University of Nottingham
UK | CHINA | MALAYSIA

research paper series

Globalisation and Labour Markets

Research Paper 2017/13

Do Immigrants' Funds Affect the Exchange Rate?

By
Nusrate Aziz, Arusha Cooray and Wing Leong Teo

GEP

Do Immigrants' Funds Affect the Exchange Rate?

Nusrate Aziz[1], Arusha Cooray[2] and Wing Leong Teo[3]

Abstract

Using annual data over 1966-2014 from the Citizenship and Immigration statistics archives of Canada, we investigate how the funds brought into Canada by immigrants, affects the real effective exchange rate (REER) of Canada. We employ the ARDL bounds testing (Pesaran, Shin and Smith, 1999) and Dynamic OLS (Stock and Watson, 1993) approaches to cointegration. Both estimation methods indicate a long run relation between immigrants' funds and exchange rate with immigrants' funds leading to a significant appreciation of the exchange rate in Canada. These results are robust to different estimation methods and an alternative proxy measure for the funds brought into Canada by immigrants.

Keywords: Immigration, immigrants' money, exchange rate, Canada

JEL classification codes: F31, F41

[1] Department of Business and Economics, Algoma University, 1520 Queen Street East, Sault Ste. Marie Ontario Canada P6A 2G4. Email: Nusrate.Aziz@algomau.ca.
[2] University of New South Wales and University of Sydney, Sydney, Australia. Email: Arusha.Cooray@unsw.edu.au.
[3] Corresponding author. School of Economics, University of Nottingham Malaysia Campus, Jalan Broga, Semenyih 43500, Selangor, Malaysia. Email: WingLeong.Teo@nottingham.edu.my.

1. Introduction

Canada has a history of being a net immigration country, accepting more migrants per capita than the United States, the United Kingdom and Europe. Currently, migrants represent more than 20 percent of the total population of Canada (Canadian National Household Survey, 2011). This trend is likely to continue into the future given the integration of immigration policy into economic policy through the emphasis placed on immigration to meet Canada's labour market requirements (Challinor, 2011). Canadian immigration policy places priority on economic migrants, that is, skilled workers and business immigrants with entrepreneurial skills and financial capital. Canada accepts approximately 6000 business applicants annually granting permanent residence to 15,000 immigrants. While there is a large literature on migration and remittances, the migration-remittance debate has focused primarily on how migration and remittances sent back home by migrants, affect both home and host countries. Similarly, the emphasis of the literature on capital flows and exchange rates has been on the influence of foreign direct investment (FDI) and portfolio flows on exchange rates. An area that has hereto been overlooked in the literature is how the money brought into host countries by immigrants, affects the receiving nation. While the Canadian authorities have specified the minimum amounts of money that people are required to bring with them, migrants bring in much more than this minimum requirement (Ley, 2011).

Therefore, using the funds brought in by migrants, we proceed to investigate how immigrants' money affects the exchange rate of Canada. According to the Canadian citizenship laws, an individual migrating under the economic class is required to bring with them at least CAD 12, 300 in 2017 which increases with the number of family members (Immigration, Refugees and Citizenship Canada, 2017). Business migrants are required to bring in much more. Under the Federal Investor program, migrants are required to bring in CAD 400,000 which is deposited with the Receiver General of Canada and have a personal net worth of CAD

800,000 with two years of management or business experience. Under the Entrepreneur class, permanent residence is granted to those with business experience and a personal net worth of CAD 300,000 upon setting up in Canada within two years of arrival (Quest Canada, 2015).

Studies indicate that these migrants bring in significant amounts of money. In an in-depth study employing a number of databases and through the use of interviews which trace migrant families back 25 years, Ley (2011) makes the observation that: "..the Canadian Imperial Bank of Commerce estimated the inward flow from Hong Kong to Canada to be between CAD 2 billion to CAD 4 billion a year in the early 1990s" (Symonds et al., 1991 cited in Ley, 2011). Large sums of money were similarly transferred from Taiwan with the relaxation of exchange controls which amounted to around 40% of Canada's GDP (Bradbury 1989 cited in Ley 2011). Ley (2011) further goes on to state that in the early 1990s, a senior banker in Vancouver had confided in him that: "The banks have so much Asian money coming in that they don't know what to do with it." According to Ley (2011), another senior bank official stated: "…that $US100 million had entered his bank from a Taiwanese branch…" while a journal noted that: "Taiwan's top ten moguls have already settled down in Vancouver and started their investment."

It is well established in the literature that capital flows affect the exchange rate (Mundell 1968, Frankel 1983, Frankel and Rose 1994, Calvo et al. 1993 among others). Hence, this large inflow of migrant money is most likely to affect the exchange rate of Canada. Despite the fact that a number of studies investigate the impact of capital flows on the exchange rate (Calvallo and Ghironi 2002, Elbadawi and Soto 1997, Naceur et al. 2011 among others) and remittances on the exchange rate (Acosta et al. 2007, Caceres and Saca 2006, Barajas et al. 2010), relatively little is known about how the money brought into host countries by immigrants affect the exchange rate of the host country. A study by Dungan et al. (2012) employs a macro-econometric forecasting model to investigate the macroeconomic effects on the Canadian

economy of a hypothetical increase in immigration. While their simulations suggest a positive impact of immigration on a number of macroeconomic variables including gross domestic product (GDP), aggregate demand, investment, productivity, government expenditures, taxes and net government balances, the result with regard to the exchange rate is mixed. Our study differs from that of Dungan et al. (2012) in that we use data on funds brought into Canada by migrants to investigate its effect on the exchange rate of Canada.

An excess of capital inflows can lead to an exchange rate appreciation, which in turn leads to a loss of a country's competitiveness, adversely affecting exports. Identifying the effect of these capital inflows is therefore important for taking appropriate policy measures. Employing annual data over 1966-2014 from the Citizenship and Immigration statistics archives of Canada, we investigate how the money brought in by immigrants, affects the exchange rate of Canada. The money brought into Canada by immigrants has been constructed by the authors as explained in Section 4. This is the first study to our knowledge, which investigates how the money brought into a host country by immigrants, affects the exchange rate. Results are tested for robustness in a number of ways: additional control variables to capture a range of possible influences on the exchange rate, different estimation methods including the Autoregressive Distributed Lag (ARDL) estimation method of Pesaran et al. (1999), and the Dynamic OLS (DOLS) estimation method of Stock and Watson (1993). Given the uncertainty and likely measurement errors in the immigrants money variable, the robustness of the results are also tested using the ratio of immigration to population as a proxy for immigrants' money to GDP ratio. The results indicate a systematic positive relationship between the exchange rate and the money brought into Canada by immigrants and migration into Canada. The results suggest that the money brought into Canada by immigrants lead to an exchange rate appreciation. The results are robust to alternative estimation procedures.

