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Immigration, Trade and Product Differentiation

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ABSTRACT

Immigrant-trade links are examined with an emphasis placed on variation across product types and home country income classifications. Data for the US and 70 trading partners spanning the 1980-1997 period are employed. We find the immigrant-trade relationship varies based on degree of product differentiation and by home country per-capita income. In response to a hypothetical 10 percent increase in the immigrant stock variable, US imports of differentiated goods from high income countries increase by approximately 2 percent. A like increase in the immigrant stock from low income countries increases US differentiated goods imports by 4.25 percent, while exports of homogenous goods increase by 2.5 to 4.3 percent. Imports of homogenous goods from high income nations and exports of all product types to these nations appear unaffected by immigrant stock levels.

1. INTRODUCTION

IN MANY NATIONS, immigration policy is a sensitive and contentious political and social issue. Often, the debate is focused on the negative effects that immigrants are thought to impose on host countries, with scant attention paid to potential benefits that immigrants may convey. In the United States, the policy debate has coincided with a sharpening of the tone, and a rise in the volume, of rhetoric advocating assimilation and, consequently, a movement away from the concepts of multiculturalism and tolerance. The influences of immigrants on the US labour market, its cultural institutions, potential strains on the government's ability to provide social services (i.e. health care and education) and the spectre of terrorism have all served as the basis for such sentiments. The public and political discourses in other developed nations — Denmark, France, the Netherlands and the UK, among others — reflect similar concerns. We examine a potential benefit of immigration that has been largely absent in the policy debate: the relationship between immigrants and host-home country trade flows. More specifically, we explore vari-

ations in the US immigrant-trade link across product types and home countries. That immigration is a controversial and vigorously-debated issue in many developed nations underscores the importance of accounting for all effects that immigrants may have on their host economies.

Immigrants are thought to enhance host-home country trade via two channels. First, immigrants' preferences for home country products may increase host country imports from their home countries if immigrants arrive to find neither the desired home country products nor reasonable substitutes are available. This is akin to the home bias effect first reported by McCallum (1995). When applicable to immigrants, this may be thought of as a transplanted home bias effect. Second, immigrants may increase host-home country trade if they are able to exploit connections to social and/or business networks in their home countries, or if they possess knowledge of home country customs or social norms that are expected to be adhered to when conducting business. Such knowledge may include information regarding the initiation and execution of informal contract structures or personal connections that, if successfully exploited, reduce search costs associated with matching potential trading partners or that convey reputation-based assurances and, thus, reduce the risk of opportunistic behaviour (Rauch and Watson, 2004; Rauch and Trindade 2002; Rauch 1999; 2001). This second channel is expected potentially to increase both host country exports to and imports from the home country.

Using US data, Gould (1994) first documents a positive relationship between immigrants and host-home country trade. Subsequent studies have documented immigrant-trade links, using aggregate measures of bilateral exports and imports, for several other host countries. For example, Wagner *et al.* (2002), Head and Ries (1998) and Helliwell (1997) examine the Canadian immigrant-trade link. Ching and Chen (2000) report a positive relationship between immigrants and Canada-Taiwan trade. Bryant *et al.* (2004), Blanes (2003), Piperakis *et al.* (2003) and Girma and Yu (2002) report links for New Zealand, Spain, Greece and the UK, respectively. At the sub-national level, Combes et al. (2005) finds evidence of an intra-France migrant-trade relationship, and several studies have identified a link between immigrants and US state-level exports (Bandyopadhyay *et al.*, 2008; Dunlevy, 2006; Herander and Saavedra, 2005; Bardhan and Guhathakurta, 2005; Co *et al.*, 2004).

We provide for a more detailed accounting of the influence of immigrants on a host economy by examining variation in the US immigrant-trade link across both product types and home country income classifications. The Rauch (1999) classification system is used to classify 4-digit SITC industries as producing either differentiated or homogenous (reference priced and organised exchange goods) goods. World Bank (2003) classifications are relied upon to categorise home countries as high, upper middle, lower middle or low income.[2] Drawing upon the existing literature, we formulate and examine several hypotheses relating to the immigrant-trade relationship. Employing data

for the US and 70 trading partners that span the years 1980-1997, we report significant variation in immigrant-trade links across product and home country income classifications.[3] Generally, immigrant-trade links are strongest for US imports of differentiated products from low income home countries and weakest for US exports of homogenous products to high income home countries. Since, on net, trade confers benefits to the US and its trading partners, policymakers may wish to consider the corresponding influences of immigrants when formulating immigration policy. Although specific results presented here may be applicable only to the US, general findings are potentially informative for the public and policymakers alike in the US and other developed host economies. We proceed as follows. Section 2 details the hypotheses to be tested. Sections 3 and 4 discuss the data and estimation results, respectively. Section 5 concludes.

2. Immigrant-trade link hypotheses

Girma and Yu (2002), examining UK trade with 48 nations, stratify their sample into two groups: 'commonwealth' and 'non-commonwealth' nations. A positive immigrant-trade link is reported only for the latter group. The authors contend that any pro-trade influences of immigrants' preferences and/or connections to social or business networks would exist regardless of home country. Thus, pro-trade influences of immigrants would be relatively uniform across home countries. However, institutional dissimilarity — for example, similar judicial systems, formal and informal contracting structures, and communications systems — would provide immigrants additional opportunities to enhance trade. Supporting this conclusion, Dunlevy (2006) reports that immigrants from countries that are institutionally dissimilar to the US increase state-level exports. This implies the influence of immigrants from countries that are relatively dissimilar to the US would be greater in magnitude compared to the influences of immigrants from countries that are similar to the US. Allowing for the possibility that both immigrant-specific factors and cultural/institutional dissimilarities have the potential to increase trade, we employ per capita income as a proxy for US-home country cultural/institutional similarity. This results in our first hypothesis.

