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The tale of two international phenomena: Migration and global imbalances*

Dramane Coulibaly[†] Blaise Gnimassoun[‡] Valérie Mignon[§]

August 3, 2020

Abstract

Following the dynamics of globalization, international migration has increased dramatically since the 1990s. Since migration patterns affect a country's demographic structure—which is known to have an impact on the current account—migration is likely to explain a significant part of world imbalances. This paper tackles this issue by investigating the role played by international migration in the dynamics of global imbalances. To this end, we rely on an overlapping generations model to derive the theoretical link between international migration and the current account position. Through a series of robust estimates, we empirically investigate this relationship by relying on a large panel of developed and developing countries. Our results point to substantial effects of international migration. Specifically, we show that an increase in migration augments national savings and tends to restore the current account balance in the destination country, while it has opposite impacts in the origin country. These effects are particularly pronounced in developing economies and are attenuated by migrants' remittances.

Keywords: International migration, current account, global imbalances, remittances.

JEL classification: F22, F32, O55, C33.

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1 Introduction

The sustained dynamics of globalization since the 1990s has been accompanied by marked global imbalances and a dramatic increase in international migration. These two phenomena are probably among the most complex topics of contemporary international economics faced by economists and decision-makers. Several recent contributions have been devoted to analyzing both international migration (see, e.g., [Ortega and Peri, 2014](#); [Bosetti et al., 2015](#); [Aubry et al., 2016](#)) and global imbalances ([Dong, 2012](#); [Lane and Milesi-Ferretti, 2012](#); [Barattieri, 2014](#); [Chinn et al., 2014](#); [Eugeni, 2015](#)). Surprisingly, these dynamics have been investigated separately, and the link between international migration and global imbalances has received no particular attention in the literature. However, the analysis of global imbalances cannot obscure the issue of international migration, which could play a crucial role as a factor amplifying or alleviating these discrepancies.

Indeed, life cycle theory allows us to conjecture the existence of a direct link between the saving and investment rates of a country and its demographic structure. This relationship has been widely investigated in the literature,¹ and empirical studies on the medium- and long-term determinants of current accounts emphasize the importance of demographic factors in explaining their dynamics.² As an example, [Cooper \(2008\)](#) argues that the large US current account deficit at play from the early 1990s to the 2008 financial crisis is the natural result of two major forces in the world economy, namely the globalization of financial markets and the demographic evolution—two factors that could maintain these imbalances over a long period of time. Using a multi-country overlapping generations model, [Backus et al. \(2014\)](#) show that demographic differences between countries, affecting both individual saving decisions and the age composition of the population, can have a significant impact on capital flows around the world. Calibrating a standard neoclassical model consistent with life cycle theory, [Domeij and Flodén \(2006\)](#) also highlight the role of the age distribution (population aging) in capital flows between OECD countries.

As is well known, the population age distribution has profoundly changed in most countries due to demographic shifts, namely a decrease in fertility and mortality rates combined with increased longevity. As recalled by [Curtis et al. \(2017\)](#), these demographic evolutions cause changes in both the ratio of savers to non-savers and household size, which in turn affect the aggregate saving rate. Specifically, a demographic composition effect is at play: whereas aggregate saving decreases when the number of retirees reduces, it rises when the number of persons in their prime-earning years grows. Moreover, increased longevity leads agents to save more for their longer expected retirement. Finally, declining fertility also tends to act positively on the saving rate. Indeed, as noted by [Curtis et al. \(2017\)](#), prime-age agents expect less retirement support from the forthcoming smaller cohorts and are thus incited to increase their saving rate. Similarly (see, e.g., [Krueger and Ludwig, 2007](#); [Backus et al., 2014](#)), demographic changes affect investment. Declining fertility rates lower investment needs, in particular the demand for schools

¹See e.g., [Leff \(1969\)](#), [Kelley and Schmidt \(1996\)](#), [Higgins and Williamson \(1996, 1997\)](#), [Higgins \(1998\)](#), and [Bloom et al. \(2007\)](#).

²See [Debelle and Faruquee \(1996\)](#), [Henriksen \(2002\)](#), [Chinn and Prasad \(2003\)](#), [Chinn and Ito \(2007\)](#), [Gruber and Kamin \(2007\)](#), [Lane and Milesi-Ferretti \(2012\)](#), and [Backus et al. \(2014\)](#).

and housing, and less new capital is required to equip the new members of the labor force (Cooper, 2008). Overall, the current account dynamic is impacted.

If demographic changes are important in explaining the dynamics of current accounts and, in turn, global imbalances, international migration should play a leading role. Indeed, international migration has a structural or permanent component that contributes to changing the usual pattern of demographic structure in both emigration and immigration countries.³ In general, high-income countries are characterized by increasing immigration, while low-income countries are marked by emigration of the same trend. This decomposition of demography in the world can exacerbate or alleviate global imbalances by altering the demographic structure and, consequently, the age dependency ratios.⁴ Indeed, to a greater extent than the world population, international migration mainly consists of working-age persons—the latter amounting to about 77% in 2015 (see Figure 1). Through its impact on the demographic structure of countries, international migration can influence the medium- and long-term evolution of their current accounts and, in turn, the dynamics of global imbalances. Figure 2 clearly suggests the existence of such a link, highlighting a positive nexus between migration and current account which mainly operates through the saving rate. The role of international migration in the path followed by global imbalances is all the more likely as its evolution is heterogeneous, in both countries of emigration and countries of immigration.

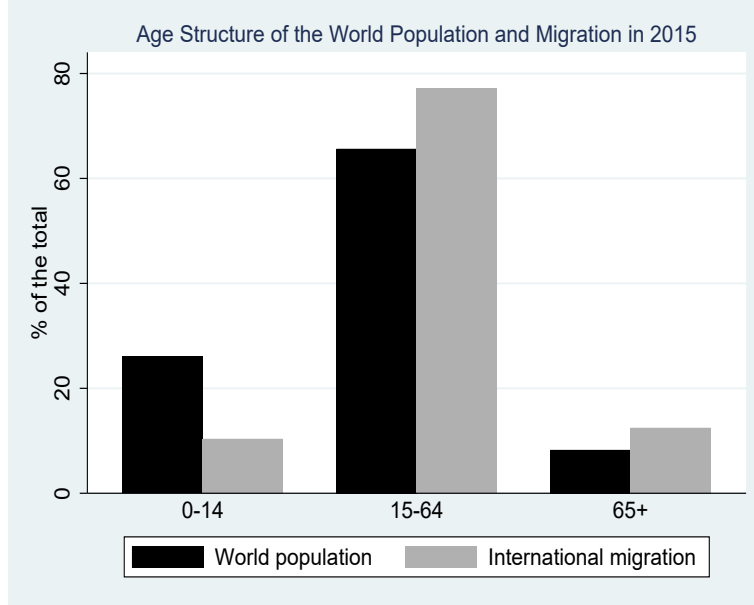
Several notions have been suggested in the literature to explain global imbalances. Among them, the saving-glut hypothesis was widely shared (Bernanke, 2005; Clarida, 2005; Gruber and Kamin, 2007), but other explanations exist such as the twin deficit hypothesis (Chinn, 2005; Erceg et al., 2005), the role of exchange rates and exchange-rate regimes (Obstfeld and Rogoff, 2005; Taylor, 2006; Gnimassoun and Mignon, 2014), and the importance of valuation effects in net foreign asset positions (Lane and Milesi-Ferretti, 2007b; Gourinchas and Rey, 2007; Devereux and Sutherland, 2009). But even in the forensic investigation of global imbalances conducted by Chinn et al. (2014), the path of international migration has not been explored. In the best-case scenario, the influence of international migration is treated indiscriminately from that of the natural demographic factors of countries.

This paper aims to fill this gap by determining the role played by international migration in the dynamics of current accounts and, in turn, in the evolution of global imbalances. To this end, we rely on an overlapping generations model to derive the theoretical relationship between migration and the current account in the context of an open economy with mobility of goods, capital, and people. This theoretical framework gives us the legitimacy to then carry out a series of robust econometric investigations to deeply analyze and assess the influence of international migration on global imbalances. Relying on a large panel of developed and developing countries over the period 1990-2014, our findings corroborate the theoretical prediction that migration improves the current account position in the host country, while

³Programs to attract temporary workers (e.g., the Braceros program in the United States or the Gastarbeit program in Germany) often result in permanent migration (see Spilimbergo, 2011).

⁴Public spending (social security, schools) and income tax being age dependent, international migration may also influence fiscal balance by changing the age structure of the population. This consideration is beyond the scope of our paper and was recently investigated by d’Albis et al. (2018) and d’Albis et al. (2019).

Figure 1: Age distributions of world population and international migration (in 2015)



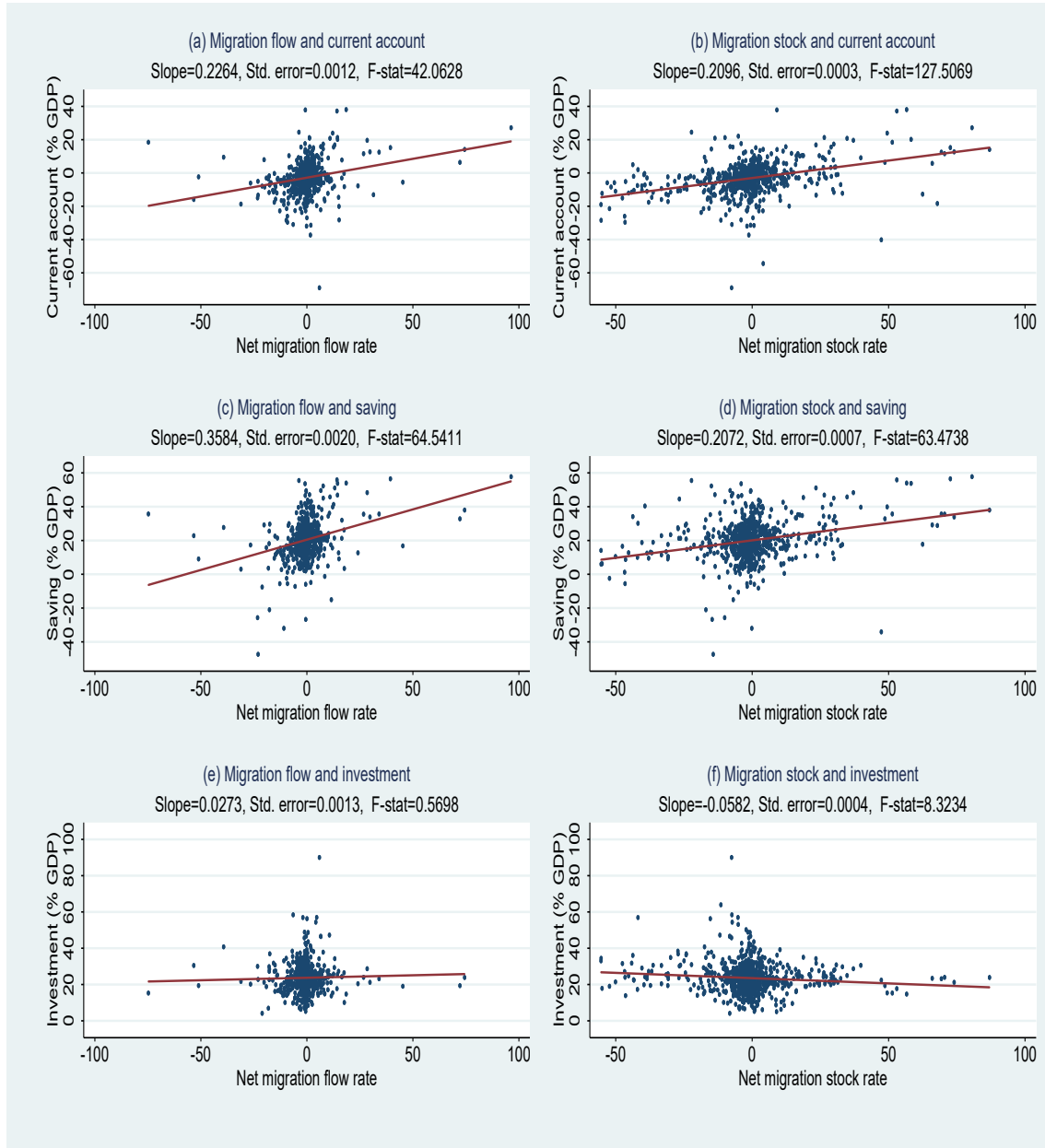
Notes: International migrants are defined as the foreign-born population.

Source: United Nations (Department of Economic and Social Affairs, Population Division).

exerting the opposite effect in the home country. Specifically, we find a positive (negative) impact of net immigration (emigration) on the host (home) country's current account position which mirrors the positive (negative) effect of immigration (emigration) on the saving rate of the host (home) country. This result confirms the theoretical prediction that international migration—mainly consisting of working-age persons—leads to an increase in the saving rate in the destination country by raising its support ratio, and exerts the opposite effect in the origin country. We also find a mixed impact of migration on the investment rate, reflecting the compensatory effect between (i) the negative impact of emigration on the investment rate of the home country through labor force emigration, and (ii) the positive influence of emigration on the home country's investment rate through remittances. Finally, we underline that the impact of net immigration on the current account balance and savings is particularly acute for developing countries compared to developed economies and is attenuated by remittances. Our findings hold after various sensitivity analyses.