The rest of the study is structured as follows. Section 2 presents some stylized facts. Section 3 discusses the literature, Section 4 presents the data, methodology and model, Section 5 evaluates the empirical results and Section 6 concludes.

2. Stylized Facts

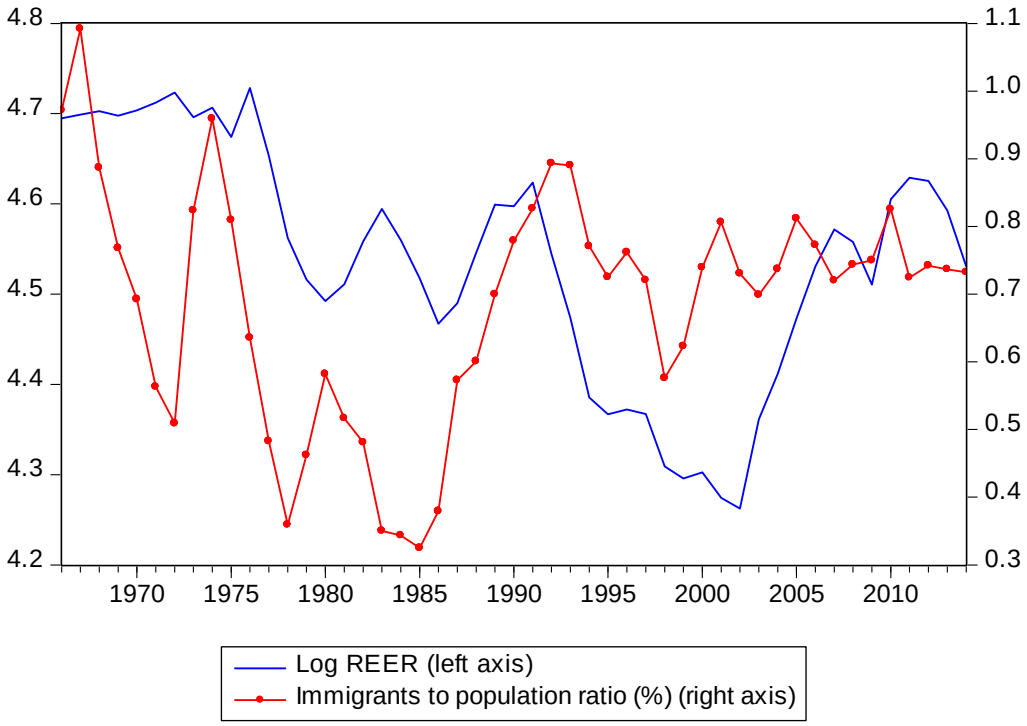
Up until 1966 since the introduction of the New Immigration Act of 1952, Canadian immigration policy, allowed the entry of individuals originating only from certain countries, which included the United States, the United Kingdom and other European countries. During this period, 70 percent of the migrants into Canada originated from the United Kingdom and other European countries (Borjas, 1993). In 1966, a White Paper on immigration recommended a preference for skilled immigrants based on the needs of the Canadian economy. Under this, applications for migration were classified into three categories: family class (immediate family of Canadian residents), assisted relative class (distant relatives of Canadian residents), and an independent class. The latter two groups were assessed on the basis of a Points System introduced in 1967. According to current laws, those migrating under the economic class have to bring $12,300 CAD for a one member family, $15,312, $18,825, $22,856, $25,923, $29,236, $32,550 CAD for a two, three, four, five, six and seven member family respectively and $3,314 CAD for each additional family member (Immigration, Refugees and Citizenship Canada, 2017). A Green Paper on immigration was introduced in 1975, under which ethnic diversity was promoted. This led to a fall in the proportion of immigrants from Europe to approximately 37 percent, while the proportion of immigrants originating from Asia rose from 8 percent in the 1960s to 29 percent in the 1970s (Borjas, 1993). Under the 1976 New Immigration Act, a new category, a humanitarian class, was created. In the 1980s, the Immigration Act was further amended to include a fifth category, the business class. Under this, individuals could immigrate to start a business or invest in Canada. As aforementioned,

under the Federal Investor program, migrants with two years of management or business experience are required to bring in $400,000 CAD and have a personal net worth of $800,000 CAD. Under the Entrepreneur class, permanent residence is granted to those with business experience and a personal net worth of $300,000 CAD upon setting up in Canada within two years of arrival (Quest Canada, 2015). There additionally is a self-employment programme. Quebec has its own investor, entrepreneur class and self-employment programs where the investment is guaranteed by the Province of Quebec (Quest Canada, 2015). This led to large scale Chinese business immigration, mainly from Hong Kong and Taiwan, bringing in large volumes of investment funds. Asia represented the largest origin region of new Canadians.

A preliminary look at the data on number of immigrants per capita and the real effective exchange rate, indicate a positive relationship between the two variables. However, the real effective exchange rate appears to respond to the number of immigrants with a time lag (see Figure 1). We argue in this paper that the positive relation between number of immigrants and real exchange rate in Canada is due to the money brought into Canada by immigrants. As discussed above, Canadian citizenship laws require immigrants to bring with them minimum amount of funds. Figure 2 plots the evolution of minimum funds required by Canadian the law for 1-member, 2-member and 3-member families[4]. As aforementioned, the amounts of money that immigrants bring with them is much higher than the minimum requirement set by the government. This is not unusual as most immigrants plan to live in Canada permanently and have no job when they land.

[4] See Section 4 on how we construct these measures.