> *H1: An immigrant-trade link exists; however, the influences of immigrants from low income countries affect trade to a greater degree than do the influences of immigrants from high income countries.*

As mentioned in the introduction, immigrants are thought to increase host-home country trade flows through two channels. The finding of home bias by McCallum (1995) has been confirmed by a number of researchers, including Wei (1998) and Helliwell (1996). Helliwell (1997) and Engel and Rogers (1996) also report border effects which may indicate the presence of home bias. One would expect that such biases would be more pronounced for

differentiated products as compared to relatively homogenous goods, if only because a higher likelihood exists for finding reasonable substitutes for homogenous goods. Rauch and Watson (2004), Rauch and Trindade (2002), and Rauch (1999; 2001) posit that networks exert a stronger impact on trade in differentiated goods. Homogenous products have common characteristics and are, by definition, independent of producers' traits or geographic locale, while differentiated products are characterised by potentially complete unknown information. The implication is that the potential for immigrants to possess asymmetric information or to exploit network connections that facilitate increases in host-home country trade is diminished for homogenous goods compared to differentiated, goods; thus, a second hypothesis is generated.

H2: The immigrant-trade link varies based on product type with the strength of the link increasing with the degree of product differentiation.

Finally, we have described the channels through which immigrants may influence host-home country trade: immigrants are thought to increase trade through network effects and via preference effects. Rauch (2001) suggests that an immigrant's home bias increases only imports while successful exploitation of network connections may increase both imports and exports. If so, coefficients may be larger if imports are employed to measure trade compared to when exports are employed.

H3: Coefficients on immigrant stock variables are of greater magnitude if imports are employed as the measure of trade as compared to when exports are employed.

Stated collectively, hypotheses 1 through 3 imply that immigrant-trade links are strongest for US imports of differentiated goods from low income countries and weakest for US exports of homogenous goods to high income countries.

3. Estimation equation and variable construction

Tinbergen (1962) first applies the gravity equation to trade flows. Subsequent researchers have used the specification in a variety of forms, with several papers having established theoretical foundations for the model.[4] In its simplest form, the gravity equation states that trade during year t between countries i and j, T_{ijt}, increases with the countries' combined economic mass and decreases with distance, D_{ij}. Equation (1) illustrates.

$$T_{ijt} = \Lambda\left(\frac{Y_{it}Y_{jt}}{D_{ij}}\right) \tag{1}$$

Higher home country GDP (Y_{jt}) implies greater export markets for US products and an increased probability of US imports. Similarly, higher US GDP (Y_{it}) signals an increased capacity for the US to export and to import. Distance between Washington, DC and the capital city of nation j (D_{ij}), measured in miles using the great circle method, is a proxy for transport costs. Λ is the constant of proportionality.

As mentioned, over time, researchers have augmented the basic gravity specification to include a number of factors that potentially facilitate or inhibit trade. Drawing upon the existing literature, we control for additional factors that may enhance or diminish trade flows by modifying equation (1) to include the following series of trade-inhibiting (Φ_{ijt}) and trade-facilitating (Γ_{ijt} and ψ_{jt}) variables.

$$\Phi_{ijt} = \left\{ MILITARY_{ijt},\ \ SANCTIONS_{ijt} \right\} \tag{2}$$

$$\Gamma_{ijt} = \left\{ FDI\ \ IN_{ijt}, FDI\ \ OUT_{ijt}, \left(\frac{Y}{POP} \right)_{jt}, ADD\ \ FTAs_{jt}, REM_{jt} \right\} \tag{3}$$

$$\Psi_{ijt} = \left\{ ENGLISH_{j}, FTA_{ijt}, OPEC_{jt}, SEAPORT_{jt} \right\} \tag{4}$$

Appending these vectors to equation (1) yields equation (5).

$$T_{ijt} = \Lambda \left(\frac{Y_{it} Y_{jt} \Gamma_{ijt} e^{\Psi_{ijt}}}{D_{ij} e^{\Phi_{ijt}}} \right) \tag{5}$$

Taking natural logarithms of the continuous variables on both sides of equation (5), including dummy variables that classify home countries as upper middle (*UMID*), lower middle (*LMID*), or low (*LOW*) income, and corresponding interaction terms to permit examination of variation in links across home country income classifications, and adding an assumed independently and identically distributed error term yields the following estimation equation.

$$\begin{aligned} \ln T_{jt} = {} & \alpha_0 + \beta_1 \ln IMM_{jt} + \gamma_1 (UMID_j \ \ x \ \ \ln IMM_{jt}) + \gamma_2 (LMID_j \ \ x \ \ \ln IMM_{jt}) \\ & + \gamma_3 (LOW_j \ \ x \ \ \ln IMM_{jt}) + \delta_1 \Delta \ln XRATE_{jt} + \delta_2 \ln Y_{jt} + \delta_3 \ln \left(\frac{Y}{POP} \right)_{jt} \\ & + \delta_4 \ln D_j + \delta_5 \ln REM_{jt} + \delta_6 \ln FDI\ \ IN_{jt} + \delta_7 \ln FDI\ \ OUT_{jt} \\ & + \delta_8 ENGLISH_j + \delta_9 FTA_{jt} + \delta_{10} MILITARY_{jt} + \delta_{11} ADD\ \ FTAs_{jt} \\ & + \delta_{12} OPEC_{jt} + \delta_{13} SANCTIONS_{jt} + \delta_{14} SEAPORT_{jt} + \lambda_1 UMID_j \\ & + \lambda_2 LMID_j + \lambda_3 LOW_j + \eta \Omega_t + \varepsilon_{jt} \end{aligned} \tag{6}$$

As the US is the host country, we drop the subscript *i* from equation (6). Since no trade is reported for 10.7 percent of the US-home country pairings, we retain these observations and utilise a Tobit specification when performing our estimations. To examine variation in the immigrant-trade relationship across product types, the series of dependent variables, T_{jt}, includes values for US imports and exports of 'differentiated', 'reference priced' and 'organised exchange' goods. We use each of these trade values in turn when estimation equation (6). Trade data are from the World Trade Flows database (Feenstra, 2000).

