	1(b)	1(c)	2(a)	2(b)	2(c)
DTFR	-0.161	-0.143	0.034	-0.475*	-0.475*	0.645
	(0.197)	(0.203)	(0.217)	(0.275)	(0.275)	(0.538)
IniEducTotal	1.000***	1.014***	1.121***	0.920***	0.920***	1.096***
	(0.123)	(0.128)	(0.087)	(0.151)	(0.151)	(0.078)
LnRGDPcap	-0.143	-0.140	-0.195	0.234	0.234	0.238
	(0.178)	(0.185)	(0.194)	(0.191)	(0.191)	(0.194)
GovtExpEducGDP(%)	0.049	0.042	0.025	0.178**	0.178**	0.142*
	(0.046)	(0.053)	(0.057)	(0.075)	(0.075)	(0.073)
Gini coeffcient		0.003	0.009	-0.009	-0.009	0.028
		(0.011)	(0.016)	(0.011)	(0.011)	(0.027)
DTFRxIniEducTotal	0.063	0.056		0.087	0.087	
	(0.048)	(0.051)		(0.065)	(0.065)	
DTFRxGini			0.000			-0.015
			(0.004)			(0.010)
Obs.	29	29	29	32	32	32

Note: There are no Gini coefficients available for Sudan and for Senegal in period 1. Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Results in columns 1(a)-(c) refer to period=1 (1974-82); Results in columns 2(a)-(c) refer to period=2 (1985-93).

Table A.18: Preliminary Results by Period. Dependent variable is Total Primary Enrollment Ratio.

	1(a)	1(b)	1(c)	2(a)	2(b)	2(c)
DTFR	4.241	5.399	0.290	-0.693	-0.693	5.191
	(5.050)	(5.271)	(4.580)	(8.478)	(8.478)	(17.045)
IniEducTotal	6.330**	7.528**	5.230***	2.349	2.349	3.904*
	(2.759)	(3.295)	(1.483)	(3.211)	(3.211)	(1.966)
LnRGDPcap	1.234	1.648	2.926	2.466	2.466	2.038
	(3.916)	(3.528)	(3.003)	(4.806)	(4.806)	(4.562)
GovtExpEducGDP(%)	-0.727	-1.126	-0.833	0.648	0.648	0.418
	(1.225)	(1.333)	(1.294)	(1.197)	(1.197)	(1.213)
Gini coeffcient		0.310	0.156	-0.071	-0.071	0.052
		(0.213)	(0.285)	(0.398)	(0.398)	(1.168)
DTFRxIniEducTotal	-0.645	-1.144		0.694	0.694	
	(1.115)	(1.272)		(1.381)	(1.381)	
DTFRxGini			0.017			-0.044
			(0.092)			(0.352)
Obs.	25	25	25	23	23	23

Note: Robust standard errors are shown in parentheses *** p<0.01, ** p<0.05, * p<0.1. Results in columns 1(a)-(c) refer to period=1 (1974-82); Results in columns 2(a)-(c) refer to period=2 (1985-93).

A.5.3 List of Countries by Period

1. Period 1 (1974–1982): Bangladesh, Cameroon, Colombia, Costa Rica, Denmark, Dominican Republic, Ecuador, Finland, France, Ghana, Italy, Ivory Coast, Jamaica, Jordan, Kenya, Korea, Lesotho, Morocco, Malaysia, Norway, Pakistan, Panama, Peru, Philippines, Spain, Syria, Trinidad&Tobago, Venezuela, United Kingdom.

2. Period 2 (1985–1993): Bangladesh, Botswana, Burundi,Central African Republic, Cameroon, Colombia, Dominican Republic, Ecuador, Egypt, Ghana, Guatemala, Indonesia, Jordan, Kenya, Sri Lanka, Morocco, Mexico, Mali, Malawi, Niger, Pakistan, Philippines, Paraguay, Rwanda, Thailand, Togo, Trinidad&Tobago, Tunisia,

Turkey, Uganda, Zambia, Zimbabwe.

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