Our contribution not only provides a key piece in the puzzle on world disequilibria but also delivers a more global dimension to the geography of current account imbalances. Indeed, in the previous literature, global imbalances are often presented as coming from some surplus countries—mainly the Asian emerging economies, Germany, Japan and the oil countries—and some large deficit countries—in particular the United States and the United Kingdom. Although this assertion is correct, it *de facto* excludes the role played by developing countries, which are nevertheless characterized by increasing structural deficits. Given that international migration is a phenomenon that links both developing and developed countries

Figure 2: International migration, current account balance, saving and investment



Notes: International migrants are defined as the foreign-born population. Each scatter plot shows observations by country and by 5-year period (1990 to 2014). The list of countries is displayed in the Appendix. Source: Authors' calculations based on data from the following databases: United Nations (Department of Economic and Social Affairs, Population Division), [Abel and Sander \(2014\)](#), and IMF World Economic Outlook (WEO).

with a certain degree of heterogeneity, accounting for it provides a more global dimension to the analysis of world imbalances. It also helps in explaining the chronic deficits experienced by developing countries,

whose evolution questions the principle of external sustainability. Moreover, disregarding international migration, despite its key role in the evolution of current accounts, is likely to lead to an erroneous assessment of the magnitude of global imbalances and, most importantly, to a distortion of the diagnosis whereby the influence of migration is confused with that of the natural demographic dynamics of countries.

The rest of the paper is organized as follows. Section 2 sets out the theoretical framework used to derive the relationship between international migration and the current account balance. Section 3 describes our empirical strategy and the data. We present and discuss our main results in Section 4, and provide several robustness checks and sensitivity analyses in Section 5. Finally, Section 6 concludes the paper.

2 Theoretical framework

In this section, we present a simple overlapping generations (OLG) model for a small open economy, which brings out the relationship between international migration and international capital flows. Our specification is inspired by the three-period OLG model for a small open economy developed by [Higgins and Williamson \(1996, 1997\)](#), into which we explicitly introduce migration. As mentioned in [Higgins and Williamson \(1996, 1997\)](#), adding a third period of life-childhood allows us to highlight the effect of changes in youth as well as elderly dependency ratios.⁵

In greater detail, to establish the link between international migration and the current account balance, our model is based on (i) some key characteristics of migration, and (ii) the literature that links demographics and international balances. Regarding the first point and as stressed above, the majority of international migrants are of working age. Indeed, this is the case of three out of every four international migrants (source: United Nations, Department of Economic and Social Affairs, Population Division). As a consequence, international migration affects the demographic structure and, in turn, the old dependency ratio (Section 2.1). Through its effect on the demographic structure, international migration may thus influence saving and investment rates (Sections 2.2 and 2.3) and, subsequently, the current account (Section 2.4).

This logic underlying our model is in line with the literature dealing with the relationship between (i) demographic change and (ii) international capital flows and current account dynamics. For instance, [Krueger and Ludwig \(2007\)](#) develop a multi-country large-scale OLG model in which they show how demographic changes impact savings and investment rates as well as the current account and the net foreign asset position. Besides the size of the social security system, the only reason for capital to flow across countries in [Krueger and Ludwig \(2007\)](#)'s model are differences in demographics across economies.

⁵The model of [Higgins and Williamson \(1996, 1997\)](#) provides an adequate theoretical framework for understanding Coale and Hoover's (1958) dependency hypothesis by underlining youth as well as elderly dependency effects. It is the three-period small open economy version of the two-period OLG model ([Samuelson, 1958](#); [Diamond, 1965](#); [Auerbach and Kotlikoff, 1987](#), chap. 2). The two-period small open economy version was used by [Krueger and Ludwig \(2007\)](#) to analyze the impact of demographic transition on international capital flows. The reader may refer to [Börsch-Supan et al. \(2006\)](#) and [Gollin and Lange \(2013\)](#) for introducing migration into OLG models.

If all countries age at the same speed, the net foreign asset position remains unchanged, and the current account declines in absolute value. Conversely, for a country that ages faster than others, its net foreign asset position and its current account increase: “capital flows from regions that are aging faster to regions that are aging slower”.

As shown, there is an important link between demographics and the current account dynamics. In the model presented below, we explicitly introduce international migration, which, through its impact on the demographic structure of countries, may significantly influence the evolution of their current account and, in turn, global imbalances.

2.1 Demographics

We consider a small open economy i in which the population dynamics, particularly migration, are set exogenously. The demographic structure allows for three periods of life: youth, middle age, and old age. Specifically, the population at each time t consists of $N_{i,t}^y$ dependent young, $N_{i,t}^m$ middle-aged adults in the labor force, and $N_{i,t}^o$ retired elderly persons. Middle-aged adults are endowed with one unit of time that is inelastically supplied to the labor force, and have a fertility rate denoted by n_i . Between youth age (period t) and middle age (period $t+1$), migration flow (positive for immigration and negative for emigration) arrives at the given rate m_i for each young cohort. For simplicity, as in [Barro and Sala-i-Martin \(2003, chap. 9\)](#), migrants are assumed to arrive before reproducing, they adopt the same behavior of fertility as the resident population, and live with their children in the host country. They send remittances to support their relatives at home. The number of retirees in period t is equal to the number of workers in the preceding period. Thus, the dynamics of demography is characterized by the following system:

$$\begin{aligned} N_{i,t}^y &= (1 + n_i)N_{i,t}^m \\ N_{i,t}^m &= (1 + m_i)N_{i,t-1}^y \\ N_{i,t}^o &= N_{i,t-1}^m \end{aligned} \tag{1}$$

Therefore, the labor force growth rate ($N_{i,t}^m/N_{i,t-1}^m$) is equal to the inverse of the old dependency ratio ($N_{i,t}^o/N_{i,t}^m$), and is given by:

$$\frac{N_{i,t}^m}{N_{i,t-1}^m} = \frac{1}{N_{i,t}^o/N_{i,t}^m} = (1 + n_i)(1 + m_i) \tag{2}$$

In what follows, to better apprehend the underlying economic mechanisms, we consider separately two types of small open economies $i \in \{I, E\}$: (i) an immigration country I (without emigration) with $m_i = m_I$, where $m_I > 0$ denotes the immigration rate, and (ii) an emigration country E (without

immigration) with $m_i = -m_E$, where $m_E > 0$ represents the emigration rate.

2.2 Consumption and saving decisions

In middle age, agents work for a wage $w_{i,t}$, and when old in the third period, they retire. The households of our small open economy have access to the world financial market where the real interest rate r is exogenously given. In the immigration country, migrants send remittances to their country of origin, and households in the emigration country receive remittances from their relatives living and working abroad.

2.2.1 Immigration country

In the immigration country, there are two types of middle-aged household, a home-born (or native-born) household and a foreign-born household, who have different lifetime utility functions.

Home-born household's decisions. Each home-born middle-aged household has a lifetime utility function given by:

$$U(c_{I,t}^{H,y}, c_{I,t}^{H,m}, c_{I,t+1}^{H,o}) = \log(c_{I,t}^{H,m}) + \beta \log(c_{I,t+1}^{H,o}) + \gamma(n_I) \log(c_{I,t}^{H,y}) \quad (3)$$

where $c_{I,t}^{H,m}$ and $c_{I,t+1}^{H,o}$ respectively stand for consumption during middle and old ages of home-born households, and $c_{I,t}^{H,y}$ denotes consumption for each of their children. The parameter β is the discount factor, and $\gamma(n_I)$ is the altruistic weight parents attach to children's consumption, with $\gamma(0) = 0$ and $\gamma'(\cdot) > 0$.

Therefore, the representative home-born middle-aged household maximizes her lifetime utility subject to the following budget constraints:

$$\begin{aligned} c_{I,t}^{H,m} + (1 + n_I)c_{I,t}^{H,y} + s_{I,t}^H &= w_{I,t} \\ c_{I,t}^{H,o} &= (1 + r)s_{I,t}^H \end{aligned} \quad (4)$$

where $s_{I,t}^H$ is the amount of savings of the home-born middle-aged household.

The optimal levels of consumption and savings of the home-born middle-aged household are given by:

$$\begin{aligned}
c_{I,t}^{H,y} &= \frac{\gamma(n_I)/(1+n_I)}{1+\beta+\gamma(n_I)} w_{I,t} \\
c_{I,t}^{H,m} &= \frac{1}{1+\beta+\gamma(n_I)} w_{I,t} \\
c_{I,t+1}^{H,o} &= \frac{\beta(1+r)}{1+\beta+\gamma(n_I)} w_{I,t} \\
s_{I,t}^H &= \frac{\beta}{1+\beta+\gamma(n_I)} w_{I,t}
\end{aligned} \tag{5}$$

Foreign-born household's decisions. The foreign-born middle-aged household has the following lifetime utility function:

$$U(c_{I,t}^{F,y}, c_{I,t}^{F,m}, c_{I,t+1}^{F,o}) = \log(c_{I,t}^{F,m}) + \beta \log(c_{I,t+1}^{F,o}) + \gamma(n_I) \log(c_{I,t}^{F,y}) + \theta \log(\tau_{I,t}) \tag{6}$$

where $c_{I,t}^{F,m}$ and $c_{I,t+1}^{F,o}$ respectively denote consumption during middle and old ages of foreign-born households, $c_{I,t}^{F,y}$ represents consumption for each of their children, $\tau_{I,t}$ stands for the amount of remittances sent to sustain relatives in the origin country, and θ represents the altruistic weight that migrants attach to the consumption of their relatives.⁶ Since we consider permanent migrants, the only difference in the utility functions (3) and (6) is the desire of immigrants to remit. Therefore, like home-born households, foreign-born households are assumed to have the same fertility rate (n_I), and attach the same altruistic weight to their children's consumption $\gamma(n_I)$. We also assume that migrants remit only during middle age in which they receive labor income.

Therefore, the budget constraints of foreign-born middle-aged households are:

$$\begin{aligned}
c_{I,t}^{F,m} + (1+n_I)c_{I,t}^{F,y} + \tau_{I,t} + s_{I,t}^F &= w_{I,t} \\
c_{I,t+1}^{F,o} &= (1+r)s_{I,t}^F
\end{aligned} \tag{7}$$

For foreign-born households, the optimal levels of consumption, remittances and savings are then given

⁶It is worth noting that remittances may be sent for self-interested motives to exploit investment opportunities in the home country (see [Lucas and Stark, 1985](#)). This consideration is not totally excluded from our model, since migrants have access to the international financial market.

by:

$$\begin{aligned}
c_{I,t}^{F,y} &= \frac{\gamma(n_I)/(1+n_I)}{1+\beta+\gamma(n_I)+\theta} w_{I,t} \\
c_{I,t}^{F,m} &= \frac{1}{1+\beta+\gamma(n_I)+\theta} w_t \\
c_{I,t+1}^{F,o} &= \frac{\beta(1+r)}{1+\beta+\gamma(n_I)+\theta} w_{I,t} \\
\tau_{I,t} &= \frac{\theta}{1+\beta+\gamma(n_I)+\theta} w_{I,t} \\
s_{I,t}^F &= \frac{\beta}{1+\beta+\gamma(n_I)+\theta} w_{I,t}
\end{aligned} \tag{8}$$

2.2.2 Emigration country

In the emigration country, there is only one type of middle-aged household (workers who have not emigrated abroad). Each middle-aged household in the emigration country has the same utility function as in Equation (3):

$$U(c_{E,t}^y, c_{E,t}^m, c_{E,t+1}^o) = \log(c_{E,t}^m) + \beta \log(c_{E,t+1}^o) + \gamma(n_E) \log(c_{E,t}^y) \tag{9}$$

where $c_{E,t}^m$ and $c_{E,t+1}^o$ respectively refer to consumption during middle and old ages of middle-aged households in the emigration country, and $c_{E,t}^y$ denotes consumption for each of their children.

The income of each middle-aged household in the emigration country includes wages, $w_{E,t}$, and remittances, $\tau_{E,t}$, received from relatives abroad. For simplicity, we assume that only middle-aged households in the emigration country are recipients of remittances (so that remittances are received at the same period as wages), remittances generally being additional revenue to labor income to help all relatives (siblings and parents). Since remittances per household should rise with the number of relatives abroad, we assume $\tau_{E,t}$ to increase with the emigration rate m_E . Therefore, middle-aged households in the emigration country face the following budget constraints:

$$\begin{aligned}
c_{E,t}^m + (1+n_E)c_{E,t}^y + s_{E,t} &= (w_{E,t} + \tau_{E,t}) \\
c_{E,t+1}^o &= (1+r)s_{E,t}
\end{aligned} \tag{10}$$

The optimal levels of consumption and saving of middle-aged households in the emigration country are

as follows:

$$\begin{aligned}
c_{E,t}^y &= \frac{\gamma(n_E)/(1+n_E)}{1+\beta+\gamma(n_E)}(w_{E,t} + \tau_{E,t}) \\
c_{E,t}^m &= \frac{1}{1+\beta+\gamma(n_E)}(w_{E,t} + \tau_{E,t}) \\
c_{E,t+1}^o &= \frac{\beta(1+r)}{1+\beta+\gamma(n_E)}(w_{E,t} + \tau_{E,t}) \\
s_{E,t} &= \frac{\beta}{1+\beta+\gamma(n_E)}(w_{E,t} + \tau_{E,t})
\end{aligned} \tag{11}$$

2.3 Firm behavior

The economy has a single production sector that is assumed to behave competitively and uses capital ($K_{i,t}$) and labor ($N_{i,t}^m$) as inputs with a constant-returns-to-scale technology. The production function ($Y_{i,t}$) is assumed to be Cobb-Douglas with labor-augmenting technological progress:

$$Y_{i,t} = K_{i,t}^\alpha (A_{i,t} N_{i,t}^m)^{1-\alpha} \tag{12}$$

where $A_{i,t} = (1 + g_i)^t$ is the exogenous technological progress growing at rate g_i .