The classification of products is based on the system developed by Rauch (1999). Rauch classifies products as homogenous or differentiated based on whether reference prices are available. Homogenous products include both goods that are traded on organised exchanges and goods not traded on organised exchanges but for which 'reference prices' are available. Differentiated goods, on the other hand, do not have reference prices. Such products are characterised by sufficiently imperfect information that prohibits standardised pricing and, thus, discourages the creation of formal or quasi-formal exchanges. Beginning with 5-digit SITC-level product classifications, Rauch classified products as organised exchange goods if they were listed in either the *International Commodity Markets Handbook* or the *Knight-Ridder CRB Commodity Yearbook*. Reference priced goods were classified as such if price quotations were found in *Commodity Prices*. If reference prices were not available, products were classified as differentiated goods. Classification at the 4-digit SITC level was made based on which of the three product types accounted for the largest share of the value of world trade at the 4-digit SITC level. Since ambiguities sometimes affected classification at the 4-digit SITC level, Rauch constructed a 'conservative' classification system, which minimises the number of goods classified as homogenous (i.e. organised exchange or reference priced), and a 'liberal' classification system that maximises the number of goods classified as homogenous. We employ both classifications in our empirical analysis.

The inclusion of the three dummy variables that identify home countries as upper middle, lower middle or low income permits examination of variation in immigrant-trade links across home country income classifications.[5] Each dummy variable is interacted, separately, with the immigrant stock variable. The fourth classification, high income, is the null classification in the estimations. Thus, estimated coefficients on the immigrant stock variable are 'base' effects that can be thought of as trade effects of immigrants from the typical home country. Coefficients on interaction terms capture variation from base effects. For example, the coefficient on the immigrant stock variable $\left(\hat{\beta}_1\right)$ estimates the influence exerted by the typical immigrant on US-home country trade, regardless of home country income classification. The coefficients on the terms that interact the immigrant stock variable with the income classifi

cation dummy variables $\left(\hat{\gamma}_1,\ \hat{\gamma}_2,\ \hat{\gamma}_3\right)$ are estimated deviations from base effects for upper middle, lower middle and low income home countries, respectively. Thus, $\hat{\beta}_1+\hat{\gamma}_1$, $\hat{\beta}_1+\hat{\gamma}_2$ and $\hat{\beta}_1+\hat{\gamma}_3$ are estimates of the influences of immigrants from upper middle, lower middle and low income countries, respectively, while $\hat{\beta}_1$ provides an estimate of the influence of immigrants from high income countries on US-home country trade.

The IMM_{jt} variable is constructed using data from the US Bureau of the Census (2000) and US INS (1999; 2002). Census data provides immigrant stocks for 1980 and 1990. We accept these counts as accurate and use inflow data to estimate intra-census year immigrant stocks. For the years 1981-1989, estimates are derived as follows.

$$IMM_{jt} = IMM_{j1980} + \sum_{1981}^{t} INFLOW_{jt} + \theta_j \tag{7}$$

θ_j adjusts for return migration, death, and amnesties. It is derived as the 1990 census count of immigrants from each country in the US and the sum of the 1980 census count plus inflows during the years 1981-1990 divided by ten. The 1991-1997 portion of the sample is also adjusted using this proportional difference. The adjustment factor is the final term in equation (8).

$$IMM_{jt} = \left(IMM_{j1990} + \sum_{t=1991}^{t} INFLOW_{ijt} \right)\left(1+\frac{\theta_j}{IMM_{j1990}} \right) \tag{8}$$

The remaining explanatory variables include $FDI\ OUT_{jt}$ and $FDI\ IN_{jt}$, which control for potential effects of economic integration on trade (US BEA, 2000; 1987).[6] Lipsey (1993) reports that, by the late 1980s, foreign affiliates accounted for a quarter of US exports and over a third of imports. Gould (1994) includes the sum of US FDI in each home country and home country FDI in the US to test for robustness. We alter Gould's measure, dividing the FDI values by each home country's GDP to gain relative measures of FDI, and distil the measure into two variables since FDI flows into the US may affect trade differently than US FDI outflows. An additional measure of integration that is more directly linked to trade flows, the $ADD\ FTAs_{jt}$ variable, is given as the number of trade agreements the home country is party to.[7]

Since trade with the US may depend on the availability of outside (i.e. non-US) trading opportunities, we include a measure of the economic remote ness of each home country. Given as $REM_{jt} = 1/\sum_{k=1}^{K}\left[\left(Y_{kt} / Y_{wt}\right) / D_{jk} \right]$, the variable is a measure of quasi-distance (Wagner *et al.* 2002). D_{jk} is the distance between each home country *j* and each nation *k* other than the US, Y_{kt} is the

GDP of country k and Y_{wt} represents gross global product (World Bank, 2006).[8] Economic remoteness can result from a nation being geographically isolated (e.g. New Zealand) or located near relatively small economies (e.g. South Africa). More remote nations face a lack of non-US trading partners and, thus, may engage in more trade with the US. While we include dummy variables to control for variation in trade across home country income classifications, we also include GDP per capita, $\left(\frac{Y}{POP}\right)_{jt}$, as a control for variation in the influence of average wealth, or standard of living, within each home country income classification (World Bank, 2003). To capture terms of trade effects, the change in the exchange rate, defined as foreign currency units per dollar, is included (IMF, 2002). An increase in the exchange rate indicates an appreciation of the US Dollar, which is expected to increase US imports and decrease US exports.

Equation (6) also includes a number of dummy variables. Common language is often cited as a proxy for cultural similarity and is found to be an important determinant of trade flows (Brainard, 1997; Girma and Yu, 2002; Hutchison, 2002; Engel and Rogers, 1996; Helliwell, 1997; Wagner et al., 2002). As shared language may also facilitate the writing and enforcement of contracts or lower costs associated with the matching of potential trading partners, $ENGLISH_j$ indicates whether English is commonly used in the respective home country (Crystal, 1993). FTA_{jt} signals membership in a trade agreement with the US. To control for petroleum imports, $OPEC_{jt}$ identifies home countries that are members of OPEC. To account for an important geographic impediment to trade, $SEAPORT_j$ represents coastal access. $MILITARY_{jt}$ signals US military involvement in the home country and serves as a proxy for general risk or uncertainty. Hufbauer et al. (1997) find sanctions reduce trade, on average, by up to one-third. Thus, we include $SANCTIONS_{jt}$ to control for US-imposed economic sanctions on the home country.[9] Finally, to absorb effects of policy shifts and macroeconomic fluctuations, we include a set of time (year) dummies, Ω_t. Table 1 presents descriptive statistics.