Figure 1: Number of Immigrants and Real Effective Exchange Rate (REER) of Canada



Source: REER (BIS), Number of Immigrants (Immigration, Refugees and Citizenship Canada, 2015)

Figure 2: Minimum Funds Required by Immigrants According to Canadian Law

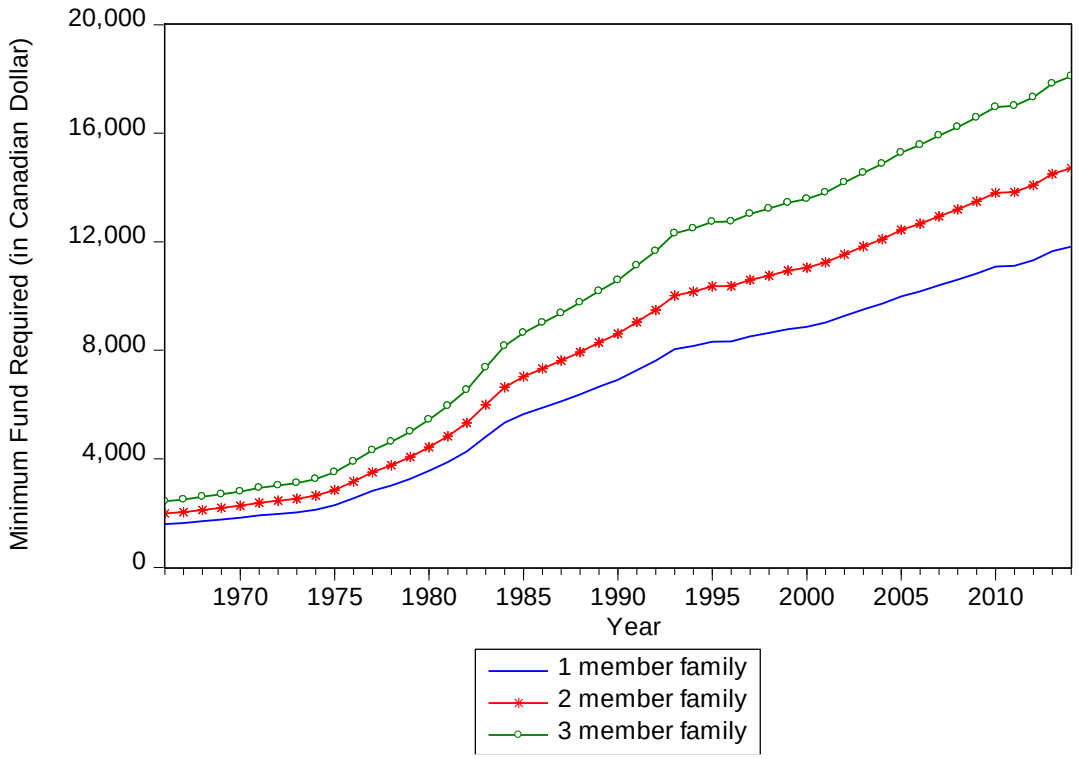
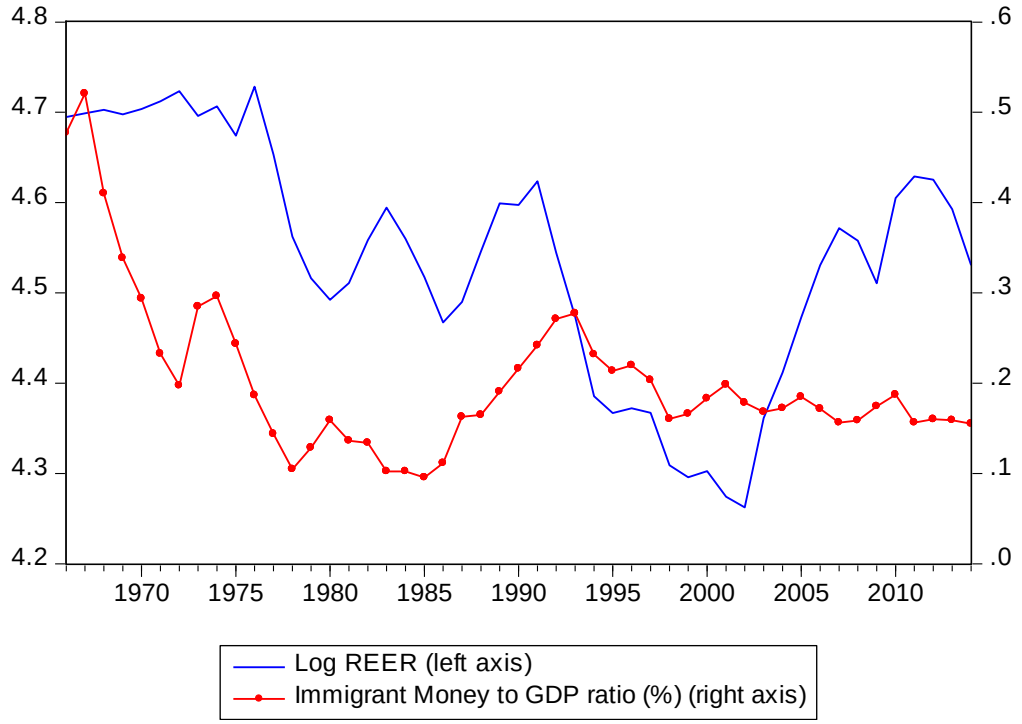


Figure 3 plot the data of money brought into Canada by immigrants[5] versus the real effective exchange rate. A positive relation between the two variables can be observed. We will investigate more formally how the money brought in by immigrants influence the exchange rate of Canada in the sections below.

[5] See section 4 for how we construct the series on money brought into Canada by immigrants.

Figure 3: Immigrant Money to GDP Ratio and Real Effective Exchange Rate (REER) of Canada



3. Literature

Since the seminal work of Mundell (1963) and Flemming (1962), the exchange rate response to capital flows has been extensively studied in the literature[6]. The Mundell-Flemming model was subsequently extended by Frenkel (1976) and Mussa (1976) to incorporate a flexible price framework, Dornbusch (1976) to account for sticky prices and Frankel (1979) to include inflation. These models have been subject to further extension and extensive empirical testing. While it is impossible to cover all of the literature, this section will discuss a few relevant empirical studies.

[6]See MacDonald and Taylor (1992), Frankel and Rose (1994) for reviews of the literature.