For the sake of simplicity, capital depreciates fully after production, and there is no capital installation, nor adjustment costs. Hence the profit is given by $\Pi_{i,t} = K_{i,t}^\alpha (A_{i,t} N_{i,t}^m)^{1-\alpha} - (1+r)K_{i,t} - w_{i,t}N_{i,t}^m$, and its maximization implies:

$$\alpha k_{i,t}^{\alpha-1} = 1 + r \tag{13}$$

$$(1 - \alpha)A_{i,t}k_{i,t}^\alpha = w_{i,t} \tag{14}$$

where $k_{i,t} = K_{i,t}/A_{i,t}N_{i,t}^m$ denotes capital per efficiency unit of labor.

2.4 National accounting and equilibrium

Gross investment $I_{i,t}$ corresponds to the variation in the capital stock ($K_{i,t+1} - K_{i,t}$) plus capital depreciation. With the assumption of full depreciation, we get:

$$I_{i,t} = K_{i,t+1} \tag{15}$$

Equivalently, gross national saving $S_{i,t}$ equals the change in national wealth plus capital depreciation, and can be expressed as follows:

$$S_{i,t} = B_{i,t+1} - B_{i,t} + K_{i,t} \tag{16}$$

where $B_{i,t+1}$ represents savings held in country i by middle-aged adults at time t (their assets when old at time $t + 1$) and is given by:

$$B_{i,t+1} = \begin{cases} N_{I,t}^{H,m} s_t^H + N_{I,t}^{F,m} s_{I,t}^F & \text{for an immigration country} \\ N_{E,t}^m s_{E,t} & \text{for an emigration country} \end{cases} \quad (17)$$

where $N_{I,t}^{H,m} = N_{I,t-1}^y$ and $N_{I,t}^{F,m} = m_I N_{I,t-1}^y$ are respectively the number of home-born and foreign-born middle-aged adults in the immigration country; $N_{E,t}^m = (1 - m_E) N_{E,t-1}^y$ is the number of middle-aged adults in the emigration country; $s_{I,t}^H$ and $s_{I,t}^F$ are respectively given in Equations (5) and (8); and $s_{E,t}$ is given in Equation (11).

Since the net foreign asset position at the beginning of period $t + 1$ (or the end of period t) equals national wealth minus domestic capital ($B_{i,t+1} - K_{i,t+1}$), the current account (i.e., the change in net foreign asset position) can be written as follows:

$$CA_{i,t} = (B_{i,t+1} - K_{i,t+1}) - (B_{i,t} - K_{i,t}) = (B_{i,t+1} - B_{i,t} + K_{i,t}) - K_{i,t+1} = S_{i,t} - I_{i,t} \quad (18)$$

From Equation (13), assuming a constant world real interest rate, the equilibrium level of capital per efficiency unit of labor is a constant given by:

$$k_{i,t} = k = \left(\frac{\alpha}{1+r} \right)^{1/(1-\alpha)} \quad (19)$$

Using Equation (14), the equilibrium real wage can, in turn, be expressed as:

$$w_{i,t} = (1 - \alpha) A_{i,t} k^\alpha \quad (20)$$

Therefore, along a balanced growth path (BGP), with constant fertility and migration rates, the gross national saving and investment rates of our small open economy are time-invariant and given by:

$$\frac{I_{i,t}}{Y_{i,t}} = \frac{K_{i,t+1}}{Y_{i,t}} = \begin{cases} (1 + g_I)(1 + n_I)(1 + m_I)k^{1-\alpha}, & \text{for an immigration country} \\ (1 + g_E)(1 + n_E)(1 - m_E)k^{1-\alpha}, & \text{for an emigration country} \end{cases} \quad (21)$$

$$\begin{aligned}
\frac{S_{i,t}}{Y_{i,t}} &= \frac{B_{i,t+1} - B_{i,t} + K_{i,t}}{Y_{i,t}} \\
&= \begin{cases} (1 + \alpha) \frac{\beta}{1 + \beta + \gamma(n_I)} \left[1 - \frac{1}{(1 + g_I)(1 + n_I)(1 + m_I)} \right] \left[1 + m_I \frac{1 + \beta + \gamma(n_I)}{1 + \beta + \gamma(n_I) + \theta} \right] \frac{1}{1 + m_I} + k^{1 - \alpha}, \\ \text{for an immigration country} \\ \\ (1 - \alpha) \frac{\beta}{1 + \beta + \gamma(n_E)} \left[1 - \frac{1}{(1 + g_E)(1 + n_E)(1 - m_E)} \right] \tilde{\tau}(m_E) + k^{1 - \alpha}, \\ \text{for an emigration country} \end{cases} \tag{22}
\end{aligned}$$

where $\tilde{\tau}_E(m_E)$ denotes remittances received as a share of GDP along the BGP, with $\tilde{\tau}'_E(\cdot) > 0$ and $\tilde{\tau}_E(0) = 0$ (since $\tau_{E,t}$ should increase with m_E).

Finally, the current account to GDP ratio is expressed as follows:

$$\begin{aligned}
\frac{CA_{i,t}}{Y_{i,t}} &= \frac{S_{i,t} - I_{i,t}}{Y_{i,t}} \\
&= \begin{cases} (1 + \alpha) \frac{\beta}{1 + \beta + \gamma(n_I)} \left[1 - \frac{1}{(1 + g_I)(1 + n_I)(1 + m_I)} \right] \left[1 + m_I \frac{1 + \beta + \gamma(n_I)}{1 + \beta + \gamma(n_I) + \theta} \right] \frac{1}{1 + m_I} + k^{1 - \alpha} - (1 + g_I)(1 + n_I)(1 + m_I)k^{1 - \alpha}, \\ \text{for an immigration country} \\ \\ (1 - \alpha) \frac{\beta}{1 + \beta + \gamma(n_E)} \left[1 - \frac{1}{(1 + g_E)(1 + n_E)(1 - m_E)} \right] \tilde{\tau}(m_E) + k^{1 - \alpha} - (1 + g_E)(1 + n_E)(1 - m_E)k^{1 - \alpha}, \\ \text{for an emigration country} \end{cases} \tag{23}
\end{aligned}$$

Equation (21) states that investment rises in response to higher future labor-force growth, given by $(1 + n_I)(1 + m_I)$ for the immigration country, and by $(1 + n_E)(1 - m_E)$ for the emigration country. Specifically, a higher fertility rate (natural augmentation in the labor force), by increasing the future labor force (or decreasing the future old dependency ratio), raises investment needs. Immigration affects the saving of the host country in the same way, and emigration has the opposite impact in the home country. The investment rate will be related to the youth dependency ratio through fertility that creates a connection between future old dependency (labor-force growth) and youth dependency ratios.

Concerning the effect of demography, Equation (22) contains two distinct channels through which demographic changes impact the saving rate (Higgins and Williamson, 1996, 1997), i.e., youth and elderly dependency effects. The youth dependency effect is captured in the saving rate by $\beta/[1 + \beta + \gamma(n_i)]$, and indicates that higher fertility decreases the saving rate by increasing the youth dependency burden. The elderly dependency effect is captured by $1 - 1/[(1 + g_I)(1 + n_I)(1 + m_I)]$ for the immigration country, and by $1 - 1/[(1 + g_E)(1 + n_E)(1 - m_E)]$ for the emigration country. This effect stresses that a rise in fertility rate promotes saving by increasing the labor force relative to retired elderly who dissave. As with a rise in fertility, migrant flows affect the saving of the host country in the same way,

with the opposite impact in the home country. In addition to its impact on the saving rate through the elderly dependency effect, international migration may also influence the saving rate through remittances. This “remittance effect” on saving is negative for the immigration country through the term $[1 + m_I(1 + \beta + \gamma(n_I))/(1 + \beta + \gamma(n_I) + \theta)] / (1 + m_I)$ which decreases with the immigration rate m_I for strictly positive values of θ (altruistic weight that a migrant attaches to his relative consumption), and equals zero if $\theta = 0$. On the contrary, for the emigration country, the remittance effect is positive and reflected in $\tilde{\tau}_E(m_E)$, which should increase with the emigration rate m_E . In other words, the positive (negative) impact of immigration (emigration) on the saving rate—through the elderly dependency effect—of the host (home) country is attenuated by the effect exerted through remittances.

Equation (23) shows the effect of the demographic profile on the saving-investment balance (current account). A higher youth dependency ratio (fertility rate) is expected to deteriorate the current account balance by lowering the saving rate and boosting the investment rate. A higher old dependency ratio excluding migration (or a lower rate of natural increase in the labor force) should produce a tendency toward a current account deficit by decreasing the saving rate. A higher immigration rate would improve the current account balance of the host country if its increasing impact on the saving rate (through elderly dependency effect and remittances) dominates that on the investment rate (future labor force); the emigration rate having the opposite impact in the home country.

In a nutshell, because of remittances, the influence of migration on the current account balance should be different from that of the natural demographic changes. Particularly, the positive impact of immigration on the saving rate and the current account balance of highly developed OECD (host) countries will be lower as remittances sent to developing countries rise. Conversely, the potential adverse effect of emigration on the current account balance of developing (home) countries will be as low as remittances received from developed countries are high. In our small open economy model with no financial constraint, international migration has no impact on investment through remittances. However, remittances received in developing countries allow households and entrepreneurs to overcome credit constraints, and provide an alternative way to finance investment (Giuliano and Ruiz-Arranz, 2009). Besides, remittances could influence the current account through the Dutch disease phenomenon, with an appreciation of the real exchange rate (Lartey, 2019).

Since a country can be both a destination and an origin country, in line with the theoretical model, the directly measurable effect is the impact of net immigration (immigration minus emigration) or net emigration (emigration minus immigration) instead of gross migration (immigration or emigration). In the regressions below, we estimate the impact from the point of view of the host country. Our regressions thus provide us with the effect of net immigration on the current account balance, saving and investment rates of the host country, representing the opposite impact of net emigration on the home country variables.

3 Empirical model and data

Based on the theoretical background developed above, we now aim at empirically assessing the influence of international migration on the current account balance.

3.1 Empirical model

Since our focus is on the influence of international migration on long-run saving-investment balances, we rely on the standard empirical model of medium-term current account determination (as in [Chinn and Prasad, 2003](#); [Chinn and Ito, 2007](#); [Gruber and Kamin, 2007](#); [Lane and Milesi-Ferretti, 2012](#)). Therefore, our empirical strategy emphasizes the role of medium-term determinants of the current account, rather than factors influencing its short-run dynamics. In this regard, we concentrate on current account variations that are not caused by cyclical factors or that do not result from the influence of nominal rigidities. To allow higher frequency variations in current account balances while focusing on current account medium-term variations, we construct a panel that contains non-overlapping 5-year averages of data for each country (as in [Chinn and Prasad, 2003](#); [Chinn and Ito, 2007](#); [Lane and Milesi-Ferretti, 2012](#)). Averages are constructed over 1990-1994, 1995-1999, 2000-2004, 2005-2009, 2010-2014, giving us five period observations for each cross-sectional unit.

Based on Equations (21)-(23), we consider the following empirical specification:

$$y_{it} = \alpha m_{it} + \beta demo_{it} + \sum_k \gamma^k X_{it}^k + \varepsilon_{it} \quad (24)$$

where i and t respectively stand for country and time period indices, y_{it} is either saving, investment or current account (expressed as ratios to GDP) of country i at period t , m_{it} denotes net immigration flows that arrived at the beginning of period t (i.e., between $t-1$ and t) expressed as a share of host population, $demo_{it}$ stands for the demographic characteristics of natives at period t , X_{it}^k are control variables, and ε_{it} is the error term.

3.2 Data

3.2.1 Dependent variable

As stressed above, our dependent variable is either saving, investment, or current account (expressed as a percentage of GDP). The corresponding data are taken from the IMF World Economic Outlook (WEO) database. Investment—or gross capital formation—refers to the total value of gross fixed capital formation and changes in inventories and acquisitions less disposals of valuables for a unit or sector. National saving is gross national saving measured by gross disposable income less final consumption

expenditures after accounting for pension funds' adjustment.