Table 1: Descriptive statistics

Variable	*All countries*	*High income countries*	*U-middle income countries*	*L-middle income countries*	*Low income countries*
Immigrants	215,959	202,147	547,571***	165,018***	116,233***
	(560,400)	(250,139)	(1,398,160)	(210,446)	(165,881)
Δ ln Exchange Rate	0.122	0.035***	0.183**	0.153	0.168*
	(0.342)	(0.178)	(0.291)	(0.424)	(0.388)
GDP	239,973	570,113***	151,572***	42,663***	52,381***
	(628,787)	(990,645)	(183,129)	(45,504)	(125,968)
GDP Per Capita	8,025	20,763***	5,082***	1,850***	409***
	(10,359)	(9,265)	(2,373)	(922)	(185)

cont....

Distance (m. from Washington, DC)	7,942.42	8,038	7,696	7,409**	8,725***
	(3,896)	(3,574)	(3,350)	(4,272)	(3,928)
Remote	2.36	1.093***	3.121***	2.887***	3.014***
	(1.786)	(1.437)	(1.976)	(1.711)	(1.184)
FDI IN	0.015	0.022***	0.001***	0.023	0.0003***
	(0.067)	(0.037)	(0.001)	(0.109)	(0.001)
FDI OUT	0.044	0.037*	0.037	0.07**	0.021***
	(0.117)	(0.043)	(0.042)	(0.194)	(0.031)
English	0.529	0.468**	0.556	0.49	0.688***
	(0.499)	(0.5)	(0.498)	(0.501)	(0.464)
FTA	0.02	0.055***	0.025	0.000***	0.000***
	(0.141)	(0.227)	(0.156)	(0.000)	(0.000)
Military	0.033	0.000***	0.000***	0.05	0.072**
	(0.177)	(0.000)	(0.000)	(0.217)	(0.258)
Number of additional FTAs	0.762	0.997***	1.148***	0.824	0.16***
	(0.757)	(0.671)	(0.603)	(0.852)	(0.367)
OPEC	0.069	0.000***	0.000***	0.166***	0.065
	(0.254)	(0.000)	(0.000)	(0.372)	(0.246)
Sanctions	0.141	0.01***	0.056***	0.225***	0.251***
	(0.349)	(0.102)	(0.23)	(0.418)	(0.434)
Seaport	0.929	0.906	0.889	0.955**	0.938
	(0.258)	(0.292)	(0.315)	(0.207)	(0.242)
Imports - conservative classification					
Differentiated products	3,169,450	8,011,200***	2,279,210	441,313***	668,011***
	(10,821,700)	(17,764,900)	(6,910,690)	(978,567)	(2,642,200)
Reference priced products	547,885	1,326,870***	325,975***	113,782***	123,272***
	(1,981,240)	(3,314,100)	(543,431)	(228,313)	(310,347)
Organised exchange products	820,077	906,109	1,185,700**	676,451	661,181
	(2,152,380)	(2,657,900)	(2,166,030)	(1,668,500)	(1,798,770)
Exports - conservative classification					
Differentiated products	2,372,250	5,628,500***	2,767,010	575,290***	260,331***
	(7,347,590)	(11,738,100)	(6,969,240)	(680,426)	(645,604)
Reference priced products	462,143	1,034,920***	475,949	131,054***	128,813***
	(1,142,440)	(1,773,390)	(1,034,220)	(132,819)	(351,037)
Organised exchange products	260,424	591,894***	195,982	66,283***	54,026***
	(580,722)	(860,575)	(472,219)	(64,218)	(112,713)
Imports - liberal classification					
Differentiated products	3,084,550	7,787,190***	2,168,140	440,754***	672,410***
	(10,592,400)	(17,393,600)	(6,726,260)	(1,018,530)	(2,716,920)
Reference priced products	514,380	1,241,030***	398,342	82,980***	62,646***
	(1,772,300)	(2,880,460)	(971,964)	(193,703)	(193,140)
Organised exchange products	915,300	1,241,460*	1,242,770*	675,915**	592,028***
	(2,424,460)	(3,381,470)	(2,206,470)	(1,617,200)	(1,642,960)
Exports - liberal classification					
Differentiated products	2,217,720	5,255,190***	2,580,250	542,882***	248,479***
	(7,039,540)	(11,305,300)	(6,590,140)	(650,361)	(621,782)
Reference priced products	475,785	1,038,160***	586,622	144,121***	112,660***
	(1,101,410)	(1,620,170)	(1,290,050)	(140,004)	(301,668)
Organised exchange products	395,391	962,226***	269,657***	83,739***	80,002***
	(960,017)	(1,489,950)	(609,414)	(84,839)	(174,473)
N	1,260	396	162	414	288

Standard deviations in parentheses. "***", "**" and "*" denote statistical significance from the overall mean at the 1%, 5% and 10% levels, respectively. GDP, imports and exports presented in 1,000s of 1995 US Dollars. GDP per capita is in 1995 US Dollars. See text for explanation of country classifications.

4. Empirical results

The results of estimating equation (6), employing differentiated, reference priced and organised exchange trade values, as determined using the conservative goods classification, are presented in Table 2. Results generated using trade values based on the liberal goods classifications are reported in Table 3. Generally speaking, the estimation results are consistent across the two classification systems. Coefficients on the immigrant stock variables imply that a 10 per cent increase in the immigrant stock from a high income country increases US imports of differentiated products from the home country by 2 per cent (conservative classification) to 2.2 per cent (liberal classification). Summation of coefficients on the immigrant stock variable and interaction terms provides estimates of the respective influences of immigrants on US trade. For example, assumed 10 percent increases in the immigrant stocks from low income and lower middle income countries correspond to increases in US imports of differentiated products of approximately 4.3 percent and 4 percent, respectively. Imports of homogenous (i.e. reference priced and organised exchange) goods from high income nations and exports of all product types to these nations appear unaffected by immigrant stock levels.

When considering the coefficients on terms interacting immigrant stock values with home country income classifications, we frequently find significance. For example, in both Table 2 and in Table 3 we find, for upper middle income and low income home countries, all coefficients on terms interacting the immigrant stock variable with the relevant home country income classification dummy variable are positive and significant. Similarly, in Table 2, we see significant coefficients on interaction terms relating to lower middle income home countries for US imports of differentiated goods and exports of reference priced and organised exchange goods. In Table 3, for the lower middle income classification, coefficients on interaction terms are positive and significant for all trade measures except US exports of differentiated goods. Since coefficients on the terms interacting the immigrant stock variable with the respective home country income classification dummy variables represent deviations from the influence of immigrants on US trade with high income home countries, we have evidence of variation in immigrant-trade effects across both product types and home country classifications.

