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Impacts of Refugee Immigrants on Germany's Trade

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Abstract

Employing data on Germany's refugees and trade with 71 home countries, we quantify impacts of Germany's refugee immigrants on its bilateral trade with those home countries. The refugee-trade link is estimated by using a gravity model with the ratio of refugee stock to cultural distance (measured by applying Hofstede's cultural dimensions theory) between host and home countries. A Poisson Pseudo-Maximum Likelihood (PPML) estimator is used to deal with the zero-trade-value problem. Empirical results show 1) refugee immigrants from low-income home countries play a more important role in determining the volume of Germany's trade flows than those from high-income home countries do; 2) while cultural distance functions similarly as geodesic distance that serves as a trade impediment, refugee immigrants generally exert a positive impact on Germany's trade. The influence is comparatively strong in aggregate and manufacturing trades, yet weak in agricultural exports and imports.

Keywords: cultural distance; gravity model; immigrants; refugees; bilateral trade

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1. Introduction

Known as a major immigrant destination as well as a target country for flows of asylum seekers looking for sanctuary, Germany had 1.1million refugees in its territory by the end of

2018 and is the only western industrialized nation among the top ten refugee host countries (UNHCR Global Trends 2018). Since the 2015 European migrant crisis, the not inconsequential number of refugees arriving in Germany have drawn significant attention worldwide and have aroused intense political, social and academic debates.

While few of existing studies have analyzed impacts of refugee immigrants on a host country's trade, much has been written about how immigrants without entry classifications (e.g., non-refugees, refugees, asylum-seekers, internally displaced persons, and stateless persons) in general affect a host country's trade. White (2007) proposed the "transplanted home bias" channel – immigrants with preferences for goods that are unavailable in a host country potentially increase that host country's imports from the home country. On the other hand, immigrants may have knowledge of home country markets that, if exploited, could increase trade flows (White and Tadesse 2010). Researchers refer to this channel as "information bridge hypothesis" that includes a "cultural bridge" and an "enforcement bridge" (Dunlevy 2004; Greenaway et al. 2007).

Building on prior studies' conclusion that immigrants, refugees or non-refugees, generally exert positive influences on a host country's exports to and imports from their home countries through facilitating trade flows and offsetting trade-inhibiting influences, the present study examines Germany's refugee-trade link across different countries of origin to provide evidence for better formulation of relevant immigration policies.

2. Model and data

We follow White and Tadesse's (2010) study on U.S. refugee-trade link by using a gravity model with the ratio of the refugee stock from country *j* residing in country *i* (i.e.,

Germany) in year *t* to the cultural distance between the refugee's host and home countries ($\frac{RE_{ijt}}{CD_{ij}}$).

This ratio is included in X_{ijt}^{ϕ}, a vector that contains trade-facilitating/inhibiting factors that are often discussed in the literature (e.g., population, exchange rate, contiguity, common language, colonial ties and membership in the same regional trade agreement (RTA)). In particular, the gravity equation can be written as:

$$T_{ijt} = \alpha \left(\frac{Y_{it}^{\beta_1} Y_{jt}^{\beta_2}}{GD_{ij}^{\gamma_1}} \right) X_{ijt}^{\phi} \varepsilon_{ijt} \quad (1)$$

where trade in goods between two countries *i* and *j* during year *t* (T_{ijt}) is an increasing function of the trading partners' combined economic scale measured in the product of host country GDP ($Y_{it}^{\beta_1}$) and home country GDP ($Y_{jt}^{\beta_2}$) and is a decreasing function of the two countries' geodesic distance ($GD_{ij}^{\gamma_1}$). ε_{ijt} is the error term. Allowing α to be a constant, we then take natural logarithms on both sides of equation (1) and include terms that interact immigrant stock and cultural distance variables to capture the potential variation in influences of immigrants across relatively more (or less) culturally-distant home countries, resulting in the empirical specification:

$$\begin{aligned} LnT_{ijt} = \alpha_0 &+ \beta_1 LnY_{it} + \beta_2 LnY_{jt} + \gamma_1 LnGD_{ij} + \lambda_1 LnRE_{ijt} + \lambda_2 LnCD_{ij} \\ &+ \lambda_3 (LnRE_{ijt} \times LnCD_{ij}) + \phi_1 LnPOP_{it} + \phi_2 LnPOP_{jt} + \phi_3 LnUSDXRATE_{jt} \\ &+ \phi_4 LnEuroXRATE_{jt} + \phi_5 Contig_{ij} + \phi_6 Comlang_{ij} + \phi_7 Colony_{ij} \\ &+ \phi_8 RTA_{ijt} + \varepsilon_{ijt} \quad (2) \end{aligned}$$

We then use a Poisson Pseudo-Maximum Likelihood (PPML) estimator in Sun and Reed's (2010) free trade agreement study, and add country fixed effects η_j, year fixed effects δ_t, and country-specific linear time trends $\eta_j t$. We specify the model as:

$$T_{ijt} = \exp\{\alpha_0 + \beta_1 LnY_{it} + \beta_2 LnY_{jt} + \gamma_1 LnGD_{ij} + \lambda_1 LnRE_{ijt} + \lambda_2 LnCD_{ij} + \lambda_3(LnRE_{ijt} \times LnCD_{ij}) + \phi_1 LnPOP_{it} + \phi_2 LnPOP_{jt} + \phi_3 LnUSDXRATE_{jt} + \phi_4 LnEuroXRATE_{jt} + \phi_5 Contig_{ij} + \phi_6 Comlang_{ij} + \phi_7 Colony_{ij} + \phi_8 RTA_{ijt} + \eta_j + \delta_t + \eta_j t + \varepsilon_{ijt}\} \quad (3)$$

Standard errors are clustered on country to control unobservable characteristics that lead to similar effects in different years for the same country.

To measure cultural distance between host country *i* and home country *j*, White and Tadesse (2010) constructed average Traditional authority versus Secular-Rational authority (TSR) and Survival values versus Self-Expression values (SSE) by using data from the World Values Surveys (WVS) and the European Values Surveys (EVS). Unlike White and Tadesse, we apply Hofstede's cultural dimensions theory which describes effects of a society's culture on values of its members in 5 aspects – Power Distance (PD), Individualism (IN), Masculinity (MA), Uncertainty Avoidance (UA) and Long Term Orientation (LTO). We construct the cultural distance as:

$$CD_{ij} = \sqrt{(PD_j - PD_i)^2 + (IN_j - IN_i)^2 + (MA_j - MA_i)^2 + (UA_j - UA_i)^2 + (LTO_j - LTO_i)^2} \quad (4)$$

White (2007) stated that, 'assuming high-income nations have developed markets and contracting procedures and that low-income nations have less complete markets and weaker contracting and enforcement mechanisms, it is likely immigrants from lower-income nations

present opportunities for increased trade'. He then stratified the home countries by income class and found that the U.S. immigrant-trade link is driven by immigration from relatively low-income countries. Following this method, we stratified the home countries by income in the present study in order to find out if the link in Germany is driven by the same way.

The sample used for this analysis totals 71 countries as Germany's trade partners with a sample period from 2002 – 2017. Table 1 lists the countries estimated with average refugee stocks. Therefore, there are 1136 (71×16) observations. Of the 1136 observations, 352 are low-income ones and 784 are high-income ones[1]. Bilateral trade flow (i.e., total trade flow, trade flow in manufacturing, trade flow in agriculture, forestry and fishing) data come from OECD.Stat STAN Bilateral Trade Database (https://stats.oecd.org). Data on refugee stocks come from UNHCR Population Statistics (http://popstats.unhcr.org). Data on gross domestic product (GDP), population and exchange rate (local currency units (LCU) per US$) come from World Bank Open Data. U.S./Euro Exchange Rate obtained from FRED Economic Database (https://fred.stlouisfed.org) is used for calculating exchange rate (LCU per Euro). Data on border adjacency, common official language, colonial ties and geodesic distance come from the Centre d'Etudes Prospectives et d'Informations Internationales (http://www.cepii.fr/anglaisgraph/bdd/distances.htm). The WTO Regional Trade Agreements (RTAs) database is the main source for RTAs. The 5-dimension Hofstede scores used to measure cultural distance come from Hofstede Insights Country Comparison (https://www.hofstede-insights.com). Table 3 presents summary statistics for the variables used in this study.