Early empirical studies based on price stickiness supported the relationship between capital mobility and exchange rates (Frankel 1979). Subsequent studies however, failed to find predictive power for price stickiness models and greater support was found for portfolio balance models (Backus, 1984, Meese and Rogoff, 1983). More recent empirical studies on the industrialized countries include for example, those by Eichenbaum and Evans (1995), Clarida and Gali (1994), Calvallo and Ghironi (2002), Bailey and Millard (2001) among others. Eichenbaum and Evans (1995) observe in the context of the U.S., that monetary shocks play an important role in explaining exchange rate movements. Similarly, Clarida and Gali (1994) show that monetary shocks explain a large percentage of the variance in the dollar-DM and dollar-yen real exchange rate, however, not the dollar-Canadian dollar, dollar-pound exchange rate. Lane and Milesi-Ferretti (2000) find that the net foreign asset position of countries are strongly correlated with the exchange rate for both industrial and developing countries, while Calvallo and Ghironi (2002) observe that for the U.S., the exchange rate in the current period is explained by the previous periods net foreign assets. Bailey and Millard (2001) note that capital flows partially explain the appreciation of the dollar in the U.S in the late 1990s. They however, also attribute this appreciation to higher productivity growth. These views are corroborated by the IMF (2001) which also finds that movements of the euro-U.S. dollar exchange rate was significantly correlated with net portfolio flows in the late 1990s and early 2000. Similar views are documented by Brooks et al. (2004) in a study of the movement of the euro and yen against the dollar. Large inflows of portfolio investment and FDI into the U.S., and portfolio flows into Europe are found to have strengthened the dollar and euro. This however, is not observed for Japan.

A large number of studies on the capital flow-exchange rate relation have also been undertaken on the developing countries. These studies reveal similar conclusions. Combes et al. (2012) in study of a sample of emerging and developing countries over 1980-2006, find that

public and private capital inflows lead to an appreciation of the real effective exchange rate with private inflows and portfolio investment exhibiting the biggest effect on the appreciation. Calvo et al. (1993) and Edwards (2000) document similar evidence for Latin America. Examining the effect of capital flows among other variables on the long-term exchange rate in Chile, Elbadawi and Soto (1997), show that short-term capital flows and portfolio investment do not influence the exchange rate, however, that long-term capital inflows and foreign direct investment lead to an exchange rate appreciation. Naceur et al. (2011) examine the effects of several flows including portfolio investment, foreign borrowing, aid, FDI, remittances and income on the exchange rates of a group of developing countries covering Africa, Europe, Asia, Latin America, and the Middle East. Their results indicate that portfolio investment, foreign borrowing, aid, and income lead to a real exchange rate appreciation, while remittances have varying effects across regions. Foreign direct investment is not found to have an effect on the real exchange rate.

Studies investigating the effect of capital flows or migration on the Canadian exchange rate are sparse. Coulombe (2013) and Beine et al. (2014) find evidence of a Dutch disease effect due to the resource boom in certain Canadian provinces by way of an increase in share of the non-tradable sector. Beine et al. (2014) further find that immigration can alleviate the Dutch disease effect arising due to booms in natural resource sectors in Canadian provinces, by reducing the size of the non-tradable sector in booming regions. This effect is found to be more evident with inter-provincial migration flows and immigration flows due to temporary worker programmes than permanent migrant flows. Amano and van Norden (1995) examining if terms of trade shocks can explain the historical movement of the Canada-U.S. exchange rate, find that while changes in the terms of trade explains movements of the exchange rate, the converse does not hold. Dungan et al. (2012) employ a macro-econometric forecasting model to simulate the effect of a hypothetical increase in immigration on the Canadian economy. Their

simulations suggest a positive impact of immigration on a number of variables including gross domestic product (GDP), aggregate demand, investment, productivity, government expenditures, taxes and net government balances. The results with regard to the exchange rate however, are mixed. They argue that remittance outflows partially offset the appreciation caused by the funds brought into Canada.

There is a literature which also shows that remittance inflows lead to an exchange rate appreciation (Lopez et al., 2007, Acosta et al., 2009, Caceras and Saca, 2006). Barajas et al. (2010) on the contrary show that evidence of an exchange rate appreciation in response to increased remittance flows is in general quantitatively small.

The literature therefore, suggests that different types of capital flows have different effects on the exchange rate. In contrast to existing studies, our study contributes to the literature by examining if the money brought into a host country, namely Canada, by immigrants, affects the exchange rate.

4. Data, Model and Methodology

Data and Model

The data cover the 1966-2014 period. The data descriptions and sources are provided in the Appendix, Table 1A. Our dependent variable is the real effective exchange rate[7]. Our main independent variable of interest is the money brought into Canada by immigrants. The money brought in by immigrants is constructed in the following manner. Immigration, Refugees and Citizenship Canada (2017) lists the minimum amounts of funds that immigrant families are required to bring with them depending on the number of family members. It

[7] The exchange rate is the amount of foreign currency exchanged per unit of domestic currency.

mentions that the minimum fund requirements are updated every year based on 50% of the "low income cut-off," of Canadian households. Statistics Canada (2015a) has the low income cut-off from 1992 to 2011. The cut-offs that have been used for minimum funds required for immigrants, correspond to the Census Metropolitan Area 500,000 inhabitants or more. It is mentioned on Statistics Canada (2015b) that low income cut-offs are updated using the CPI. Therefore, using CPI data, we reconstructed the low income cut-off for Canada from 1966-2014, and therefore the minimum funds required for immigrant families comprising different numbers of family members for the same period. The money brought in by immigrants is then constructed by multiplying the total number of immigrants by the corresponding minimum funds required divided by the average number of family members. We consider this as a ratio of GDP in the empirical analysis.

We also believe the number of immigrants to be closely correlated to the funds brought in by them. Therefore, as an additional robustness check, we also use the total number of migrants to population as a proxy for the money brought into Canada by immigrants[8].

We use a number of control variables in the empirical estimation that follows. Productivity (prod) is the productivity gap, proxied by the ratio of real GDP per capita in Canada to real GDP per capita in the U.S, which is used to capture the Balasa-Samuelson effect as in Combes et al. (2012). If productivity grows faster in the tradable rather than in the non-tradable sectors, it leads to higher wages in the tradable sectors, which flow to the non-tradable sectors placing upward pressure on wages. Higher wages in non-tradable sectors lead to higher

[8] In each year t, each immigrant brings in money equivalent to Υ x nominal GDP per capita. The total money brought in by immigrants in year t would be the number of immigrants in year t x Υ x nominal GDP per capita in year t. To maintain consistency with the treatment of other capital flows in the empirical specification, we divide the money brought in, by nominal GDP in year t, so the ratio becomes, the number of immigrants in year t x Υ x nominal GDP per capita in year t) / (nominal GDP in year t) = (the number of immigrants in year t x Υ) / (population in year t). So, number of immigrants to GDP ratio is proportional to the money brought in by immigrants to GDP ratio.