The remaining coefficients provide expected results. A depreciation of the home country's currency relative to the dollar increases US imports and lowers exports. The positive and generally significant coefficients on the GDP and GDP per capita variables indicate that the US tends to trades more intensively with larger and wealthier economies. We find that higher transport costs, as represented by the distance variable, reduce trade, while economic remoteness generally corresponds with increased US-home country trade. Higher US FDI in the home country increases trade; however, higher home country FDI in the US appears to increase trade considerably less. This appears reasonable as US FDI outflows are primarily equity while US inflows

Table 2: Estimated effects of immigration on trade flows, conservative goods classification (Tobit Specifications)

Dependent variable	*Imports*			*Exports*		
Explanatory variables	*Differen-tiated*	*Reference priced*	*Organised exchange*	*Differen-tiated*	*Reference priced*	*Organised exchange*
ln Immigrants$_{jt}$	0.204***	0.126	-0.122	0.05	-0.119	-0.11*
	(0.062)	(0.082)	(0.11)	(0.035)	(0.097)	(0.061)
Upper middle income home country$_j$ x ln Immigrants$_{jt}$	0.137*	0.201**	0.262**	0.13***	0.213***	0.208***
	(0.077)	(0.101)	(0.126)	(0.043)	(0.059)	(0.076)
Lower middle income home country$_j$ x ln Immigrants$_{jt}$	0.186**	0.053	0.159	0.028	0.191***	0.395***
	(0.074)	(0.099)	(0.138)	(0.041)	(0.056)	(0.074)
Low income home country$_j$ x ln Immigrants$_{jt}$	0.23***	0.293***	-0.038	0.277***	0.573***	0.35***
	(0.068)	(0.095)	(0.132)	(0.038)	(0.051)	(0.068)
Δ ln Exchange Rate$_{jt}$	0.357***	0.309**	0.676***	-0.076	-0.181**	-0.242**
	(0.103)	(0.154)	(0.177)	(0.058)	(0.078)	(0.103)
ln GDP$_{jt}$	1.06***	0.884***	1.246***	0.729***	0.821***	0.916***
	(0.038)	(0.051)	(0.071)	(0.021)	(0.029)	(0.038)
ln GDP Per Capita$_{jt}$	0.211**	0.505***	1.166***	-0.015	0.151**	0.611***
	(0.086)	(0.116)	(0.162)	(0.048)	(0.065)	(0.089)
ln Distance$_j$	-0.287***	-0.739***	-0.631***	-0.64***	-0.622***	-0.935***
	(0.1)	(0.133)	(0.175)	(0.056)	(0.075)	(0.1)
ln Remote$_{jt}$	0.199***	0.118	0.286***	0.003	0.089**	0.228***
	(0.057)	(0.075)	(0.094)	(0.032)	(0.043)	(0.057)
ln FDI IN$_{jt}$	-0.027	0.042*	0.003	0.024**	0.009	0.007
	(0.018)	(0.024)	(0.031)	(0.01)	(0.014)	(0.018)
ln FDI OUT$_{jt}$	0.045*	0.215***	0.421***	0.277***	0.226***	0.294***
	(0.026)	(0.036)	(0.046)	(0.015)	(0.02)	(0.027)
English$_j$	0.434***	0.782***	0.207	0.419***	0.357***	0.171*
	(0.088)	(0.119)	(0.15)	(0.049)	(0.067)	(0.088)
FTA$_{jt}$	2.168***	1.793***	-0.18	0.702***	0.865***	0.401
	(0.265)	(0.343)	(0.42)	(0.148)	(0.2)	(0.259)
Military$_{jt}$	-0.358	-0.923***	-2.159***	-0.299**	-0.306*	-0.026
	(0.227)	(0.309)	(0.407)	(0.127)	(0.174)	(0.237)
Number of additional FTAs$_{jt}$	0.514***	0.267***	0.387***	0.243***	0.149***	0.067
	(0.061)	(0.082)	(0.105)	(0.034)	(0.047)	(0.061)
OPEC$_{jt}$	-1.281***	-0.581***	2.681***	-0.5***	-0.666***	-0.245
	(0.15)	(0.205)	(0.264)	(0.083)	(0.115)	(0.156)
Sanctions$_{jt}$	-0.451***	-0.269*	-0.55**	-0.267***	-0.285***	-0.217*
	(0.115)	(0.154)	(0.22)	(0.064)	(0.087)	(0.118)
Seaport$_j$	0.773***	0.203*	0.932***	0.043	0.18***	0.375***
	(0.084)	(0.111)	(0.148)	(0.047)	(0.063)	(0.084)
Upper middle income home country$_j$	1.816**	-2.281*	-5.983***	-1.538***	-2.675***	-3.208***
	(0.914)	(1.187)	(1.505)	(0.511)	(0.69)	(0.892)
Lower middle income home country$_j$	-1.308	-0.108	-6.677***	-0.255	-2.112***	-5.403***
	(0.863)	(1.151)	(1.636)	(0.482)	(0.653)	(0.863)
Low income home country$_j$	-0.612	-1.46	-2.365	-3.103***	-6.685***	-5.613***
	(0.837)	(1.186)	(1.655)	(0.467)	(0.632)	(0.839)
Constant	-9.057***	-3.281*	8.28***	8.332***	7.391***	11.798***
	(1.43)	(1.921)	(2.664)	(0.798)	(1.081)	(1.465)
N	1,260	1,260	1,260	1,260	1,260	1,260
ANOVA-based fit measure	0.81	0.66	0.58	0.89	0.80	0.73

Heteroskedasticity-consistent robust standard errors in parentheses. Statistical significance is indicated as follows. '***', '**' and '*' represent significance at the 1%, 5% and 10% levels respectively.