3.2.2 Migration and demographic variables

We rely on the global bilateral migration stock database of the United Nations ([United Nations, 2015](#)) for 232 countries. Since stock data are more widely available than flows, a growing number of empirical studies use bilateral migrant stock data to explain changes in contemporary migration patterns (see for example, [Beine et al., 2011](#); [Ortega and Peri, 2014](#); [Docquier et al., 2016](#); [Alesina et al., 2016](#)). To proxy for migration flows, other studies ([Docquier et al., 2014a](#); [Docquier et al., 2014b](#)) rely on the difference between successive bilateral stock matrices. This measure understates the inflow of new migrants because between the two periods, some migrants present in the first period may die, return or migrate toward another country. To overcome this drawback, [Abel \(2013\)](#) and [Abel and Sander \(2014\)](#) propose a new flow-from-stock approach to estimate global bilateral migration flows using changes in published bilateral migrant stock data. This method is based on an algorithm that estimates migrant transition flows between two sequential migrant stock tables, using data on population, i.e., the number of births and deaths. In the present paper, we rely on the data computed by [Abel and Sander \(2014\)](#) using this methodology on the global bilateral migration stocks of the United Nations over four five-year periods between 1990 and 2010. We thus compute net immigration flow rates, given by the difference between immigration flows and emigration flows per thousand population of the host country and expressed as an annual rate. In the regressions, we also consider net immigration stock rates, computed as the difference between immigration and emigration stocks as a percentage of the host country population.

In line with our theoretical model, we capture the demographic characteristics of natives by the natural rise in the labor force, which is proxied by the rate of natural increase in population (the rate of population change in the absence of migration). Alternatively, we account for the demographic characteristics of natives using the total age dependency ratio (the ratio of young and old population to the working-age population) or the vector of the young-age and old-age dependency ratios. Following [Lane and Milesi-Ferretti \(2012\)](#), we add to dependency ratios the aging rate, which measures the expected change in the old-age dependency ratio in the future. Countries with higher aging rates (faster-aging population) are expected to save more.

Data regarding demographic variables (except migration and aging rate) are taken from the World Bank World Development Indicators (WDI) database. The rate of natural increase in population, which is equal to the rate of population change in the absence of migration, is obtained by the difference between the death and birth rates expressed as a percentage. The total age dependency ratio is computed as the ratio of dependents (people younger than 15 or older than 64) to the working-age population (population between 15 and 64), expressed as a percentage. In the same way, the young-age and old-age dependency ratios are respectively given by the percentage of the population younger than 15 and the percentage of the population older than 64 to the working-age population. Based on United Nations population

projections, the aging rate is constructed as the difference between the projected age dependency ratio in year $t + 20$ and the actual age dependency ratio in year t .

3.2.3 Control variables

The selection of control variables follows the literature on the medium-term determinants of the current account (see [Chinn and Prasad, 2003](#); [Chinn and Ito, 2007](#); [Gruber and Kamin, 2007](#); [Lane and Milesi-Ferretti, 2012](#)). Following this literature, where appropriate, variables for each country i are measured relative to a weighted average of the corresponding variables of country i 's trading partners, since the current account should be influenced only by idiosyncratic shifts in fundamentals. Migration being expressed in net terms, it does not enter in relative terms, since migration partner countries are generally trading partners.

The set of control variables includes:

- *Fiscal balance* (expressed as a percentage of GDP and in relative terms): it is used to capture the Ricardian equivalence hypothesis, and its influence on the current account position is expected to be positive. Corresponding data are extracted from the IMF WEO database.
- *Net foreign asset* (NFA) position (as a share of GDP, lagged value): a country receiving income issued from foreign direct investment is experiencing an improvement in its current account. We consider the lagged value to avoid correlation with the dependent variable—the NFA position being the accumulation of past current account balances. NFA data are collected from the updated and extended version of the dataset constructed by [Lane and Milesi-Ferretti \(2007a\)](#).
- *Real GDP per capita* (adjusted by PPP exchange rates, 2011 USD, expressed in relative terms and in logs): this variable, taken from WDI, aims at capturing the stage of economic development hypothesis according to which when a country is at the beginning (end) of its development process, it must run current account deficits (surpluses) due to large capital imports (exports).
- *GDP growth rate* (expressed in relative terms): this variable is introduced to account for the influence of an income shock on the current account balance. Its impact depends on whether high growth rates are perceived as transitory or permanent by households: the current account improves in response to a transitory positive shock, but it worsens following a permanent positive shock. GDP growth rate data are taken from WDI.
- *Trade openness* (ratio of exports plus imports of goods and services to GDP): this variable, extracted from WDI, is used as a proxy for trade liberalization, which promotes flows of goods and services. Since countries most exposed to international trade tend to be more attracted to foreign capital, the relationship between openness to trade and the current account is expected to be negative.

- *Terms of trade (TOT) change* (ratio of export prices to import prices, in logarithmic variation): this variable captures the Harberger-Laursen-Metzler effect based on the hypothesis that an improvement in terms of trade raises income, and as spending increases less than income, saving will necessarily increase. Terms of trade data are taken from the United Nations Conference on Trade and Development (UNCTAD) database.
- *Financial development*: it is proxied by domestic credit to the private sector as a share of GDP. This variable is used to account for the influence of financial market development and to capture the ability of the financial sector to support the economy (King and Levine, 1993; Levine et al., 2000). This measure of financial depth, taken from the World Bank Global Financial Development Database (GFDD), refers to the financial resources provided to the private sector, such as loans, non-equity securities, and trade credits and other account receivables that establish a claim for repayment. As highlighted by Chinn and Prasad (2003) and Chinn and Ito (2007), the impact of financial market development on the current account is ambiguous. On the one hand, this variable measures the depth and sophistication of the financial system, and could, therefore, enhance saving. On the other hand, it also reflects the borrowing constraints faced by individual agents, and could reduce the need for precautionary saving and, in turn, lower the saving rate.
- *Financial openness*: it is measured by Chinn and Ito (2006)'s index of capital account openness, and is used to capture the influence of financial liberalization policies on current account balances through their impact on saving and investment decisions. As for financial development, this variable could have two opposite effects on the current account position (Chinn and Prasad, 2003; Chinn and Ito, 2007). On the one hand, countries with high capital controls are expected to have relatively limited access to international capital and, therefore, could experience smaller current account deficits. On the other hand, capital controls could reflect the desire to impede capital flight caused by past current account deficits.
- *Dummy for oil-exporting countries*: as in Chinn and Prasad (2003), Chinn and Ito (2007) and Chinn et al. (2014), this dummy variable is used to account for the fact that oil-exporting countries have on average more favorable current account positions.
- *Crisis dummy*: this dummy variable takes the value 1 in year t if the considered country is experiencing a major economic crisis. It is included to capture the disruption in access to capital markets during major economic crises (see Lane and Milesi-Ferretti, 2012), and its impact is expected to be positive. The crisis dates are drawn from the database of Laeven and Valencia (2013).
- *Regional dummies* for East Asia and Pacific, Latin America and Caribbean, Middle East and North Africa, South Asia, and Sub-Saharan Africa, are used to account for unobserved heterogeneity at the regional level.

3.3 Time period and sample of countries

Based on the availability of data in the different databases considered, our sample covers 162 countries over the period 1990-2014.⁷ Table A-1 in the Appendix displays summary statistics for all variables. Regarding our main variable of interest, the average annual net immigration flow rate per thousand population has a mean of -0.42 and ranges from -74.75 for Kuwait during the period 1990-1995 to 96.32 for Qatar during the period 2005-2010. For the net immigration stock rate, the mean, the minimum and the maximum values respectively amount to -1.22%, -55.40% (for Grenada in 2000) and 86.99% (for United Arab Emirates in 2010).

4 Results

Following the literature dealing with the medium-term variations in the current account balance,⁸ Equation (24) does not include country-specific fixed effects. Indeed, as shown by Chinn and Prasad (2003), changes in the current account are attributable to cross-section rather than time-series variation, for both advanced and developing countries. Therefore, the empirical specification in Equation (24) aims at explicitly accounting for the contribution of migration on both the cross-sectional and time-series variation in current account balances.

4.1 Results using migration flows

Table 1 reports the estimation results of Equation (24) obtained by pooled OLS, considering migration expressed in terms of flows. As shown, although the estimated coefficients associated with the demographic variables (natural increase, dependency ratios, aging rate) generally have the expected signs, their impacts are not significant. Turning to the other control variables, fiscal balance, the net foreign asset position, and the variable GDP per capita adjusted by PPP exchange rates exert significant positive effects on the current account. As expected, an improvement in the fiscal balance tends to ameliorate the current account, while a worsening in the former would be detrimental to the latter. This result is consistent with the Ricardian equivalence hypothesis, and is in line with overlapping generations models (Obstfeld and Rogoff, 1996) and Blanchard (1985)'s finite-horizon model, according to which deterioration in the fiscal balance has a similar effect on the current account as it involves income redistribution from future to present generations. Regarding the NFA to GDP ratio, its positive effect on the current account was expected as well: (i) countries with large net foreign asset positions also generally display important current account surpluses, since (ii) an improvement in the NFA position translates into a rise in net investment income. Finally, the variable GDP per capita adjusted by PPP exchange rates aims at

⁷The list of countries is displayed in the Appendix.

⁸See Chinn and Prasad (2003) and Lane and Milesi-Ferretti (2012) among others.

Table 1: Pooled OLS estimates using flows

Variables	Current account			Saving			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Net mig. flow	0.069** (0.033)	0.066* (0.035)	0.066* (0.035)	0.082** (0.041)	0.082* (0.045)	0.077* (0.044)	-0.035 (0.039)	-0.041 (0.041)	-0.045 (0.042)
Nat. increase	-0.852 (0.658)			0.121 (0.765)			0.220 (0.671)		
Dep. ratio		-0.003 (0.042)			-0.001 (0.051)			-0.043 (0.044)	
Old dep. ratio			-0.005 (0.088)			-0.095 (0.090)			-0.118 (0.082)
Young dep. ratio			-0.003 (0.043)			0.010 (0.053)			-0.034 (0.046)
Aging rate		0.115 (0.102)	0.117 (0.112)		0.101 (0.123)	0.155 (0.139)		-0.047 (0.098)	-0.004 (0.106)
Fiscal bal.	0.722*** (0.106)	0.724*** (0.107)	0.724*** (0.108)	0.735*** (0.111)	0.746*** (0.110)	0.733*** (0.112)	-0.128 (0.089)	-0.130 (0.089)	-0.139 (0.091)
Lag. NFA	1.137*** (0.368)	1.121*** (0.369)	1.120*** (0.373)	1.591** (0.662)	1.544** (0.681)	1.489** (0.680)	-0.252 (0.399)	-0.356 (0.415)	-0.397 (0.420)
Ln(GDP p.c.)	1.485** (0.631)	1.672*** (0.606)	1.678** (0.660)	3.136*** (0.778)	2.951*** (0.741)	3.203*** (0.824)	1.968** (0.833)	1.649** (0.769)	1.853** (0.865)
GDP Growth	-0.554*** (0.188)	-0.535*** (0.189)	-0.535*** (0.188)	0.566*** (0.165)	0.567*** (0.165)	0.571*** (0.163)	0.932*** (0.138)	0.910*** (0.140)	0.913*** (0.141)
Trade open.	-0.010 (0.007)	-0.012 (0.007)	-0.012 (0.007)	-0.002 (0.007)	-0.003 (0.008)	-0.004 (0.008)	0.017** (0.007)	0.017** (0.007)	0.016** (0.007)
TOT change	-0.011 (0.074)	-0.018 (0.074)	-0.018 (0.074)	0.076 (0.082)	0.076 (0.082)	0.077 (0.082)	0.097 (0.085)	0.096 (0.086)	0.096 (0.086)
Financial open.	0.219 (1.045)	0.057 (1.052)	0.062 (1.060)	-0.413 (1.362)	-0.439 (1.400)	-0.252 (1.409)	-0.573 (1.238)	-0.258 (1.269)	-0.113 (1.262)
Financial dev.	-0.015 (0.010)	-0.018* (0.010)	-0.018* (0.010)	-0.012 (0.010)	-0.015 (0.010)	-0.014 (0.010)	-0.004 (0.010)	-0.003 (0.010)	-0.003 (0.010)
Oil exp. dummy	3.297** (1.469)	3.104** (1.490)	3.098** (1.498)	3.421** (1.376)	3.614*** (1.375)	3.381** (1.396)	1.675 (1.440)	1.847 (1.452)	1.656 (1.460)
Crisis	19.127* (10.013)	19.272** (9.783)	19.261** (9.787)	24.073 (16.315)	24.340 (15.997)	23.876 (15.574)	-1.682 (10.338)	-1.448 (10.687)	-1.804 (10.075)
Constant	-3.936 (3.112)	-5.735 (4.304)	-5.740 (4.315)	7.683** (3.786)	7.853 (5.143)	7.664 (5.188)	10.263*** (3.565)	14.161*** (4.502)	13.998*** (4.537)
Observations	514	514	514	494	494	494	498	498	498
R-squared	0.526	0.526	0.526	0.569	0.570	0.571	0.326	0.328	0.329
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5% and 1% confidence level, respectively.

capturing the stage of economic development of countries. At the beginning of their development process, countries experience current account deficits coming from large capital imports. Once they reach a higher stage of economic development, they face current account surpluses to export capital and reimburse the accumulated debt. By showing that the current account improves with the level of development, the positive sign obtained for this variable confirms the “stage of development” hypothesis.