relative prices for non-tradables and higher price levels at home, leading to an appreciation of the REER. The terms of trade (TOT), constructed as the ratio of Canada's export price deflator to import price deflator is used (as in Barajas et al. (2010), Combes et al. (2012), Elbadawi and Soto (1997), Amano and van Norden (1995)), as an improvement in the terms of trade can lead to an exchange appreciation. Openness (OPEN) as measured by the ratio of the sum of exports and imports to GDP is used as a more open economy experiences more capital flows and higher trade flows which lead to an exchange rate appreciation (Naceur et al., 2011, Elbadawi and Soto, 1997). The current a/c to GDP captures the current account balance to GDP for Canada. An increase in exports will lead to an increased demand for the domestic currency, and a fall in imports, a fall in demand for foreign currency. Therefore, positive net exports will place upward pressure on the value of a currency. Negative net exports will have the opposite effect on a currency. We consider a number of different financial flows. The ratios of FDI, portfolio and other investment balance to GDP for Canada are included as studies show that these flows affect the exchange rate (Naceur et al., 2011, Elbadawi and Soto, 1997, Calvo et al., 1993, Combes et al., 2012, Edwards, 2000).

Thus, the empirical model we estimate is the following which is based on Combes et al (2012). Specifically, we posit that the real effective exchange rate (REER) depends on the following variables:

$$REER_t = f(Immigrants_{Money_t}, Prod_t, Tot_t, Open_t, Current_t, FDI_{t,}, Portfolio_t, Other\_Invest_t)$$

Immigrants money to GDP is the main variable of interest. This is replaced by the ratio of total migrants to population for Canada in the robustness checks. $Prod_t$ is the productivity gap, Tot_t is the terms of trade, $Open_t$ is openness as measured by the sum of imports and exports to GDP, $Current_t$ is the current account balance to GDP for Canada,

$FDI_{t,}, Portfolio_t, Other\_Invest_t$ denote the ratios of FDI, portfolio and other investment balance to GDP for Canada, respectively.

Methodology

Table 1 reports p values for unit root tests where the null hypothesis is the presence of a unit root.

[Table 1, about here]

The results indicate that while the REER, productivity, terms of trade, openness and the current account series are non-stationary, FDI, and portfolio and other investments to GDP ratios are stationary in levels. The money brought in by immigrants to GDP ratio and immigrants' per capita series are stationary in levels under the ADF, however, non-stationary under the PP test. All non-stationary variables are stationary in first differences. In the presence of both I(0) and I(1) series conventional cointegration tests such as the Engle-Granger two-step procedure and Johansen cointegration tests are not valid. Therefore, we use the ARDL approach of Pesaran and Shin (1999) and Pesaran et al. (2001) which has the advantage of allowing for a mix of both I(0) and I(1) variables.

To estimate the ARDL bounds testing approach, let us assume that y_t is an I(1) dependent variable, and x_t is a vector of I(d) regressors, (where $0 \leq d \leq 1$). Δy_t is a conditional ECM:

$$\Delta y_t = c_0 + \alpha_y y_{t-1} + \alpha_x x_{t-1} + \sum_{i=1}^{p-1} \beta_i \Delta y_{t-i} + \sum_{j=1}^{q-1} \mu_j \Delta x_{t-j} + e_t$$

where, c_0 is a constant, and α_y and α_x are long-run coefficient matrices for y_{t-1} and x_{t-1}. Δy_{t-i} and Δx_{t-j} capture the short run dynamics of the model, and e_t, is a white noise error term. OLS

estimation is used to test for cointegration between y_t and x_t and an F statistic is calculated for the joint test of significance of the coefficients of the lagged levels. If the calculated F-statistic exceeds the upper critical value, we can conclude that a long-run cointegrating relationship exists between the variables. If a long run cointegrating relationship exists between the variables, we test for a short run relationship.

In order to control for endogeneity, we also use the Dynamic OLS (DOLS) estimation method of Stock and Watson (1993). The DOLS method controls for regressor endogeneity by the estimation of I(1) variables on regressors of various orders of integration and leads and lags of first differences of the regressors, and autocorrelated errors by a GLS procedure. Asymptotically it has the same properties as the Johansen maximum likelihood estimator (1988).

5. Results

The preliminary estimation is carried out using the ARDL estimation method. Table 2 reports, estimated long run and short run coefficients for the ARDL model. The lag length for the ARDL model was selected on the basis of the Akaike information criterion (AIC).

[Table 2(a) and 2(b), about here]

Columns (1) and (2) correspond to the cases where the immigrant money to GDP ratio is constructed based on the assumption of on average, 1-member and 2-member family, respectively. The F statistics reported (Bounds testing) at the bottom of Table 2(a) suggests a cointegrating relationship between the variables. Panel (A) of Table 2(a) reports long run results using ARDL estimation. Our main independent variable of interest which is immigrants' money, is positive and statistically significant at the 1% levels in both columns (1) and (2),

suggesting that the funds brought into Canada by immigrants have a positive and significant long run effect on the REER. In column (1) for example, a 0.1% increase in immigrants' money to GDP ratio[9], leads to a 5.55% increase in the REER. The coefficient on the terms of trade is positive and significant in both columns. FDI, portfolio investment and other investment to GDP ratios, all have positive significant effects on the REER. These results are consistent with those of Ben-Necuer et al. (2011). Ben-Naceur et al. (2011) observe that if the relative price of exports relative to imports increase, it leads to a contraction of the non-tradable sector with labour moving to the export sector which leads to an exchange rate appreciation. Greater openness has a negative and significant effect on the REER in both columns. If openness is considered a measure of trade liberalization then, greater openness can lead to a REER depreciation, increasing competitiveness (Ben-Naceur et al., 2001). The diagnostic tests for serial correlation, heteroscedasticity, functional form, normality and stability suggest that the model is correctly specified and stable.

The short run results are reported in Panel B of Table 2(a). Here the error correction term is negative and significant suggesting convergence in the model and a statistically significant long run relation between the variables. The coefficient on the error correction term in column (1) for example, is -0.468 implying that the system corrects its previous period disequilibrium at a speed of 46.8% annually to reach the steady state. The coefficient on immigrants' money is not statistically significant in the short-run, though its lag is negative and statistically significant at 10%. In contrast to immigrants' money, portfolio investment and other investment have positive and statistically significant effects on the REER and greater openness a short run negative effect on the REER. We also plot CUSUM and CUSUMSQ plots to check for structural breaks, there is no evidence of breaks in the data.