Table 3: Estimated effects of immigration on trade flows, liberal goods classification (Tobit Specifications)

Dependent variable	*Imports*			*Exports*		
Explanatory variables	*Differen-tiated*	*Reference priced*	*Organised exchange*	*Differen-tiated*	*Reference priced*	*Organised exchange*
ln Immigrants$_{jt}$	0.219***	-0.028	-0.178	0.044	-0.14	-0.053
	(0.062)	(0.064)	(0.117)	(0.035)	(0.143)	(0.058)
Upper middle income home country$_j$ x ln Immigrants$_{jt}$	0.15*	0.366***	0.467***	0.14***	0.216***	0.149**
	(0.077)	(0.079)	(0.128)	(0.044)	(0.054)	(0.072)
Lower middle income home country$_j$ x ln Immigrants$_{jt}$	0.201***	0.203***	0.616***	0.047	0.151***	0.277***
	(0.074)	(0.078)	(0.131)	(0.042)	(0.052)	(0.069)
Low income home country$_j$ x ln Immigrants$_{jt}$	0.206***	0.474***	0.393***	0.285***	0.575***	0.345***
	(0.068)	(0.075)	(0.125)	(0.039)	(0.047)	(0.064)
Δ ln Exchange Rate$_{jt}$	0.368***	0.029	0.07	-0.084	-0.137*	-0.182*
	(0.103)	(0.148)	(0.177)	(0.059)	(0.072)	(0.097)
ln GDP$_{jt}$	1.048***	1.15***	0.777***	0.724***	0.815***	0.926***
	(0.038)	(0.04)	(0.065)	(0.022)	(0.027)	(0.036)
ln GDP Per Capita$_{jt}$	0.203**	0.555***	0.483***	-0.019	-0.217***	-0.494***
	(0.086)	(0.091)	(0.151)	(0.049)	(0.06)	(0.081)
ln Distance$_j$	-0.268***	-0.801***	-0.497***	-0.619***	-0.752***	-0.835***
	(0.1)	(0.105)	(0.169)	(0.057)	(0.07)	(0.094)
ln Remote$_{jt}$	0.212***	0.049	0.223**	0.033	0.063	0.22***
	(0.057)	(0.059)	(0.094)	(0.033)	(0.04)	(0.054)
ln FDI IN$_{jt}$	-0.024	0.123***	0.02	0.033***	0.005	-0.004
	(0.018)	(0.019)	(0.031)	(0.011)	(0.013)	(0.017)
ln FDI OUT$_{jt}$	0.049*	0.215***	0.296***	0.292***	0.224***	0.287***
	(0.026)	(0.029)	(0.044)	(0.015)	(0.018)	(0.025)
English$_j$	0.451***	0.719***	0.68***	0.454***	0.382***	0.128
	(0.088)	(0.094)	(0.149)	(0.051)	(0.062)	(0.083)
FTA$_{jt}$	2.164***	0.98***	2.294***	0.704***	0.5***	0.794***
	(0.264)	(0.272)	(0.426)	(0.152)	(0.185)	(0.247)
Military$_{jt}$	-0.336	-0.431*	-1.977***	-0.283**	-0.353**	-0.377*
	(0.227)	(0.244)	(0.39)	(0.13)	(0.159)	(0.222)
Number of additional FTAs$_{jt}$	0.511***	0.119*	0.37***	0.245***	0.192***	0.111*
	(0.061)	(0.065)	(0.103)	(0.035)	(0.043)	(0.058)
OPEC$_{jt}$	-1.372***	-0.32*	3.003***	-0.442***	-0.759***	-0.52***
	(0.15)	(0.168)	(0.263)	(0.085)	(0.105)	(0.146)
Sanctions$_{jt}$	-0.435***	-0.135	-0.237	-0.331***	-0.303***	0.028
	(0.114)	(0.121)	(0.207)	(0.066)	(0.08)	(0.109)
Seaport$_j$	0.777***	0.3***	0.756***	0.011	0.264***	0.271***
	(0.084)	(0.088)	(0.142)	(0.048)	(0.058)	(0.079)
Upper middle income home country$_j$	1.948**	-3.848***	-5.225***	-1.636***	-2.831***	-2.349***
	(0.913)	(0.936)	(1.52)	(0.524)	(0.638)	(0.85)
Lower middle income home country$_j$	-1.498*	-1.767*	-7.78***	-0.498	-1.865***	-3.843***
	(0.863)	(0.909)	(1.551)	(0.495)	(0.603)	(0.807)
Low income home country$_j$	-0.343	-3.979***	-5.716***	-3.147***	-7.095***	-5.029***
	(0.836)	(0.933)	(1.577)	(0.48)	(0.584)	(0.786)
Constant	-9.029***	-8.693***	10.206***	8.389***	9.553***	9.275***
	(1.429)	(1.515)	(2.552)	(0.819)	(0.999)	(1.352)
N	1,260	1,260	1,260	1,260	1,260	1,260
ANOVA-based fit measure	0.81	0.81	0.52	0.88	0.83	0.76

See Table 2 for notes.

include generally more portfolio investment. If English is commonly spoken in the home country, then US trade (especially in differentiated and reference priced goods) is higher. US military involvement in the home country dampens trade with US imports falling more than exports. Countries more globally integrated, politically and economically, trade relatively more with the US, with trade in differentiated goods affected more than homogeneous goods trade. Likewise, home countries that are parties to trade agreements with the US tend to trade more intensively, across all product classifications, with the US. The US tends to trade less, in terms of export and imports of differentiated and reference priced goods, with OPEC members; however, the US imports significantly more organised exchange products (which includes petroleum and related products) from OPEC members. As expected, sanctions reduce trade across all product classifications and, if the home country is not landlocked, trade with the US tends to be higher.

4.1 Immigrant-Trade Link-Related Hypotheses

Revisiting the hypotheses introduced in Section 2, the empirical analysis provides evidence of a positive relationship between immigration and host-home country trade. Table 4 provides a summary of observed immigrant-trade links across each home country income classification and each product classification. When considering the relative magnitudes of links across home country classifications, we find that links are consistently of greater magnitude for immigrants from low income countries, especially with respect to trade in differentiated and reference priced goods. Observed links are weakest - in fact, non-existent in many instances - for immigrants from high income countries.