As expected, the GDP growth rate positively impacts saving and investment rates, while negatively affecting the current account. In other words, the increasing GDP growth rate’s influence on the investment rate dominates that on the saving rate. As previously mentioned, from a theoretical viewpoint, the impact of economic growth on the current account depends on whether individuals perceive high growth rates as transitory or persistent. Trade openness has a positive and significant effect on investment and a non-significant negative impact on both current account and saving. This result, in line with [Chinn and Prasad \(2003\)](#) among others, is explained by the fact that openness may be viewed as a proxy for trade liberalization. In this sense, it accounts for some characteristics such as trade barriers, which obviously impede flows of goods and services, contributing to deteriorating the current account by increasing

investment. The impact of terms of trade changes is not significant, invalidating the Harberger-Laursen-Metzler effect. Financial openness and financial development do not generally exert a significant effect on the current account either, confirming their aforementioned ambiguous impact highlighted by [Chinn and Prasad \(2003\)](#) and [Chinn and Ito \(2007\)](#).

Finally, regarding the two dummy variables, their effect is positive on the current account, as expected. Indeed, the positive link between the dummy for oil-exporting countries and the current account reflects the fact that such economies generally experience more favorable current account positions. Similarly, the more countries are deficient in oil, the greater the deficit in the current account. As the crisis dummy accounts for the disruption in access to financial markets, it positively affects the current account.

Let us now turn to our main variable of interest, namely net immigration. Our findings show (i) a positive impact of net immigration flows on the saving rate at the 10% significance level (5% if we introduce the rate of natural increase in population into the estimated specification), and (ii) a negative impact on investment that is not significant at the 10% level. As the positive impact on saving and the (non-significant) negative effect on investment influence the current account (saving-investment balance) in the same direction, there is an overall positive effect of migration flows on the current account position that is significant at the 10% level. Specifically, the estimated coefficient suggests that a 1-point increase in the net immigration flow per 1,000 population is associated with about a 0.07 percentage point increase in the current account to GDP ratio. This effect is quite modest because it implies that an increase in the net flow of immigration per 1,000 population by around 15 points is necessary to bring about an improvement of 1 percentage point in the external balance. For comparative purposes, the effect of net immigration appears to be ten times smaller than that of the ratio of the fiscal balance to GDP. The impact of net foreign assets is even greater as an increase in this variable by 0.9 percentage point of GDP is associated with an improvement of 1 percentage point in the external balance. However, some caution should be taken when interpreting the results of Table 1 in causal and quantitative terms, due to the issue of endogeneity that we will address in detail further (see Sections 4.3 and 5). The positive impact of net immigration flows on the saving rate confirms the theoretical prediction that international migration mainly consisting in working-age persons leads to an increase (decrease) in the national saving rate in the host (home) country, by raising (lowering) the labor force (who save) to retired elderly (who dissave) ratio. This result is not surprising since, as shown in Figure 1, international migration mainly consists of working-age persons, i.e., people who are more inclined to save. The non-positive (non-significant negative) impact of net immigration on the investment rate reported in Table 1 likely represents the positive influence of emigration on the investment rate of the origin country which operates through remittances, because (as explained in Subsection 2.4) remittances are an alternative way to finance investment in the presence of credit constraints ([Giuliano and Ruiz-Arranz, 2009](#)). This effect attenuates or surpasses the negative impact on the investment rate through declining the labor force (caused by emigration).

To sum up, our findings underline the key role played by international migration flows in explaining

global imbalances, while controlling for standard determinants. Indeed, our results show evidence that migration flows improve national savings and the current account balance in the destination country, while they have opposite impacts in the origin country. However, although interesting and informative, migration flows are less appropriate than migration stocks to account for remittances and their impact on the current account position. Therefore, in the rest of the paper we consider migration stocks rather than migration flows.

4.2 Results using migration stocks

As stressed above, since former migrants may continue to remit to their home country, relying on migration stocks rather than flows is more relevant to reflect the influence of such remittances on the current account. Indeed, remittances are more appropriately accounted for using stocks as this involves the settlement of migrants in host countries over a relatively long period. To give some insights on how large remittances are relative to current accounts, we report descriptive statistics on remittances in Table A-2 in the Appendix. As for the UNCTAD statistics from 2005, we construct the statistics on remittances received (as a percentage of exports and GDP) and remittances paid (as a percentage of imports and GDP). We also distinguish developed countries from developing economies. As shown, remittances received represent a relatively large share of exports and GDP, in particular for developing countries (10.4% and 4% respectively), while remittances paid represent only 3.2% of imports and 1.3% of GDP. Remittances therefore benefit the current accounts of developing countries. Our statistics thus echo the results of [Hassan and Holmes \(2016\)](#), who show that remittances strengthen the sustainability of the current account by making cointegration between exports and imports more likely, including in developing countries.

We estimate the same model as before, replacing migration flows with stocks. The corresponding results obtained by pooled OLS are reported in Table 2. Regarding our main variable of interest,⁹ it is worth noting that the impact of net immigration stocks on the current account balance is highly significant (1% statistical level). Looking at the two components of the current account, this strong positive effect is associated with a significant positive coefficient of the saving rate and a significant negative coefficient of the investment rate reflecting the importance of remittances in promoting investment in origin countries. As mentioned above, remittances received in developing origin countries help to overcome credit constraints and provide an alternative way to finance investment ([Giuliano and Ruiz-Arranz, 2009](#)).

⁹The results related to the demographic and control variables are quite similar to those previously obtained. The main differences concern the fiscal balance and the crisis dummy whose effects on the current account are still positive but non significant.

Table 2: Pooled OLS estimates using stocks

Variables	Current account			Saving			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Net mig. stock	0.160*** (0.028)	0.152*** (0.029)	0.151*** (0.029)	0.076** (0.036)	0.079** (0.036)	0.071* (0.036)	-0.120*** (0.032)	-0.115*** (0.031)	-0.120*** (0.032)
Nat. increase	-1.171* (0.612)			-0.092 (0.739)			0.745 (0.631)		
Dep. ratio		-0.038 (0.042)			-0.062 (0.046)			-0.020 (0.040)	
Old dep. ratio			-0.059 (0.102)			-0.223** (0.094)			-0.136 (0.084)
Young dep. ratio			-0.036 (0.041)			-0.044 (0.048)			-0.008 (0.041)
Aging rate		0.041 (0.100)	0.052 (0.109)		-0.011 (0.124)	0.078 (0.140)		-0.096 (0.091)	-0.033 (0.095)
Fiscal bal.	0.074 (0.063)	0.071 (0.063)	0.070 (0.063)	-0.018 (0.065)	-0.017 (0.064)	-0.023 (0.063)	-0.055*** (0.010)	-0.053*** (0.010)	-0.057*** (0.010)
Lag. NFA	1.040** (0.404)	1.040** (0.404)	1.034** (0.405)	1.743** (0.712)	1.579** (0.712)	1.498** (0.709)	-0.021 (0.392)	-0.105 (0.404)	-0.158 (0.407)
Ln(GDP p.c.)	1.494** (0.637)	1.648*** (0.589)	1.700*** (0.653)	3.345*** (0.786)	2.967*** (0.731)	3.389*** (0.821)	2.090*** (0.787)	1.780** (0.722)	2.082** (0.814)
GDP Growth	-0.572** (0.280)	-0.568** (0.284)	-0.566** (0.282)	0.431* (0.222)	0.410* (0.221)	0.417* (0.215)	0.881*** (0.139)	0.858*** (0.143)	0.864*** (0.146)
Trade open.	-0.004 (0.008)	-0.006 (0.008)	-0.006 (0.009)	0.005 (0.008)	0.005 (0.008)	0.002 (0.009)	0.017** (0.007)	0.017** (0.007)	0.015** (0.007)
TOT change	0.061 (0.060)	0.058 (0.060)	0.058 (0.060)	0.085 (0.072)	0.080 (0.072)	0.079 (0.072)	0.107 (0.069)	0.107 (0.070)	0.106 (0.070)
Financial open.	-0.849 (0.990)	-0.769 (1.010)	-0.719 (1.031)	-0.574 (1.350)	-0.376 (1.370)	0.014 (1.391)	0.604 (1.078)	0.769 (1.112)	1.048 (1.115)
Financial dev.	-0.023** (0.010)	-0.024** (0.010)	-0.024** (0.010)	-0.020* (0.011)	-0.020* (0.010)	-0.019* (0.011)	-0.001 (0.009)	0.001 (0.009)	0.002 (0.009)
Oil exp. dummy	5.929*** (1.533)	5.601*** (1.554)	5.547*** (1.568)	8.277*** (1.390)	8.293*** (1.392)	7.860*** (1.417)	2.029* (1.205)	2.197* (1.217)	1.893 (1.232)
Crisis	1.522 (11.620)	1.741 (11.691)	1.688 (11.689)	-1.125 (20.431)	-0.411 (20.483)	-0.814 (19.895)	-2.703 (8.780)	-2.340 (9.096)	-2.655 (8.291)
Constant	-4.234 (3.121)	-3.754 (4.455)	-3.780 (4.441)	5.367 (3.830)	10.212** (5.089)	9.960* (5.094)	8.512** (3.453)	11.889*** (4.238)	11.721*** (4.240)
Observations	561	561	561	541	541	541	545	545	545
R-squared	0.444	0.442	0.442	0.495	0.497	0.500	0.355	0.354	0.356
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5% and 1% confidence level, respectively.

4.3 Accounting for endogeneity: Pooled 2SLS estimates

In the pooled OLS regressions reported in Tables 1 and 2, we assume that migration is exogenous with respect to the current account position. However, as stressed above, there may be an endogeneity bias between the two variables, due to omitted factors such as institutional quality, the different aspects of which are difficult to apprehend in a single indicator. Indeed, countries with better institutional quality offer better living conditions and should attract more immigrants or experience less emigration. At the same time, better government institutions attract foreign capital, deteriorating the current account balance and reducing the need for precautionary saving while promoting investment (Chinn and Ito, 2007; Gruber and Kamin, 2007). In this case, one can expect OLS regressions to provide biased estimations. Specifically, OLS regressions should underestimate the positive (negative) impact of net immigration (emigration) on the current account balance and saving rate of the host (home) country, and overestimate its positive (negative) influence on investment, without accounting for the indirect impact through remittances. Because of the latter indirect effect, the sign of the bias for investment may be ambiguous.

ous. Indeed, countries with a well-developed financial system generally have high investment rates while attracting more remittances. This induces a positive correlation between remittances and investment, and indirectly between emigration and investment. We address the endogeneity issue in various ways. In the present section, we deal with methodological aspects, and rely on an instrumental variables approach using gravity-type specifications. In Section 5, we complement our robustness checks through an in-depth analysis (i) using an alternative instrument instead of a gravity-based instrument, and (ii) shrinking or broadening the list of controls.

To take into account the potential endogeneity bias issue, we first use the two-stage least squares (2SLS) estimation strategy. This 2SLS estimation approach follows recent developments in the international migration literature (Ortega and Peri, 2014; Alesina et al., 2016; Docquier et al., 2016) inspired by trade studies (Frankel and Romer, 1999). In line with Ortega and Peri (2014), we apply the 2SLS strategy on migration stocks instead of migration flows, since the stock of bilateral migration is well fitted by gravity-type models. Specifically, we rely on a pseudo-gravity regression to construct a geography-based prediction of bilateral migration stocks. It is worth mentioning that gravity equations are frequently used in the trade literature, in particular to reduce the impact of omitted variables when analyzing how trade and migration influence income. This framework is also employed in the international migration literature. Indeed, in addition to the aforementioned studies, Dao et al. (2018) rely on gravity regressions to quantify the main drivers of the mobility transition, and micro-founded gravity models have been estimated to investigate the evolution of the scale of international migration flows (Hanson and McIntosh, 2016) and their composition across alternative destinations (Grogger and Hanson, 2011; Beine et al., 2011; Bertoli and Fernandez-Huertas Moraga, 2013).¹⁰ Gravity-type models have also been used in the literature dealing with current accounts and global imbalances. For instance, Boz et al. (2019) employ a standard structural gravity framework to investigate the effect of trade costs on current account balances, and Barattieri (2014) uses gravity-related techniques to analyze the relationship between specialization in the export of services and current account outcomes.

In this section, we follow these strands of the literature and estimate our pseudo-gravity regressions using an instrumental variable method. To deal with negative values for the net immigration rate in the log-gravity model, we follow the literature (Beine et al., 2016) and consider two separate gravity models for net-immigration countries (countries with positive net immigration) and net-emigration countries (countries with negative net immigration). Like Alesina et al. (2016) and Docquier et al. (2016), we use the following pseudo-gravity models that allow for time-varying bilateral relationships in a panel setting:¹¹

¹⁰For a detailed presentation of gravity models in the migration literature, see Bertoli and Fernandez-Huertas Moraga (2017).