[9] Note from Figure 3 that the immigrant money to GDP ratio varies between 0.1% to 0.5% during the sample period.

Table 2(b) reports results using the number of immigrants to population as the independent variable. The results reported show that the main variable of interest, the immigration to population variable, which is used as a proxy for the money brought into Canada by migrants, is positive and statistically significant at the 1% level. The long run results reported in Panel A are consistent with the results obtained above in Table 2(a). A 0.1% increase in the immigration to population ratio leads to a 2.81% increase in the REER. The coefficients on FDI, portfolio investment and other investment to GDP ratios are positive and statistically significant. The terms of trade and current account has a positive and significant effect and openness a negative significant effect on the REER. The short run results reported in Panel B, indicate that the coefficient on the immigration to population ratio is positive and significant contemporaneous but its lag has a negative and significant effect. The error correction term is negative and significant suggesting convergence in the model and a statistically significant long run relation between the variables.

[Table 3, about here]

Next, we estimate the models by using DOLS estimation to control for regressor endegeneity. Columns (1)-(2) of Table 3 reports long run DOLS results using immigrants' money as the main independent variable, and column (3) using immigration to population as the main independent variable. One lag and one lead of the current values of the explanatory variables in first differences are incorporated to capture the long-run equilibrium dynamics. The results are very similar to the results obtained under ARDL estimation. The main variable of interest, immigrants' money, continues to have a statistically significant and positive effect on the REER, suggesting once again, that the money brought into Canada by immigrants leads to an exchange rate appreciation. In column (1), a 0.1% increase in immigrants' money to GDP leads to a 3.78% increase in the REER. The coefficient on immigration to population is similarly, positive and statistically significant at the 10% level in column (3). The terms of trade, current

account balance, FDI, portfolio investment and other investment to GDP ratios all have positive statistically significant effects on the exchange rate while openness has a negative significant effect.

6. Conclusion

Using annual data over 1966-2014 from the Citizenship and Immigration statistics archives of Canada and the ARDL bounds testing approach and DOLS estimation, we investigate how the funds brought into Canada by immigrants, in particular, affects the real effective exchange rate (REER) of Canada. We also use the number of immigrants to population as an additional robustness check. Both methods of estimation confirm a statistically significant relation between migrant funds, migration and REER in the long run. There is however, no consistent short run relationship between the money brought into Canada by immigrants or the number of migrants and the exchange rate. The results additionally show that the terms of trade and FDI have a consistently positive long run effect on the exchange rate of Canada while openness has a negative effect.

It can be concluded that if the funds brought into Canada by immigrants lead to an exchange rate appreciation, it has implications for exports and capital flows. While the appreciation of the exchange rate in the long run can lead to a loss of export competitiveness, it can also lead to greater capital inflows. Therefore, it is important that policy makers consider the effects of immigration or the funds brought in by immigrants into Canada when formulating monetary and trade policy.

Acknowledgements: We thank Anindya Banerjee, Chris Milner, Rod Tyers, Jay Menon and conference participants of "9th Globalisation and Economic Policy (GEP) International Conference, Kuala Lumpur" and "50th Annual Conference of the Canadian Economic Association, Ottawa" for their comments and valuable suggestions. All remaining errors are ours. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. Conflicts of interest: none.

References:

Acosta P, Lartey E and Mandelman F (2009) Remittances and the Dutch Decease, Journal of International Economics, 79, 102-116.

Amano R and van Norden S (1995) Terms of trade and real exchange rates: the Canadian evidence, Journal of International Money and Finance 14, 83-104.

Backus D (1984) Empirical Models of the Exchange Rate: Separating the Wheat from the Chaff, Canadian Journal of Economics, 17, 824-846

Bailey A and Millard S (2001) Capital Flows and Exchange Rates. Bank of England Quarterly Bulletin, Autumn, 310-318.

Barajas A, Chami R, Fullenkamp C and Garg A (2010) The Global Financial Crisis and Workers' Remittances to Africa: What's the Damage?, IMF Working Paper No. 24, IMF, Washington.

Beine M, Coulombe S and Vermeulen W (2014) Dutch Decease and the Mitigation Effect of Migration: Evidence from Canadian Provinces, Economic Journal, 125, 1574–1615.

Borjas G (1993) The Intergenerational Mobility of Immigrants, Journal of Labor Economics 11, 113-135.

Brooks R, Edison H, Kumar M and Slok T (2004) Exchange Rates and Capital Flows, European Financial Management, 10, 511-533.

Calvallo M and Ghironi F(2002) Net Foreign Assets and the Exchange Rate: Redux Revived, Journal of Monetary Economics, 49, 1057-1097.

Calvo G, Leiderman L and Reinhart C (1993) Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors, IMF Staff Papers, 40, 108-151.

Canadian National Household Survey (2011) Statistics Canada, Ottawa, Ontario.

Caceres L and Saca N (2006) What do Remittances do? Analyzing the Private Remittance Transmission Mechanism in El Salvador, IMF.

Challinor A E (2015) Canada's Immigration Policy: A Focus on Human Capital, Migration Policy Institute, September 15, 2011. (http://www.migrationpolicy.org/article/canadas-immigration-policy-focus-human-capital: accessed: April 2016)

Clarida, R. and Gali, J. (1994). Sources of Real Exchange Rate Fluctuations: How Important are Nominal Shocks?, NBER Working Paper No. 4658.

Coulombe S (2013). Terms of Trade Changes, the Dutch Decease, and Canadian Provincial Disparity, Institute of Intergovernmental Relations School of Policy Studies, Queen's University.

Combes J, Kinda T and Plane P (2012). Capital Flows, Exchange Rate Flexibility, and the Real Exchange Rate, Journal of Macroeconomics, 34, 1034-1043.

Dornbusch, R. (1976). Exchange Rate Expectations and Monetary Policy, Journal of International Economics **6** (3): 231–244.

Dungan P, Fang T and Gunderson M (2012). Macroeconomic Impacts of Canadian Immigration: Results from a Macro Model, IZA Working Paper No. 6743.

Edwards, S. (2000). Capital Flows, Real Exchange Rates and Capital Controls: Some Latin American Experiences. In, S. Edwards (Ed.), Capital Flows and the Emerging Economies, Chicago and London: University of Chicago Press, 2000, 197-253.

Eichenbaum, M, Evans CL. (1995). Some empirical evidence on the effects of shocks to monetary policy on exchange rates. Quarterly Journal of Economics 110: 975–1010.