Comparing the relative strengths of immigrant-trade links across product classifications, we find that immigrants increase US imports of differentiated products regardless of income classification and that immigrants increase US exports of such goods for all income classifications except the high income classification. In fact, when considering trade in differentiated products, in nearly all instances (14 of 16 cases) the estimated influence of immigrants on either imports of from or exports to the home country is positive and significant. For the homogenous product classifications, we find that in only 16 of 32 instances (9 of 16 cases involving reference priced products and 7 of 16 cases involving organised exchange products) are corresponding immigrant effects both positive and significant.

Finally, considering the relative magnitudes of immigrants' influences on imports from and exports to the home country, the former exceed the latter in 16 of 24 cases. This supports the notion that import elasticities would be greater than the export elasticities if the import elasticity contains both a taste effect and a network effect while the export elasticity contains only a network effect. However, it is important to note that while this is an empirical observation it is also very much possible (and plausible) that immigrants' influences on host country exports to their home countries is greater than the

influence of immigrants on host country imports from their home countries.

Table 4: Summary of observed immigrant-trade links

	Imports			*Exports*		
Conservative goods classification:						
Sub-classification:	*Differentiated*	*Reference priced*	*Organised exchange*	*Differentiated*	*Reference priced*	*Organised exchange*
High income home countries	0.204***	0.126	-0.122	0.05	-0.119	-0.11*
	(3.29)	(1.54)	(1.11)	(1.43)	(1.23)	(1.80)
U- middle income home countries	0.067*	0.327***	0.14	0.18***	0.094*	0.098
	(1.74)	(3.53)	(1.20)	(4.53)	(1.75)	(1.40)
L-middle income home countries	0.39***	0.179**	0.037	0.078**	0.072	0.285***
	(6.55)	(2.25)	(0.33)	(2.36)	(1.60)	(4.80)
Low income home countries	0.434***	0.419***	-0.16	0.327***	0.454***	0.24***
	(8.45)	(5.34)	(1.39)	(11.41)	(11.72)	(4.53)
Liberal goods classification:						
Sub-classification:						
High income home countries	0.219***	-0.028	-0.178	0.044	-0.14	-0.053
	(3.53)	(0.44)	(1.52)	(1.26)	(0.98)	(0.91)
U-middle income home countries	0.069*	0.338***	0.289**	0.184***	0.076	0.096
	(1.79)	(4.61)	(2.49)	(4.51)	(1.53)	(1.45)
L-middle income home countries	0.42***	0.175***	0.438***	0.091***	0.011	0.224***
	(7.06)	(2.76)	(4.22)	(2.68)	(0.62)	(4.00)
Low income home countries	0.425***	0.446***	0.215**	0.329***	0.435***	0.292***
	(8.28)	(7.18)	(2.13)	(11.18)	(12.16)	(5.97)

Immigrant effects are constructed using coefficients presented in Tables 2 and 3. T-statistics are in parentheses. "***", "**" and "*" denoted significance from zero at the 1%, 5% and 10% levels, respectively. The relevant *t*-statistic for interaction effects is constructed as:

$$t = \frac{\hat{\beta}_{IMMIGRANTS} - \hat{\beta}_{INTERACTION}}{\sqrt{\text{var}(\hat{\beta}_{IMMIGRANTS}) + \text{var}(\hat{\beta}_{INTERACTION}) + 2\,\text{cov}(\hat{\beta}_{IMMIGRANTS}, \hat{\beta}_{INTERACTION})}}.$$

4.2 Robustness checks

As sample composition may drive the results, we estimate equation (6) using the full complement of dependent variables while removing one country from the sample at a time and repeating the process for 70 successive rounds. For example, in the first round we exclude Australia, while the second round includes Australia but excludes Argentina. Considerable variation in results once a country is removed implies the country's inclusion has a large impact on results for the full sample. In total, 840 estimations were performed; resulting in estimation of 3,360 proportional immigrant effects.[10] Exclusion of any

lower middle or low income nation does not largely alter the estimated group-level effects for any product types. It appears that the reported immigrant-trade effects for these classifications are robust to changes in sample composition.[11] Removal of South Korea, a high income country, from the sample leads to reductions in coefficients on the immigrant stock variable from 0.204 to 0.158 in the conservative classification case and from 0.219 to 0.18 in the liberal classification case. From 1980 to 1997, the US increased its imports of differentiated Korean goods by 241 per cent — from $3.2 billion to $11 billion — while the Korean-born US population more than doubled from roughly 290,000 persons to more than 683,000. A portion of the increased imports may be attributable to Japanese automakers responding to Voluntary Export Restraints by shipping 'knock-down' kits to Korea for assembly and subsequent export to the US.

Examination of immigrant-trade links for the upper middle income country income classification produces a somewhat similar finding. Due to the small number of nations in this category, Mexico's trade ties to the US and that there are more immigrants in the US from Mexico than from any other nation, it is not surprising that Mexico greatly influences the observed immigrant-trade effects. Excluding Mexico changes the estimated immigrant-trade effects by sixty percent or more in 11 of the 12 categories, with the immigrant-trade link decreasing in 8 of the 11 instances. The reported results are also sensitive to the exclusion of Greece, Malaysia, and Uruguay; however, variation in effects is of much lesser magnitude and may be more attributable to the small group size than to specific factors regarding these nations.

5. Conclusion

We have explored one potential effect of immigration on a host economy, finding that immigrants exert positive influences on US imports from and exports to their respective home countries. Immigrant-trade links are found to operate across at least two dimensions — relative home country economic development and the degree of product differentiation. In response to a hypothetical 10 per cent increase in the immigrant stock from high income countries, US imports of differentiated goods from such countries increase by approximately 2 per cent. Similar increases in immigrant stocks from low income and lower middles income countries yield increases in US imports of differentiated goods of approximately 4.3 per cent and 4 per cent, respectively. Further, such increases in the immigrant stock from low income countries correspond to increases in US exports of homogenous goods ranging from 2.4 per cent to 4.4 per cent. Imports of homogenous (i.e. reference priced and organised exchange) goods from high income nations and exports of all product types to these nations appear unaffected by immigrant stock levels. We also find links between immigration and US trade with high and upper middle income nations are somewhat sensitive to sample composition. However, the link between immigration from low and lower middle income countries and trade appears robust.