¹¹Once these gravity equations have been estimated, we sum them over origin (destination) countries j (i) to obtain the predicted immigration (emigration) for each destination (origin) country i (j): $\widehat{immig}_{it} = \sum_j \widehat{immig}_{ijt} = \sum_j \exp(\ln \widehat{immig}_{ijt})$ and $\widehat{emig}_{jt} = \sum_i \widehat{emig}_{ijt} = \sum_i \exp(\ln \widehat{emig}_{ijt})$.

$$\begin{aligned} \ln immig_{ij,t} = & a_1 \ln Pop_{1960,i} + a_2 \ln Dist_{ij} + a_3 Border_{ij} + a_4 Colony_{ij} \\ & + a_5 OffLang_{ij} + a_6 EthLang_{ij} + \psi_{j,t} + \tau_t + e_{ij,t} \end{aligned} \quad (25)$$

$$\begin{aligned} \ln emig_{ji,t} = & b_1 \ln Pop_{1960,j} + b_2 \ln Dist_{ji} + b_3 Border_{ji} + b_4 Colony_{ji} \\ & + b_5 OffLang_{ji} + b_6 EthLang_{ji} + \psi_{i,t} + \tau_t + e_{ji,t} \end{aligned} \quad (26)$$

where $immig_{ij,t}$ is the bilateral net-immigration rate received in destination i (difference between the stock of migrants born in country j and living in country i and the stock of migrants born in country i and living in country j) at period t , expressed in terms of the population of destination country i ; $emig_{ji,t}$ denotes the bilateral net-emigration rate from origin j (difference between the stock of migrants born in country j and living in country i and the stock of migrants born in country i and living in country j) at period t , expressed in terms of the population of origin country j ; $Pop_{1960,i}$ and $Pop_{1960,j}$ are respectively the destination and origin population sizes in 1960; $Dist_{ij}$ is the weighted distance that is equal to the distance between destination country i and origin country j based on bilateral distances between the biggest cities of the two countries; $Border_{ij}$ is a dummy variable to indicate whether countries i and j share a common border; $Colony_{ij}$ is a dummy for colonial relationship; and $OffLang_{ij}$ and $EthnoLang_{ij}$ are respectively a dummy for sharing common official and ethnic minority languages (if language spoken by at least 9% of population in both countries). In this gravity model, the migration costs are captured by geographic variables (such as $Dist$, $Border$) and linguistic and colonial ties ($OffLang$, $EthLang$, $Colony$). Following [Docquier et al. \(2016\)](#) and [Feyrer \(2019\)](#), to account for the time-varying dimension in a panel setting, Equations (25) and (26) include interactions between geographic distance and time dummies (a_{2t} and b_{2t} , respectively). This allows the effect of geographic distance to be time-varying, and thus to capture a reduction in migration costs, for example caused by improvements in aircraft technology. Finally, as in [Alesina et al. \(2016\)](#) we include time fixed effects τ_t and origin-time (destination-time) fixed effects $\psi_{j,t}$ ($\psi_{i,t}$) to account for multilateral resistance in destination (origin) countries, reflecting the reaction of bilateral migration of a given origin-destination pair to time-varying common origin (destination) shocks which matter for migrants' destination. To ensure the exogeneity of gravity-based instruments, the gravity model for net immigration (emigration) does not include destination-time (origin-time) fixed effects because the latter may be linked to the current account (saving or investment) through unobserved factors ([Docquier et al., 2016](#)).

As mentioned above, the gravity-based 2SLS strategy is widely used in the literature on international migration. However, the validity of the instrument constructed using the gravity model may be questioned, in particular because of the possible spatial correlation in the dependent variable or even because the geographic factors in the gravity model are also correlated with other flows between countries such as trade and capital flows (see [Bertoli and Fernandez-Huertas Moraga, 2017](#)). In our case, however, these threats are considerably reduced since we rely on a panel gravity model allowing for a time-varying

effect of geographical factors, to account for technical progress in transport as suggested by several recent studies (see [Docquier et al., 2016](#); [Bertoli and Fernandez-Huertas Moraga, 2017](#); [Pascali, 2017](#); [Feyrer, 2019](#)). Furthermore, it seems advisable to include, in the main regressions, the rates of openness to trade and to capital as control variables to be sure that the migration rate does not capture their effects (see [Docquier et al., 2016](#)). Similarly, by considering various demographic variables as controls in the equations, this framework allows us to capture the specific effect exerted by international migration on the current account—i.e., the effect net of that of demographics. Given the importance of the endogeneity issue, we propose several related robustness tests in Section 5.5.

Data on geographic, ethnic, linguistic, and colonial variables are from the CEPII’s Gravity database described in [Head et al. \(2010\)](#).¹² The estimation results of gravity models are reported in Table A-3 in the Appendix. For both net immigration and net emigration, the gravity model has high explanatory power, and all variables are significant with the expected signs: (i) population at destination (origin) in 1960 negatively impacts bilateral migration, (ii) sharing a common border and common language or having a colonial tie positively impact bilateral migration, and (iii) bilateral distance has a negative influence with a magnitude that decreases on average between 1990 and 2010, reflecting the reduction in migration costs. Figure A-1 in the Appendix compares the predicted net im(e)migration rates with the actual values: as shown, the predicted and actual values are highly correlated with an estimated slope coefficient around unity.

The results of the 2SLS models are reported in Table 3. Let us first check the relevance of the gravity-based instruments. Based on [Kleibergen and Paap \(2006\)](#)’s rk Wald F-stat test, we reject the null hypothesis of weak identification—the test statistic for weak identification being above [Stock and Yogo \(2005\)](#)’s critical value at 10% max IV size (16.38). The 2SLS regression results show significant positive impacts of net immigration on the current account and saving rate, which increase in magnitude, while the effect on the investment rate remains negative but non-significant. Indeed, an increase in the net immigration stock of about 6 percentage points causes an improvement in the current account by 1 percentage point of GDP. This impact remains 6 times smaller than that of net foreign assets, but slightly greater than that of the net immigration stock in Table 2. This reflects the aforementioned endogeneity issue: OLS regressions underestimate the positive (negative) impact of net immigration (emigration) on the host (home) country’s current account and savings, while overestimating the positive effect of net emigration on investment of the home country (through remittances).

As before, the improving effect of net immigration on the current account reflects (i) the positive (negative) impact of immigration (emigration) on the saving rate of the host (home) country, and (ii) the positive impact of emigrant’s remittances on the investment rate of the home country, which offsets the negative

¹²We estimate the gravity model using the Poisson Pseudo Maximum Likelihood (PPML) non-linear approach. As argued by [Silva and Tenreyro \(2006\)](#), contrary to the log-linearized model estimation by OLS, PPML estimation can be used to address issues related to (i) the presence of zero values in the observations of the dependent variable, and (ii) heteroscedasticity. We rely on [Silva and Tenreyro \(2010\)](#)’s procedure to deal with the identification problem of the (pseudo) maximum likelihood estimates of Poisson regression models with non-negative values of the dependent variable (bilateral migration) and a large number of zeros on some regressors.

Table 3: Pooled 2SLS estimates using stocks

Variables	Current account			Saving			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Net mig. stock	0.170*** (0.049)	0.167*** (0.049)	0.167*** (0.049)	0.172*** (0.053)	0.175*** (0.052)	0.173*** (0.052)	-0.012 (0.062)	-0.011 (0.061)	-0.011 (0.061)
Nat. increase	-1.215** (0.617)			-0.708 (0.755)			0.134 (0.680)		
Dep. ratio		-0.036 (0.042)			-0.063 (0.047)			-0.020 (0.039)	
Old dep. ratio			-0.049 (0.098)			-0.177* (0.096)			-0.084 (0.082)
Young dep. ratio			-0.035 (0.041)			-0.050 (0.049)			-0.014 (0.041)
Aging rate		0.052 (0.100)	0.059 (0.109)		0.064 (0.124)	0.130 (0.140)		-0.033 (0.095)	0.004 (0.100)
Fiscal bal.	0.074 (0.062)	0.070 (0.061)	0.069 (0.061)	-0.020 (0.060)	-0.022 (0.059)	-0.027 (0.058)	-0.059*** (0.012)	-0.058*** (0.012)	-0.061*** (0.012)
Lag. NFA	1.028*** (0.397)	1.021*** (0.395)	1.016** (0.396)	1.448** (0.626)	1.302** (0.627)	1.233** (0.623)	-0.258 (0.408)	-0.310 (0.414)	-0.345 (0.416)
Ln(GDP p.c.)	1.437** (0.642)	1.587*** (0.587)	1.617** (0.642)	2.762*** (0.804)	2.515*** (0.748)	2.791*** (0.828)	1.460* (0.810)	1.311* (0.731)	1.466* (0.821)
GDP Growth	-0.568** (0.272)	-0.559** (0.275)	-0.558** (0.273)	0.478** (0.223)	0.469** (0.223)	0.477** (0.219)	0.926*** (0.135)	0.914*** (0.140)	0.919*** (0.140)
Trade open.	-0.004 (0.008)	-0.006 (0.008)	-0.006 (0.008)	0.006 (0.008)	0.005 (0.008)	0.003 (0.009)	0.017** (0.007)	0.017** (0.007)	0.016** (0.007)
TOT change	0.060 (0.060)	0.056 (0.060)	0.056 (0.060)	0.073 (0.073)	0.068 (0.072)	0.066 (0.072)	0.096 (0.068)	0.095 (0.069)	0.094 (0.069)
Financial open.	-0.973 (1.115)	-0.971 (1.146)	-0.946 (1.165)	-1.498 (1.435)	-1.404 (1.468)	-1.176 (1.493)	-0.491 (1.274)	-0.387 (1.320)	-0.263 (1.337)
Financial dev.	-0.023** (0.010)	-0.024** (0.010)	-0.024** (0.010)	-0.018* (0.011)	-0.021** (0.010)	-0.019* (0.010)	-0.001 (0.009)	-0.001 (0.009)	0.000 (0.009)
Oil exp. dummy	5.876*** (1.548)	5.507*** (1.578)	5.472*** (1.582)	7.842*** (1.424)	7.716*** (1.441)	7.385*** (1.461)	1.585 (1.291)	1.619 (1.342)	1.437 (1.324)
Crisis	1.396 (11.541)	1.500 (11.655)	1.461 (11.650)	-2.502 (20.575)	-1.941 (20.622)	-2.294 (20.249)	-4.467 (9.140)	-4.208 (9.199)	-4.429 (8.814)
Constant	-3.847 (3.511)	-3.486 (4.518)	-3.495 (4.509)	8.894** (4.122)	12.487** (5.233)	12.413** (5.222)	12.579*** (3.802)	14.568*** (4.315)	14.543*** (4.320)
Observations	561	561	561	541	541	541	545	545	545
R-squared	0.444	0.442	0.442	0.487	0.489	0.490	0.333	0.334	0.334
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
K-P F-stat	33.50	30.10	33.60	28.30	24.22	27.38	29.13	25.15	28.50
SY 10% max IV size	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38
SY 25% max IV size	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530

Notes: Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5% and 1% confidence level, respectively. K-P F-stat is the Kleibergen and Paap (2006) rk Wald F-stat test of weak identification that has to be compared with Stock and Yogo (2005) critical values (SY 10% /25% max IV size).

effect of emigration on investment due to labor force loss. Therefore, accounting for potential endogeneity does not alter our findings about the improving impact of net immigration on the external balance of host countries.

5 Sensitivity analysis and heterogeneous effects

In this section, we check the robustness of our results while investigating heterogeneity in different dimensions: excluding oil-exporting countries, excluding outliers, comparing advanced countries with developing countries, and comparing net-immigration countries with net-emigration countries. We also

provide additional robustness checks regarding the endogeneity issue.¹³

5.1 Excluding oil-exporting countries

In the above regressions, we used a dummy variable for oil-exporting countries to account for the evidence that these economies have, on average, more favorable current account positions. As it is well known that some oil-exporting countries (e.g., Qatar, Saudi Arabia, United Arab Emirates) attract more emigrants, we check the sensitivity of our findings by excluding oil-exporting economies from our panel. The corresponding regression results are reported in Table 4. They confirm our previous conclusions with a strong positive effect of net immigration on the current account position, highlighting the robustness of our findings to the exclusion of oil exporters.