Elbadawi I and Soto R (1997). Capital Flows and Long Term Equilibrium Real Exchange Rates in Chile, Revista De Analisis Economico, 12, 35-62.

EVeiws (2017) Estimating a cointegrating regression: http://www.eviews.com/help/helpintro.html#page/content/nsreg-Estimating_a_Cointegrating_Regression.html (accessed April 2017)

Fleming, J M (1962). Domestic financial policies under fixed and floating exchange rates, IMF Staff Papers **9**: 369–379.

Frankel J A (1979) On the Mark: A Theory of Floating Exchange Rates Based on Real Interest Differentials, American Economic Review, 69, 610-622

Frankel, J.A. (1983). Monetary and Portfolio-Balance Models of Exchange Rate Determination. National Bureau Economic Research, Summer Institute Paper, 80-87, In *Economic Independence and Flexible Exchange Rates*, edited by Jagdeep S. Bhandari and Bluford H. Putnampp, Cambridge: MIT Press, 84-115.

Frankel J A and Rose A K (1994) A Survey of Empirical Research on Nominal Exchange Rates, NBER Working Paper No. 4865.

Frenkel J A (1976) A Monetary Approach to the Exchange Rate: Doctrinal Aspects and Empirical Evidence," Scandinavian Journal of Economics, 78, 200-224.

IMF (2001) World Economic Outlook: Fiscal Policy and Macroeconomic Stability, May 2001.

Immigration, Refugees and Citizenship Canada (2017). "Proofs of funds – Skilled immigrants (Express Entry)." Last modified May 8, 2017. http://www.cic.gc.ca/english/immigrate/skilled/funds.asp.

Lane, P R., and G. M. Milesi-Ferretti. (2000). The transfer problem revisited: Net foreign assets and long-run real exchange rates. Centre for Economic Policy Research Discussion Paper 2511.

Lartey (2008). Remittances, Exchange Rate Regimes and the Dutch Decease, Working Paper 2008-12, Federal Reserve Bank of Atlanta.

Ley D (2011) Millionaire Migrants: Trans-Pacific Life Lines, Wiley and Sons.

Lopez H, Molina L and Bussolo M (2007) Remittances and the Real Exchange Rate, World Bank Policy Research Working Paper No. 4213, Washington.

MacDonald R and Taylor M (1992) Exchange Rate Economics: A Survey, IMF Staff Papers, 39, 1-57.

Meese R and Rogoff K (1983) 'Empirical exchange rate models of the seventies: are any fit to survive?' Journal of International Economics 14, 3-24.

Mundell, Robert A. (1963). Capital mobility and stabilization policy under fixed and flexible exchange rates. Canadian Journal of Economic and Political Science **29** (4): 475–485.

Mussa M (1976) The Exchange Rate, the Balance of Payments, and Monetary and Fiscal Policy Under a Regime of Controlled Floating, Scandinavian Journal of Economics, 78 (2): 229-48.

Naceur S, Bakardzhieva D and Kamar B (2012) Disaggregated Capital Flows and Developing Countries' Competitiveness, World Development, 40, 223-237.

Pesaran M H and Shin Y (1999) 'An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis' in S Strom, (ed.), Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium, Cambridge: Cambridge U P.

Pesaran M H, Shin Y, and Smith R J (2001) 'Bounds Testing Approaches to the Analysis of Level Relationships', Journal of Applied Econometrics, 16, 289-326.

Quest Canada (2015). "Business Class." Accessed April 23, 2016. http://questcanada.com/business-applications/.

Smith, P.N. andWickens, M.R. (1986). An Empirical Investigation into the Causes of Failure of the Monetary Model of the Exchange Rate. Journal of Applied Econometrics, 1(2), 143-162.

Statistics Canada (2015a). "Table 2 Low income cut-offs (1992 base) before tax." Last modified November 27 2015. http://www.statcan.gc.ca/pub/75f0002m/2012002/tbl/tbl02-eng.htm.

Statistics Canada (2015b). "Low income cut-offs." Last modified November 27 2015. http://www.statcan.gc.ca/pub/75f0002m/2012002/lico-sfr-eng.htm.

Stock, J, and Watson M (1993) A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems, Econometrica 61, 783–820.

Taylor, M.P. (1995). The Economics of Exchange Rate. Journal of Economic Literature, 33(1), 13-47.

Table 1: Unit Root Tests

Variables	Level		First difference	
	ADF	PP	ADF	PP
Log REER	0.28	0.47	0.00	0.00
LogProd	0.67	0.81	0.00	0.00
LogTOT	0.59	0.56	0.00	0.00
Open	0.66	0.82	0.00	0.00
Current Ac/GDP	0.12	0.11	0.00	0.00
FDI /GDP	0.00	0.00	0.00	0.00
Portfolio/GDP	0.02	0.03	0.00	0.00
Other investment/GDP	0.00	0.00	0.00	0.00
Immigrants money /GDP	0.04	0.24	0.00	0.00
Immigrants /POP	0.01	0.20	0.00	0.00

Note: Numbers reported are p-values.

Table 2(a): Estimated Long Run and Short Run Coefficients of ARDL Model with Immigrants' Money

Dependent variable dlog(REER)	(1)	(2)
Panel A: Long run coefficients		
log(Prod)	-0.049	-0.048
	(0.278)	(0.279)
log(TOT)	0.873***	0.873***
	(0.144)	(0.144)
OPEN	-0.009***	-0.009***
	(0.002)	(0.002)
Current_ac/gdp	0.043***	0.043***
	(0.015)	(0.015)
FDI_ac/gdp	0.035***	0.035***
	(0.010)	(0.010)
Portfolio_investment/gdp	0.048***	0.048***
	(0.015)	(0.015)
Other_investment/gdp	0.049***	0.049***
	(0.017)	(0.017)
Immigrants_money/gdp	**0.555*** **	**0.891*** **
	(0.152)	**(0.244)**
Constant	0.974	0.974
	(0.655)	(0.655)
dlog_reer(-1)	0.338***	0.338***
	(0.063)	(0.063)
dlog_tot	0.961***	0.961***
	(0.076)	(0.076)
dlog_tot(-1)	-0.277***	-0.277***
	(0.088)	(0.088)
dopen	-0.007***	-0.007***
	(0.001)	(0.001)
Dcurrent_gdp	0.007**	0.007**
	(0.003)	(0.003)
dportfolio_gdp	0.014***	0.014***
	(0.002)	(0.002)
dportfolio_gdp(-1)	-0.004***	-0.004***
	(0.001)	(0.001)
dOther	0.013***	0.013***
	(0.002)	(0.003)
d(immigrants_money/gdp)	0.042	0.067
	(0.079)	(0.128)
d(immigrants_money/gdp)(-1)	-0.151*	-0.242*
	(0.083)	(0.134)