Table 1 about here

Table 2 about here

Table 3 about here

3. Results

Estimation results for low-income countries are presented in table 4. For low-income home countries, we observe that higher GDP values for home countries correlate with increased trade flows in a statistically significant manner when aggregate and manufacturing exports and imports are employed as dependent variables. Elasticity values (i.e., 0.686, 0.927, 0.673 and 0.520) are near or below unity, which is consistent with findings from prior gravity-based studies. As expected, coefficients on geodesic distance are negative and significant. Stocks of refugee immigrants from low-income countries significantly increase Germany's aggregate and manufacturing exports as well as manufacturing imports. While the coefficients on the refugee stock have the expected positive signs in general, the coefficients on the term which interacts refugee stock and cultural distance are all negative for aggregate and manufactured goods, suggesting that cultural distance has a negative impact on trade flows.

Turning to the estimated coefficients that are statistically significant on the remaining independent variables in table 4, we find that Germany trades more with low-income home countries with relatively larger population and that significant trade creation exists for Germany's aggregate imports. In particular, being as members of a common RTA increases Germany's total import from a low-income home country by 64.05% ($[(e^{0.495} - 1) \times 100]\%$).

When agricultural exports and imports are employed as dependent variables, the coefficients are not strong enough to yield significant effects in all estimations except for the coefficient on exchange rate between U.S. dollar and local currency of a home country. Depreciation of a home country's currency relative to the dollar significantly reduces Germany's

agricultural exports to that country, despite the fact that most goods exported and imported by Germany can be invoiced by either U.S. dollar or Euro.

Table 4 about here

Estimation results for high-income countries are presented in table 5. For high-income home countries, the GDP coefficients except for that on manufacturing imports are all positive and statistically significant, indicating that Germany trades more with larger economies. Coefficients on geodesic distance are all negative and significant. Unlike stocks of refugee immigrants from low-income countries, that from high-income countries do not show statistically significant effects for all types of trade flow. As expected, coefficients on cultural distance are negative and significant in general. While cultural distance does serve as a trade impediment, the magnitudes and significance levels of the coefficients on the term which interacts refugee stock and cultural distance are much smaller than that on cultural distance, suggesting that refugee immigrants counter, at least in part, the inhibiting influence of cultural distance on trade.

Again, unlike results in table 4, we find, in table 5, that Germany trades less with high-income home countries with larger population. While coefficients on exchange rate between U.S. dollar and local currency of a home country does not indicate trade facilitating/inhibiting effects statistically, that on contiguity and colonial ties are, in general, statistically negative and positive, respectively. Significant trade creations are found when aggregate and manufacturing exports are applied as dependent variables. In particular, being as members of a common RTA increases Germany's total and manufacturing exports to a high-income home country by 6.08% and 6.61%, respectively. Overall, the values of R^2 in both table 4 and table 5 are above 83%, indicating a well-fitted functional form.

Table 5 about here

4. Conclusions and Discussions

The basic purpose of this study is to quantify impacts of Germany's refugee immigrants on its trade. Two findings have been observed from empirical results as follows. First, refugee immigrants from low-income home countries play a more important role in determining the volume of Germany's trade flows than those from high-income home countries do. This finding supports and extends White's (2007) U.S. immigrant-trade study, in which the U.S. immigrant-trade link is found to be driven by immigration from relatively low-income countries. Prior studies explained this phenomenon by stating that low-income countries, in general, may not develop well-established markets and contracting procedures and therefore are less transparent and more corrupt, giving immigrants from those countries more opportunities to present their network influence (Dunlevy 2004; Greenaway et al. 2007; White 2007).