Table 4: Pooled 2SLS estimates using stocks, excluding oil-exporting countries

Variables	Current account			Saving			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Net mig. stock	0.143** (0.056)	0.158*** (0.050)	0.138** (0.055)	0.170*** (0.056)	0.169*** (0.055)	0.168*** (0.055)	0.053 (0.066)	0.055 (0.064)	0.054 (0.065)
Nat. increase	-1.276** (0.547)			-0.709 (0.766)			0.165 (0.673)		
Dep. ratio		-0.039 (0.031)			-0.019 (0.054)			-0.025 (0.047)	
Old dep. ratio			0.091 (0.075)			-0.078 (0.097)			-0.152* (0.085)
Young dep. ratio			-0.009 (0.036)			-0.015 (0.055)			-0.018 (0.048)
Aging rate		0.024 (0.086)	0.007 (0.094)		0.087 (0.130)	0.115 (0.144)		-0.076 (0.100)	-0.015 (0.106)
Fiscal bal.	0.464*** (0.161)	0.483*** (0.145)	0.455*** (0.162)	0.660*** (0.144)	0.660*** (0.145)	0.657*** (0.145)	-0.032 (0.101)	-0.029 (0.102)	-0.036 (0.102)
Lag. NFA	0.975*** (0.377)	1.047*** (0.403)	0.993*** (0.385)	1.073 (0.746)	1.059 (0.756)	1.052 (0.760)	-0.039 (0.433)	-0.044 (0.433)	-0.061 (0.433)
Ln(GDP p.c.)	0.794 (0.553)	0.828* (0.469)	1.019* (0.578)	1.776** (0.831)	1.812** (0.799)	1.940** (0.869)	0.777 (0.726)	0.651 (0.704)	0.932 (0.763)
GDP Growth	-0.264** (0.124)	-0.167 (0.135)	-0.212 (0.135)	1.021*** (0.205)	1.025*** (0.220)	1.022*** (0.220)	1.119*** (0.160)	1.087*** (0.168)	1.078*** (0.168)
Trade open.	0.004 (0.006)	0.004 (0.006)	0.006 (0.006)	0.011 (0.008)	0.010 (0.008)	0.009 (0.008)	0.015** (0.007)	0.015** (0.007)	0.012* (0.007)
TOT change	0.004 (0.055)	-0.013 (0.062)	0.004 (0.058)	0.044 (0.073)	0.046 (0.074)	0.046 (0.074)	0.126* (0.073)	0.124* (0.073)	0.125* (0.072)
Financial open.	0.120 (1.061)	-0.307 (0.992)	-0.159 (1.117)	-0.440 (1.413)	-0.498 (1.456)	-0.360 (1.473)	-0.453 (1.342)	-0.284 (1.372)	0.014 (1.376)
Financial dev.	-0.011 (0.009)	-0.006 (0.009)	-0.010 (0.009)	0.003 (0.010)	0.000 (0.010)	0.001 (0.010)	0.005 (0.009)	0.006 (0.009)	0.007 (0.009)
Crisis	8.766 (11.388)		8.759 (11.176)	15.098 (20.730)	16.036 (20.558)	15.836 (20.443)	4.544 (12.170)	4.301 (12.965)	3.833 (11.776)
Constant	-3.581 (2.738)	-1.862 (3.527)	-6.831* (3.572)	10.917** (4.293)	10.860* (6.122)	11.109* (6.034)	15.557*** (3.535)	18.134*** (4.788)	18.651*** (4.744)
Observations	487	487	487	470	470	470	474	474	474
R-squared	0.341	0.316	0.335	0.478	0.478	0.478	0.238	0.238	0.242
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
K-P F-stat	26.35	26.88	25.28	23.17	19.40	20.69	23.89	20.52	22.12
SY 10% max IV size	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38
SY 25% max IV size	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530

Notes: Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5% and 1% confidence level, respectively.

¹³To save space, we only report (i) the most relevant regression results using net immigration stocks, and (ii) the estimations obtained using the 2SLS procedure. Results using OLS are similar to those obtained with 2SLS and are available upon request to the authors.

5.2 Excluding outliers

As an extension to the previous section, we perform a series of additional tests to check whether our main results are sensitive to outliers. To this end, we examine the effect of net immigration on the current account by imposing various restrictions. First, we exclude all observations on net immigration for which the absolute value exceeds 50%. Second, following [Chinn and Prasad \(2003\)](#), we exclude all observations for which the current account deficit is greater than 10% of GDP. Third, we mix the previous two restrictions. Finally, we combine the first restriction with the more restrictive condition that the current account deficit does not exceed 5% of GDP. These restrictions imply a growing decrease in the total number of observations (19 for the first, 84 for the second, 98 for the third, and 212 for the fourth). Table 5 displays the corresponding results. As shown, the impact of migration on the current account remains robust despite these increasingly severe restrictions. Even in the last three specifications where the number of observations is reduced by 38%, the results are significant at the 5% statistical level except in one case.

5.3 Advanced vs. developing countries

For the sake of completeness, we also investigate whether migration heterogeneously affects the current account position, depending on the type—advanced or developing—of the considered countries. To this end, we estimate our model by distinguishing two samples of countries: a panel of 34 advanced economies, and a panel comprising 128 developing countries.¹⁴ The results are displayed in Tables 6 and 7.

Focusing on advanced countries, the results in Table 6 show that migration does not significantly impact the current account position. This illustrates the fact that the influence of immigration on the current account of developed countries is weakened by the extent of remittances sent to the origin countries. For developing countries, the results in Table 7 show a significant positive impact of net immigration on the current account. Specifically, the effect of net immigration on the saving rate is significantly positive, while it is non significant on the investment rate. Since developing economies are generally net-emigration countries, the non-positive impact of net immigration on investment may reflect the positive influence of net emigration on investment in home developing countries; this effect comes through remittances and attenuates or exceeds the negative impact exerted by labor force emigration on the investment rate. Overall and in line with our previous conclusions, our findings emphasize that remittances play a key role in enhancing investment of developing countries.

¹⁴See the Appendix for the corresponding lists of countries.

Table 5: Pooled 2SLS estimates using stocks, excluding potential outliers

Variables	$ nms \leq 50\%$			$ca \geq -10\%$			$ nms \leq 50\% \text{ \& } ca \geq -10\%$			$ nms \leq 50\% \text{ \& } ca \geq -5\%$		
Net mig. stock	0.212*** (0.077)	0.193** (0.076)	0.193** (0.077)	0.095** (0.037)	0.101*** (0.037)	0.100*** (0.037)	0.132*** (0.050)	0.126*** (0.048)	0.127*** (0.049)	0.110* (0.057)	0.113** (0.055)	0.114** (0.055)
Nat. increase	-1.718** (0.713)			-0.462 (0.429)			-0.672 (0.487)			-0.693 (0.516)		
Dep. ratio		-0.072 (0.045)			0.021 (0.028)			0.007 (0.026)			-0.001 (0.027)	
Old dep. ratio			-0.073 (0.104)			0.056 (0.071)			0.041 (0.070)			0.061 (0.072)
Young dep. ratio			-0.072 (0.044)			0.016 (0.027)			0.004 (0.027)			-0.007 (0.027)
Aging rate		-0.011 (0.100)	-0.011 (0.108)		0.084 (0.079)	0.061 (0.082)		0.058 (0.078)	0.040 (0.082)		0.113 (0.086)	0.079 (0.089)
Fiscal bal.	0.067 (0.057)	0.063 (0.056)	0.063 (0.056)	0.469*** (0.093)	0.468*** (0.094)	0.473*** (0.095)	0.419*** (0.102)	0.414*** (0.103)	0.418*** (0.104)	0.460*** (0.099)	0.464*** (0.100)	0.471*** (0.102)
Lag. NFA	1.056** (0.437)	1.079** (0.439)	1.079** (0.440)	0.582 (0.487)	0.633 (0.482)	0.659 (0.487)	0.653 (0.637)	0.705 (0.634)	0.722 (0.636)	1.748*** (0.626)	1.780*** (0.618)	1.816*** (0.620)
Ln(GDP p.c.)	1.202* (0.695)	1.434** (0.635)	1.437** (0.696)	1.105*** (0.424)	1.282*** (0.408)	1.196*** (0.450)	0.939** (0.471)	1.181*** (0.441)	1.091** (0.497)	-0.041 (0.429)	0.018 (0.423)	-0.145 (0.486)
GDP Growth	-0.578** (0.272)	-0.587** (0.274)	-0.587** (0.274)	-0.029 (0.122)	0.006 (0.126)	0.004 (0.126)	-0.033 (0.122)	-0.009 (0.126)	-0.007 (0.127)	0.068 (0.126)	0.088 (0.131)	0.090 (0.133)
Trade open.	-0.004 (0.008)	-0.006 (0.008)	-0.006 (0.009)	0.008* (0.005)	0.008 (0.005)	0.008 (0.005)	0.008 (0.005)	0.008 (0.005)	0.008 (0.005)	0.011* (0.006)	0.009 (0.006)	0.010* (0.006)
TOT change	0.060 (0.060)	0.056 (0.060)	0.056 (0.060)	0.012 (0.049)	0.015 (0.051)	0.016 (0.051)	0.019 (0.049)	0.020 (0.051)	0.020 (0.051)	0.035 (0.048)	0.036 (0.050)	0.039 (0.050)
Financial open.	-1.367 (1.198)	-1.043 (1.209)	-1.040 (1.245)	-1.328* (0.754)	-1.526* (0.784)	-1.592* (0.819)	-1.364* (0.757)	-1.437* (0.772)	-1.532* (0.827)	-1.097 (0.710)	-1.235* (0.725)	-1.398* (0.790)
Financial dev.	-0.025** (0.010)	-0.024** (0.011)	-0.024** (0.011)	-0.004 (0.007)	-0.005 (0.007)	-0.006 (0.007)	-0.007 (0.007)	-0.008 (0.007)	-0.008 (0.007)	-0.001 (0.007)	-0.004 (0.007)	-0.005 (0.007)
Oil exp. dummy	5.964*** (1.547)	5.484*** (1.571)	5.481*** (1.573)	4.971*** (0.995)	4.835*** (1.027)	4.927*** (1.009)	5.188*** (1.026)	5.016*** (1.060)	5.092*** (1.037)	4.093*** (0.924)	3.892*** (0.968)	4.027*** (0.929)
Crisis	-0.569 (12.281)	-0.150 (12.325)	-0.153 (12.320)	8.655 (5.990)	8.421 (6.213)	8.649 (6.057)	6.976 (6.100)	6.887 (6.357)	7.072 (6.237)	7.579 (6.159)	7.707 (6.340)	8.150 (5.984)
Constant	-2.140 (4.128)	-0.181 (5.342)	-0.182 (5.334)	-4.759** (2.158)	-7.364*** (2.685)	-7.321*** (2.676)	-3.783 (2.549)	-5.938** (2.917)	-5.913** (2.912)	2.024 (2.493)	0.876 (2.974)	0.931 (2.958)
Observations	542	542	542	477	477	477	463	463	463	349	349	349
R-squared	0.381	0.380	0.380	0.606	0.606	0.606	0.520	0.520	0.520	0.565	0.564	0.566
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
K-P F-stat	65.53	66.58	65.73	21.20	19.45	22.83	43.29	43.78	43.70	36.76	36.62	38.91
SY 10% max IV size	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38
SY 25% max IV size	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530

Notes: Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5% and 1% confidence level, respectively. K-P F-stat is the [Kleibergen and Paap \(2006\)](#) rk Wald F-stat test of weak identification that has to be compared with [Stock and Yogo \(2005\)](#) critical values (SY 10% /25% max IV size). $|nms|$ = absolute value of net migration stock and ca = current account balance.

5.4 Net-immigration vs. net-emigration countries

As a supplementary robustness check, we directly assess our conjecture that the non-positive impact of net immigration on the investment rate reflects the positive effect of emigration on investment in the home country through remittances—with this effect compensating for or exceeding the negative impact of labor force emigration on investment needs. To this end, we estimate regressions on net-immigration and net-emigration countries separately. For the sake of precision, we exclude countries whose net immigration is close to being balanced. We thus classify as “net-immigration countries” economies with an immigration stock rate exceeding the emigration stock rate by one per thousand persons and, similarly, “net-emigration countries” include nations with an emigration stock rate exceeding the immigration stock rate by one per