ecm(-1)	**-0.468*** **(0.056)**	**-0.468*** **(0.056)**
Diagnostic tests		
Serial correlation (LM test) [p-value]	0.174 [0.841]	0.174 [0.841]
RESET, F-Statistics [p-value]	0.634 [0.433]	0.634 [0.432]
Normality, (Jarque-Bera) [p-value]	2.207 [0.332]	2.204 [0.332]
Heteroscedasticity: Breusch-Pagan_Godfrey (Obs*R-squared)	17.697 [0.543]	17.694 [0.543]
CUSUM of Squares	Stable	Stable
Bounds Test		
F-Statistics [parameters]	5.285*** [k = 8]	5.282*** [k = 8]

Note: (1) immigrants' money variable considers 1-member family, on average (2); immigrants' money variable considers 2-member family, on average. Standard errors are in parentheses. The optimal lags are chosen using AIC. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively.
Bound Test Critical Values (for k = 8): at 1% level of significance 2.62 (LB) and 3.77 (UB); 5% level of significance 2.11 (LB) and 3.15 (UB); 10% level of significance 1.85 (LB) and 2.85 (UB).

Table 2(b): Estimated Long Run and Short Run Coefficients of ARDL Model with Immigration to Population

Dependent variable dlog(REER)	
Panel A: Long run coefficients	
log(Prod)	0.093
	(0.407)
log(TOT)	0.681***
	(0.121)
OPEN	-0.011***
	(0.002)
Current_ac/gdp	0.051***
	(0.018)
FDI_ac/gdp	0.037***
	(0.012)
Portfolio investment/GDP	0.049***
	(0.015)
Other investment/GDP	0.051***
	(0.018)
immig/pop	**0.281*** **
	(0.092)
Constant	1.875***
	(0.546)
Panel B: Short run coefficients	
dlog_reer(-1)	0.392***
	(0.074)
dlog_prod	-0.020
	(0.257)
dlog_prod(-1)	0.632**
	(0.244)
dlog_tot	0.761***
	(0.092)
dlog_tot(-1)	-0.408***
	(0.110)
dcurrent_gdp	-0.010***
	(0.003)
dportfolio	0.015***
	(0.002)
dportfolio(-1)	-0.005***
	(0.001)
dOther	0.016***
	(0.003)
dimmig_pc	0.086***
	(0.030)

dimmig_pc(-1)	-0.065**
	(0.031)
ecm(-1)	**-0.494*** **
	(0.047)
Diagnostic tests	
Serial correlation, LM Test	0.051
[p-value]	[0.951]
RESET, F-Statistics	2.197
[p-value]	[0.150]
Heteroscedasticity: Breusch-Pagan_Godfrey	
(Obs*R-squared)	21.572
[p-value]	[0.364]
Normality (Jarque-Bera)	0.522
[p-value]	[0.770]
CUSUM of Squares (Stability test)	
[p-value]	Stable
Bounds Test	
	8.289***
F-Statistics	[k = 8]

Note: The optimal lags are chosen using AIC.
***, ** and * indicate significance at 1%, 5% and 10% level, respectively.

Table 3: Dynamic OLS (DOLS)

Dependent variable log(REER)	**(1)**	**(2)**	**(3)**
Long run coefficients			
log(Prod)	-0.482	-0.416	-0.216
	(0.318)	(0.338)	(0.450)
log(TOT)	0.959***	0.926***	0.842***
	(0.184)	(0.195)	(0.167)
OPEN	-0.011***	-0.011***	-0.012***
	(0.002)	(0.002)	(0.001)
Current_ac/gdp	0.047***	0.045**	0.060***
	(0.016)	(0.017)	(0.017)
FDI_ac/gdp	0.034*	0.033*	0.043**
	(0.017)	(0.018)	(0.016)
Portfolio investment/GDP	0.045***	0.045**	0.051***
	(0.014)	(0.015)	(0.014)
Other investment/GDP	0.060**	0.056**	0.066***
	(0.021)	(0.022)	(0.020)
Immigrants_money/GDP	**0.378***	**0.637***	
	(0.200)	**(0.339)**	
Immigration per capita			**0.241***
			(0.122)
Constant	0.797	0.914	1.287
	(0.871)	(0.915)	(0.772)
Adj R^2	0.96	0.96	0.96
Hansen Parameter Instability			
Lcstatistic[ǂ] [p-value]	**0.068[>0.2]**	**0.065[>0.2]**	**0.073 [>0.2]**

Note: (1) immigrants' money variable with 1-member family, on average, (2) immigrants money variable with 2-member family, on average, (3) immigration per capita as a proxy for immigrants money. Standard errors are reported in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. ǂ Null hypothesis: Series are cointegrated.

Appendix

Table 1A: Data Descriptions and Sources

Variables	Source
Real Effective Exchange Rate Index	Source: BIS (Narrow)
Prod	Canada's Real GDP per capita divided by U.S. Real GDP per capita. Source: World Bank
Open	(Nominal Exports of Goods and Service + Nominal Imports of Goods and Services)/ Nominal GDP. Source: World Bank.
Terms of Trade	Export Price Deflator divided by Import Price Deflator. The deflators are obtained from dividing nominal export or import by their real counterparts. Source: World Bank
Current Account to GDP Ratio	Nominal current account balance divided by nominal GDP. Source: IMF.
FDI to GDP ratio	Nominal FDI balance divided by nominal GDP. The variable has been transformed so that a positive value refers to net capital inflow. Source: IMF
Portfolio Investment to GDP Ratio	Portfolio investment balance divided by nominal GDP. The variable has been transformed so that a positive value refers to a net capital inflow. Source: IMF
Other Investment to GDP Ratio	Other investment balance divided by nominal GDP. The variable has been transformed so that a positive value refers to a net capital inflow. Source: IMF
Money brought in by Immigrants	Constructed by authors by multiplying the total number of immigrants by the corresponding minimum funds required divided by average number of family members (see section 4).
Immigrant to Population Ratio	Constructed by authors as immigrant number divided by total population. Population Data Source: World Bank. Immigration Data Source: Immigration, Refugees and Citizenship Canada, 2015