As mentioned, the public and political debates relating to US immigration policy have largely focused on purported negative consequences of immigration. The same can be said for many other developed economies that are net recipients of international migrant flows. The results presented here inform policy by providing a more complete accounting of the net influences of immigrants. Conventional wisdom holds that, on average, immigrants from low and lower middle income countries impose higher costs on the US as compared to immigrants from higher income nations. Thus, without consideration of our primary findings (i.e. that immigrant-trade links are strongest for immigrants from low and lower middle income countries and non-existent, except for imports of differentiated products, for immigrants from high income countries), formulation of immigration policy would result in a bias in favour of immigrants from high and upper middle income nations.

It is important to mention, however, that even if we can accurately calculate any costs associated with immigration, it would still be difficult to quantify the benefits of immigrant-trade links. Further, any additional benefits of immigration — for example, those related to greater cultural and ethnic diversity — would need to be measured and incorporated into the analysis prior to formulating an optimal immigration policy. Nevertheless, the findings presented here demonstrate the existence of benefits that do exist and that, thus far, have been absent from the public and political dialogues. We hope the findings presented here inform the associated debates. Since the results presented here may not be mirrored by similar studies involving other host economies, conclusions may only be applicable to the US. That being said, this paper refines previous estimates of immigrant-trade links, suggests that further study is merited and, hopefully, serves as a starting point for subsequent research.

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APPENDICES

A: Country listing

High-income: Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, South Korea, Spain, Switzerland, United Kingdom. *Upper-middle income*: Argentina, Brazil, Chile, Greece, Hungary, Malaysia, Mexico, Trinidad and Tobago, Uruguay. *Lower-middle income*: Bolivia, Colombia, Costa Rica, Dominican Republic, Ecuador, Egypt, El Salvador, Fiji, Guatemala, Indonesia, Iran, Jamaica, Jordan, Morocco, Panama, Peru, Philippines, Poland, Romania, South Africa, Syria, Thailand, Venezuela. *Low-income*: Bangladesh, China, Ethiopia, Ghana, Guyana, Haiti, Honduras, India, Kenya, Nicaragua, Nigeria, Pakistan, Senegal, Sierra Leone, Sri Lanka, Tanzania.

B: Listing of US Military Interventions, 1980-1997

Bolivia (1986): Troops assist raids on cocaine region; El Salvador (1981-92): Troops, advisors and over-flights aid anti-rebel war; *Haiti* (1994-96): Troops, naval blockade; President Aristide restored to office; *Honduras* (1983-89): Troops help build bases near borders; *Iran* (1980): Nuclear threat, aborted raid to rescue embassy hostages; *Iran* (1984): Iranian jets shot down over Persian Gulf; Iran (1987-88): Naval bombing US intervenes on side of Iraq in war; *Nicaragua* (1981-90): Naval operation, CIA directs Contra invasions; *Panama* (1989-90): Troops, bombing, government leaders arrested, over 2,000 killed; *Philippines* (1989): Air cover provided for government against coup.

C: Listing of US-imposed Economic Sanctions, 1980-1997[12]

Argentina (1980-83): Improve human rights, adhere to nuclear safeguards; *Bolivia* (1980-82): Improve human rights, deter drug trafficking; *Brazil* (1980-84): Improve human rights, adhere to nuclear safeguards; *China* (1989-97): Tiananmen Square, improve human rights, end nuclear proliferation; *Colombia* (1996-97): Stop narcotics trade, improve human rights; *Ecuador* (1995-98): End border conflict with Peru; *El Salvador* (1980-81; 1987-88; 1990-93): Improve human rights, end Civil War; *Ethiopia* (1980-92): Settle expropriation claims, improve human rights; *Guatemala* (1993): Restore democracy, oppose coup; *Haiti* (1987-94): Improve human rights, restore democracy, stop narcotics trade; *India* (1980-82): Adhere to nuclear safeguards; *Indonesia* (1991-97): Improve human rights, end conflict/human rights violations in East Timor; *Iran* (1980-81; 1984-97): Release hostages, settle expropriation claims, end war with Iraq, halt Gulf shipping attacks; *Israel* (1980-83): Depart from Sinai, adhere to UN Resolution 242, push Palestinian autonomy talks; *Jordan* (1990-97): Enforce UN embargo vs. Iraq; *Nicaragua* (1981-90; 1992-95): End support for El Salvador rebels, destabilise Sandinista government; implement civil control over security forces, settle expropriation claims; *Nigeria* (1993-97) Improve human rights, establish democracy, stop narcotics trade; *Pakistan* (1980-97): Adhere to nuclear safeguards; *Panama* (1987-90): Destabilise Noriega; *Peru* (1991-97): Improve human rights, establish democracy, end border conflict with Ecuador; *Romania* (1983-93): Improve human rights, establish democracy; *South Africa* (1985-91) End Apartheid; *Syria* (1986-97): End support of terrorism; *Thailand* (1991-92) Restore constitutional regime.

ENDNOTES

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2. Details of both product and home country classification procedures are provided in Section 3.

3. Appendix A lists the countries included in the dataset.

4. See Anderson (1979), Helpman and Krugman (1985), Bergstrand (1985), Davis (1995), Deardorff (1998), Feenstra *et al* (2001), Eaton and Kortum (2001), and Anderson and van Wincoop (2003).

5. The World Bank (1997) lists nations as 'low' income if 1995 GNP per capita (GNPC) < $765; 'lower middle' if $765 < GNPC < $3,035; 'upper middle' if $3,035 < GNPC < $9,385; 'high' if GNPC > $9,385.

6. US BEA (1987; 2000) FDI data is at historical cost but lacks specific values, for confidentiality reasons. If FDI < $500,000 in any country, we code the FDI value at the upper limit of $500,000.

7. The variable is equal to the sum of memberships in ANCOM, APEC, ASEAN, ANZERTA, CARICOM, CARIFTA, CACM, EEA, EFTA, EU, LAFTA, LAIA, and MERCOSUR (Ghosh and Yamarik, 2004).

8. If $i = j$, internal distance is the square root of the country's mass times 0.4 (Head and Mayer, 2000).

9. Appendix B lists military interventions and Appendix C lists sanctions related to countries in this study.

10. For each of the 70 excluded home countries, 12 estimations are undertaken with each producing 4 estimated immigrant effects.

11. Estimation results are available, upon request, from the author.

12. Hufbauer *et al.* (1997).

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