Second, while cultural distance functions similarly as geodesic distance that serves as a trade impediment, refugee immigrants generally exert a positive impact on Germany's trade. The influence is comparatively strong in aggregate and manufacturing trades, yet weak in agricultural exports and imports. If further studies could research on reasons to which the strong and weak links are attributable, they would provide a better and more comprehensive understanding of Germany's immigrant-trade link and the conclusions drawn here would be reinforced.

Notes

1. In the calendar year 2010, the World Bank (https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups) classified nations as low-income if 2010 gross national income (GNI) per capita

was ≤ $1005; lower middle-income if GNI per capita was between $1006 and $3975; upper middle-income if GNI per capita was between $3976 and $12275; high-income if GNI per capita > $12275. We merged the low-income and lower middle-income home countries into one group: low-income countries; the upper middle-income and high-income ones into another group: high-income countries. Table 2 lists the countries in the data set by income class.

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Appendix: Tables

Table 1 – Country listing, with refugee stocks (year = 2002-2017)

Country	Avg. Refugee stock	Country	Avg. Refugee stock
Albania	1469	Mexico	41
Angola	2340	Morocco	1434
Argentina	34	Mozambique	80
Australia	22	Netherlands	26
Bangladesh	592	New Zealand	8
Belgium	11	Nigeria	2018
Brazil	190	Pakistan	6410
Bulgaria	516	Peru	218
Burkina Faso	233	Philippines	190
Canada	73	Poland	4851
Cabo Verde	5	Portugal	15
Chile	422	Romania	1813
China	3560	Russia	28191
Colombia	207	Saudi Arabia	208
Croatia	4236	Senegal	117
Czech Republic	1545	Serbia	85989
Dominican Republic	50	Singapore	15
Egypt	892	Slovakia	167
El Salvador	18	Slovenia	147
Estonia	182	South Africa	80
France	35	South Korea	279
Ghana	2137	Spain	170
Hungary	945	Sri Lanka	9183
India	2093	Sweden	10
Indonesia	125	Syria	73534
Iran	25400	Tanzania	29
Iraq	57795	Thailand	518
Israel	260	Turkey	96128
Italy	65	Ukraine	22663
Japan	116	United Kingdom	21
Jordan	532	United States	262
Latvia	753	Uruguay	10
Lebanon	9467	Venezuela	39
Libya	649	Vietnam	15504
Lithuania	415	Zambia	12
Malaysia	44		

Source: The author's calculation based on UNHCR Population Statistics.
Note: The numbers have been rounded up to the nearest digits.

Table 2 – Countries represented

Low-income countries	Lower middle-income countries	Upper middle-income countries	High-income countries
Bangladesh	Angola	Albania	Australia
Burkina Faso	Cabo Verde	Argentina	Belgium
Mozambique	Egypt	Brazil	Canada
Tanzania	El Salvador	Bulgaria	Croatia
	Ghana	Chile	Czech Republic
	India	China	Estonia
	Indonesia	Colombia	France
	Iraq	Dominican Republic	Hungary
	Morocco	Iran	Israel
	Nigeria	Jordan	Italy
	Pakistan	Latvia	Japan
	Philippines	Lebanon	Netherlands
	Senegal	Libya	New Zealand
	Sri Lanka	Lithuania	Poland
	Syria	Malaysia	Portugal
	Ukraine	Mexico	Saudi Arabia
	Vietnam	Peru	Singapore
	Zambia	Romania	Slovakia
		Russia	Slovenia
		Serbia	South Korea
		South Africa	Spain
		Thailand	Sweden
		Turkey	United Kingdom
		Uruguay	United States
		Venezuela	

Source: 2010 World Bank per capita GNI-based classification.

Table 3 – Variables and summary statistics (year = 2002-2017, observation = 1136).

	Description	Mean	S.D.	Min.	Max.
Dependent variable					
EXP_{ij}	Germany's total exports to country *j* (million dollars)	13906.47	25675.85	6.29	141249.70
IMP_{ij}	Germany's total imports from country *j* (million dollars)	11287.34	20882.46	0.08	117764.30
$MaEXP_{ij}$	Germany's exports to country *j* in manufacturing (million dollars)	13135.20	24175.95	5.56	133968.60
$MaIMP_{ij}$	Germany's imports from country *j* in manufacturing (million dollars)	9617.36	18518.20	0.01	115207.60
$AgEXP_{ij}$	Germany's exports to country *j* in agriculture, forestry and fishing (million dollars)	123.09	326.82	0	3123.81
$AgIMP_{ij}$	Germany's imports from country *j* in agriculture, forestry and fishing (million dollars)	344.71	897.54	0	8224.14
Independent variable					
Y_i	GDP of Germany (million dollars)	3301129.00	494991.20	2079136.00	3898727.00
Y_j	GDP of country *j* (million dollars)	757150.30	2088755.00	620.97	19500000.00
GD_{ij}	Geodesic distance between Germany and country *j* (kilometers)	5304.69	4168.28	279.86	18386.66
RE_{ij}	Refugee stock with origin country *j* (thousand)	6.59	27.30	0.001	496.67
CD_{ij}	Cultural distance for country *j* relative to Germany	74.64	18.30	29.93	109.89
POP_i	Population of Germany (thousand)	81841.36	785.64	80274.98	82657.00
POP_j	Population of country *j* (thousand)	81228.09	212664.50	442.95	1386395.00
$USDXRATE_j$	Exchange rate between U.S. dollar and local currency of country *j*	773.89	3221.00	0.48	33226.30
$EuroXRATE_j$	Exchange rate between Euro and local currency of country *j*	962.52	3974.45	0.58	37549.04
$Contig_{ij}$	1 if Germany and country *j* share a border; 0 otherwise	0.07	0.26	0	1
$Comlang_{ij}$	1 if Germany and country *j* have a common official language; 0 otherwise	0.01	0.12	0	1
$Colony_{ij}$	1 if Germany and country *j* have colonial ties; 0 otherwise	0.01	0.12	0	1
RTA_{ij}	1 if Germany belongs to the same Regional Trade Agreement with country *j*; 0 otherwise	0.44	0.50	0	1

Table 4 – Estimation results for low-income countries

	Dependent variable					
	EXP_{ij}	IMP_{ij}	$MaEXP_{ij}$	$MaIMP_{ij}$	$AgEXP_{ij}$	$AgIMP_{ij}$
Independent variable						
LnY_{jt}	0.686***	0.927***	0.673***	0.520*	0.076	0.191
	(0.228)	(0.333)	(0.212)	(0.273)	(0.279)	(0.507)
$LnGD_{ij}$	-3.406**	-2.429*	-2.825**	-3.105**	2.811	1.191
	(1.427)	(1.317)	(1.266)	(1.432)	(3.505)	(0.854)
$LnRE_{ijt}$	1.188*	-0.011	1.165*	1.324*	-4.979	-0.152
	(0.646)	(0.940)	(0.635)	(0.729)	(3.239)	(0.749)
$LnRE_{ijt} \times LnCD_{ij}$	-0.270*	-0.017	-0.263*	-0.310*	1.109	0.031
	(0.149)	(0.213)	(0.147)	(0.170)	(0.720)	(0.171)
$LnPOP_{jt}$	6.538**	9.294***	6.106**	6.932**	-1.696	-2.021
	(2.548)	(2.131)	(2.571)	(3.358)	(3.159)	(3.105)
$LnUSDXRATE_{jt}$	0.172	0.021	0.064	0.269	-0.864**	0.241
	(0.208)	(0.216)	(0.166)	(0.295)	(0.422)	(0.219)
RTA_{ijt}	-0.132	0.495**	-0.088	0.004	0.002	-0.335
	(0.091)	(0.226)	(0.092)	(0.140)	(0.326)	(0.306)
Constant	-46.057**	-85.895***	-45.274**	-51.662*	1.762	12.463
	(19.092)	(17.959)	(20.125)	(30.566)	(13.217)	(27.795)
R^2	0.985	0.982	0.986	0.994	0.837	0.968
Number of observations	352	352	352	352	352	352

Note: Each parameter is from a separate regression with country fixed effects, year fixed effects, and country-specific linear time trends, and the standard errors are clustered on country. Standard errors are in parentheses.

LnY_{it}, $LnCD_{ij}$, $LnPOP_{it}$, $LnEuroXRATE_{jt}$, $Contig_{ij}$, $Comlang_{ij}$, $Colony_{ij}$ are excluded to ensure that the estimates exist.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5 – Estimation results for high-income countries

	Dependent variable					
	EXP_{ij}	IMP_{ij}	$MaEXP_{ij}$	$MaIMP_{ij}$	$AgEXP_{ij}$	$AgIMP_{ij}$
Independent variable						
LnY_{jt}	0.879***	0.558***	0.854***	0.149	0.471***	0.348**
	(0.053)	(0.165)	(0.058)	(0.110)	(0.179)	(0.141)
$LnGD_{ij}$	-1.735***	-2.317***	-1.679***	-2.175***	-2.041*	-1.650**
	(0.335)	(0.413)	(0.325)	(0.388)	(1.232)	(0.836)
$LnRE_{ijt}$	0.104	0.077	0.093	0.028	0.276	-0.359
	(0.078)	(0.090)	(0.094)	(0.084)	(0.291)	(0.326)
$LnCD_{ij}$	-5.173***	-7.812***	-5.031***	-6.404***	-2.212	-10.866***
	(1.555)	(1.845)	(1.516)	(1.753)	(5.676)	(3.769)
$LnRE_{ijt} \times LnCD_{ij}$	-0.026	-0.018	-0.023	-0.007	-0.077	0.094
	(0.019)	(0.023)	(0.023)	(0.021)	(0.071)	(0.080)
$LnPOP_{jt}$	-2.272***	-3.238***	-2.199***	-2.237***	-0.351	-4.025**
	(0.730)	(0.848)	(0.716)	(0.800)	(2.515)	(1.734)
$LnUSDXRATE_{jt}$	0.024	0.036	0.024	0.014	-0.222	-0.080
	(0.017)	(0.023)	(0.018)	(0.017)	(0.150)	(0.076)
$Contig_{ij}$	-1.766**	-3.239***	-1.695**	-2.689***	-1.360	-4.570**
	(0.823)	(0.984)	(0.801)	(0.929)	(2.966)	(2.025)
$Colony_{ij}$	3.800***	5.791***	3.697***	4.022**	0.666	8.568**
	(1.437)	(1.683)	(1.408)	(1.577)	(4.994)	(3.450)
RTA_{ijt}	0.059**	-0.105	0.064***	-0.101	-0.148	0.114
	(0.023)	(0.159)	(0.022)	(0.154)	(0.138)	(0.194)
Constant	53.054***	80.958***	51.654***	69.839***	26.092	94.651**
	(15.319)	(18.378)	(14.904)	(17.443)	(56.042)	(37.490)
R^2	0.997	0.994	0.996	0.996	0.985	0.994
Number of observations	784	784	784	784	784	784

Note: Each parameter is from a separate regression with country fixed effects, year fixed effects, and country-specific linear time trends, and the standard errors are clustered on country. Standard errors are in parentheses.
LnY_{it}, $LnPOP_{it}$, $LnEuroXRATE_{jt}$, $Comlang_{ij}$ are excluded to ensure that the estimates exist.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$