Table 6: Pooled 2SLS estimates using stocks, advanced countries

Variables	Current account			Saving			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Net mig. stock	-0.063 (0.104)	-0.044 (0.142)	-0.044 (0.101)	-0.109 (0.114)	-0.083 (0.174)	-0.074 (0.123)	-0.050 (0.089)	-0.037 (0.126)	-0.036 (0.093)
Nat. increase	-1.548 (1.712)			-0.084 (1.770)			1.281 (1.380)		
Dep. ratio		0.355*** (0.127)			-0.126 (0.112)			-0.469*** (0.085)	
Old dep. ratio			0.355*** (0.135)			-0.137 (0.123)			-0.469*** (0.096)
Young dep. ratio			0.356** (0.162)			-0.110 (0.164)			-0.468*** (0.116)
Aging rate		0.315** (0.133)	0.316** (0.134)		0.092 (0.136)	0.108 (0.128)		-0.207** (0.089)	-0.206*** (0.076)
Fiscal bal.	0.460*** (0.146)	0.559*** (0.139)	0.559*** (0.140)	0.936*** (0.139)	0.938*** (0.141)	0.933*** (0.147)	0.485*** (0.083)	0.389*** (0.078)	0.389*** (0.075)
Lag. NFA	2.488* (1.485)	2.949** (1.396)	2.949** (1.393)	4.141*** (1.330)	3.776*** (1.357)	3.774*** (1.343)	1.568 (1.033)	0.752 (0.925)	0.752 (0.920)
Ln(GDP p.c.)	12.765*** (2.641)	9.999*** (3.253)	9.984*** (2.390)	8.713*** (2.756)	9.005** (4.046)	8.672*** (2.978)	-4.147* (2.189)	-1.382 (3.003)	-1.395 (2.342)
GDP Growth	-0.447 (0.279)	-0.183 (0.287)	-0.183 (0.291)	-0.036 (0.272)	0.007 (0.277)	0.003 (0.279)	0.375 (0.245)	0.167 (0.276)	0.167 (0.280)
Trade open.	-0.003 (0.008)	0.006 (0.010)	0.006 (0.009)	-0.011 (0.008)	-0.016* (0.009)	-0.016* (0.009)	-0.007 (0.005)	-0.021*** (0.006)	-0.021*** (0.006)
TOT change	-0.554** (0.234)	-0.463** (0.211)	-0.463** (0.212)	-0.714*** (0.198)	-0.689*** (0.185)	-0.689*** (0.183)	-0.195 (0.186)	-0.258 (0.167)	-0.258 (0.168)
Financial open.	0.793 (2.772)	-1.291 (2.869)	-1.286 (3.124)	0.151 (2.595)	0.891 (2.431)	1.012 (2.839)	-0.786 (2.465)	1.989 (2.083)	1.994 (2.343)
Financial dev.	-0.041*** (0.014)	-0.036** (0.016)	-0.036** (0.016)	-0.055*** (0.012)	-0.056*** (0.013)	-0.055*** (0.012)	-0.013 (0.009)	-0.019* (0.011)	-0.019* (0.010)
Oil exp. dummy	-0.121 (3.126)	0.066 (3.823)	0.077 (3.042)	-6.721** (3.391)	-6.031 (4.287)	-5.758* (3.442)	-6.496*** (2.483)	-5.826* (3.377)	-5.816** (2.620)
Constant	-61.210*** (13.624)	-67.643*** (16.053)	-67.590*** (12.300)	-13.365 (14.015)	-10.150 (20.177)	-8.925 (15.446)	48.507*** (10.756)	58.797*** (15.294)	58.843*** (12.776)
Observations	105	105	105	105	105	105	105	105	105
R-squared	0.648	0.690	0.690	0.774	0.786	0.788	0.512	0.632	0.632
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
K-P F-stat	41.81	12.46	39.17	41.81	12.46	39.17	41.81	12.46	39.17
SY 10% max IV size	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38
SY 25% max IV size	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530

Notes: Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5% and 1% confidence level, respectively. K-P F-stat is the Kleibergen and Paap (2006) rk Wald F-stat test of weak identification that has to be compared with Stock and Yogo (2005) critical values (SY 10% /25% max IV size).

thousand persons.¹⁵

The regression results, reported in Tables 8 and 9, are in line with our previous findings. As for advanced countries, we find no significant impact of net immigration on the current account of net-immigration countries. Focusing on net-emigration countries, our results clearly show that emigration has a significant deteriorating effect on the current account balance of origin countries. This adverse impact is associated with a significant decline in the saving rate and a significant positive effect on the investment rate. This positive effect on investment reflects that the positive impact of net emigration dominates the negative effect of labor force emigration on the investment rate of home countries.

¹⁵Our findings are robust to the choice of the threshold. They are indeed insensitive to any threshold value greater than one per thousand persons.

Table 7: Pooled 2SLS estimates using stocks, developing countries

Variables	Current account			Saving			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Net mig. stock	0.164*** (0.048)	0.141*** (0.052)	0.133** (0.055)	0.170*** (0.056)	0.168*** (0.055)	0.161*** (0.057)	-0.005 (0.068)	0.005 (0.065)	0.013 (0.069)
Nat. increase	-1.134 (0.711)			-0.776 (0.939)			-0.053 (0.754)		
Dep. ratio		-0.092* (0.047)			-0.038 (0.060)			0.066 (0.050)	
Old dep. ratio			-0.215 (0.151)			-0.142 (0.155)			0.189 (0.126)
Young dep. ratio			-0.090* (0.047)			-0.036 (0.060)			0.064 (0.050)
Aging rate		-0.298* (0.160)	-0.266* (0.157)		0.124 (0.211)	0.149 (0.218)		0.344* (0.176)	0.315* (0.179)
Fiscal bal.	0.054 (0.057)	0.052 (0.055)	0.049 (0.055)	-0.035 (0.052)	-0.037 (0.051)	-0.039 (0.051)	-0.054*** (0.014)	-0.055*** (0.013)	-0.052*** (0.013)
Lag. NFA	0.687** (0.337)	0.695** (0.328)	0.666** (0.327)	1.162* (0.662)	1.101 (0.679)	1.058 (0.679)	0.129 (0.466)	0.089 (0.500)	0.134 (0.510)
Ln(GDP p.c.)	1.786** (0.709)	1.799*** (0.626)	1.980*** (0.700)	2.796*** (0.900)	2.713*** (0.828)	2.878*** (0.927)	1.050 (0.878)	1.258 (0.803)	1.065 (0.889)
GDP Growth	-0.462** (0.234)	-0.465** (0.231)	-0.457** (0.227)	0.517** (0.217)	0.512** (0.217)	0.517** (0.214)	0.843*** (0.130)	0.852*** (0.130)	0.845*** (0.128)
Trade open.	-0.041*** (0.016)	-0.045*** (0.015)	-0.047*** (0.016)	-0.009 (0.017)	-0.009 (0.016)	-0.011 (0.017)	0.044*** (0.012)	0.046*** (0.012)	0.048*** (0.012)
TOT change	0.097* (0.058)	0.099* (0.058)	0.097* (0.058)	0.123* (0.075)	0.115 (0.074)	0.113 (0.074)	0.112 (0.069)	0.107 (0.069)	0.109 (0.069)
Financial open.	-0.660 (1.183)	-0.406 (1.195)	-0.327 (1.208)	-1.201 (1.686)	-1.328 (1.725)	-1.260 (1.725)	-0.490 (1.392)	-0.757 (1.439)	-0.834 (1.466)
Financial dev.	-0.011 (0.017)	-0.002 (0.018)	-0.000 (0.018)	0.014 (0.023)	0.008 (0.022)	0.009 (0.022)	0.015 (0.019)	0.008 (0.020)	0.007 (0.020)
Oil exp. dummy	6.277*** (1.670)	5.950*** (1.674)	5.733*** (1.649)	8.077*** (1.549)	7.918*** (1.561)	7.726*** (1.574)	1.123 (1.472)	1.200 (1.496)	1.419 (1.489)
Crisis	1.476 (12.087)	2.885 (11.712)	3.808 (11.254)	0.873 (23.392)	1.671 (23.468)	2.450 (23.237)	-0.831 (11.318)	-1.340 (10.999)	-2.217 (11.650)
Constant	-3.446 (3.332)	2.837 (4.740)	3.816 (4.985)	7.585* (4.305)	8.642 (6.364)	9.453 (6.174)	11.625*** (4.045)	4.814 (5.352)	3.826 (5.219)
Observations	456	456	456	436	436	436	440	440	440
R-squared	0.448	0.451	0.452	0.474	0.475	0.477	0.363	0.365	0.363
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
K-P F-stat	133.9	129	124.1	84.43	85.95	83.62	81.99	83.27	81.57
SY 10% max IV size	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38
SY 25% max IV size	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530

Notes: Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5% and 1% confidence level, respectively. K-P F-stat is the [Kleibergen and Paap \(2006\)](#) rk Wald F-stat test of weak identification that has to be compared with [Stock and Yogo \(2005\)](#) critical values (SY 10% /25% max IV size).

5.5 On the issue of endogeneity

Although the gravity-based 2SLS strategy is widely used to deal with endogeneity in studies on international migration, it may be relevant to carry out more tests to ensure the robustness of our findings. We therefore perform two types of additional robustness tests, namely: (i) the use of an alternative instrument to that derived from the gravity model, and (ii) a sensitivity analysis of our results to the inclusion or exclusion of various control variables, including demographic ones.

First, instead of using the instrument constructed via the gravity model, we employ the diaspora as an instrument in the 2SLS approach. Indeed, the diaspora stock is considered to be a good predictor of the evolution of future flows and stocks of migrants due to network effects (see, for example, [Bosetti et al., 2015](#)). Therefore, we follow the previous studies using the initial shares of people born abroad as an alternative instrument (see among others, [D'Amuri and Peri, 2014](#); [Ottaviano et al., 2018](#); [Gnimassoun,](#)

Table 8: Pooled 2SLS estimates using stocks, net-immigration countries

Variables	Current account			Saving			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Immig. stock	-0.086 (0.136)	0.094 (0.102)	0.098 (0.101)	0.281* (0.170)	0.344** (0.147)	0.354*** (0.137)	0.314** (0.155)	0.196 (0.133)	0.192 (0.122)
Nat. increase	0.901 (1.542)			-2.316 (1.813)			-3.860** (1.714)		
Dep. ratio		0.177** (0.077)			0.057 (0.090)			-0.102* (0.060)	
Old dep. ratio			0.316* (0.169)			0.441* (0.233)			0.176 (0.153)
Young dep. ratio			0.149* (0.077)			-0.019 (0.085)			-0.157** (0.062)
Aging rate		0.527*** (0.126)	0.457*** (0.125)		0.332* (0.191)	0.142 (0.175)		-0.103 (0.123)	-0.246** (0.121)
Fiscal bal.	0.722*** (0.100)	0.778*** (0.099)	0.793*** (0.102)	0.420*** (0.121)	0.427*** (0.130)	0.470*** (0.131)	-0.034 (0.111)	-0.083 (0.105)	-0.051 (0.102)
Lag. NFA	1.916** (0.845)	1.859** (0.775)	1.953** (0.780)	1.517** (0.684)	1.524** (0.683)	1.804** (0.711)	-2.184** (0.946)	-1.849** (0.841)	-1.674** (0.821)
Ln(GDP p.c.)	5.532*** (2.084)	4.364*** (1.415)	3.575* (1.905)	-0.657 (2.905)	0.237 (2.367)	-1.959 (2.891)	-6.400*** (1.987)	-4.151*** (1.437)	-5.655*** (1.765)
GDP Growth	-0.103 (0.362)	0.123 (0.340)	0.097 (0.338)	0.442 (0.428)	0.619 (0.399)	0.552 (0.402)	0.587* (0.314)	0.560* (0.290)	0.492* (0.266)
Trade open.	0.017 (0.011)	0.002 (0.011)	0.006 (0.011)	0.013 (0.011)	0.003 (0.012)	0.013 (0.013)	0.007 (0.009)	0.009 (0.009)	0.017** (0.008)
TOT change	-0.047 (0.153)	-0.096 (0.154)	-0.105 (0.155)	-0.297 (0.217)	-0.286 (0.227)	-0.314 (0.219)	-0.275 (0.184)	-0.211 (0.168)	-0.226 (0.161)
Financial open.	-3.659 (3.628)	-5.996* (3.300)	-5.860* (3.186)	-10.571*** (3.901)	-12.112*** (3.959)	-11.824*** (3.599)	-9.567*** (3.270)	-9.062*** (3.144)	-8.645*** (2.934)
Financial dev.	-0.004 (0.015)	-0.004 (0.017)	0.000 (0.018)	-0.020 (0.015)	-0.024 (0.016)	-0.012 (0.020)	-0.004 (0.013)	-0.010 (0.012)	-0.000 (0.014)
Oil exp. dummy	-0.176 (2.146)	1.673 (1.831)	2.358 (2.261)	9.910*** (2.653)	9.642*** (2.475)	11.533*** (2.915)	8.939*** (2.319)	6.692*** (1.860)	8.006*** (2.124)
Constant	-23.485* (12.801)	-30.088*** (9.655)	-28.618*** (9.799)	37.253** (17.044)	27.460* (16.151)	31.718** (14.968)	62.965*** (11.882)	57.427*** (9.523)	59.892*** (8.784)
Observations	122	122	122	119	119	119	119	119	119
R-squared	0.774	0.788	0.789	0.730	0.710	0.718	0.221	0.345	0.380
K-P F-stat	8.792	9.885	13.07	8.468	9.775	12.83	5.144	5.848	7.879
SY 10% max IV size	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38
SY 25% max IV size	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530

Notes: Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5% and 1% confidence level, respectively. K-P F-stat is the Kleibergen and Paap (2006) rk Wald F-stat test of weak identification that has to be compared with Stock and Yogo (2005) critical values (SY 10% /25% max IV size).

2019). To limit the possible effects of the diaspora on the current account over the period under study, we use the pre-sample data on the stock of people born abroad. Since the migration database used so far is available from 1990, we calculate the diaspora rate using the World Bank's bilateral migration database. As those data are available from 1960 and by decade, we therefore use the net foreign-born rates for 1960, 1970, and 1980 as instruments for the net migration rates of 1990, 2000, and 2010 respectively, which corresponds to a 30-year lag.¹⁶

Second, we examine the sensitivity of our previous results by excluding control variables, but also by including more control variables. Since the effect of migration on the current account can be nested with that of the country's natural demographic variables, it may be relevant to assess what happens if the latter are not included in the regressions. Furthermore, given that certain variables such as the rates of openness to trade and to capital are influenced by the same geographic factors as migration, we analyze

¹⁶The strong correlation between the net migration rate and the net diaspora rate (see Figure A-2 in the Appendix) indicates that the latter is potentially a good instrument of the former.

Table 9: Pooled 2SLS estimates using stocks, net-emigration countries

Variables	Current account			Saving			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Emig. stock	-0.302*** (0.077)	-0.302*** (0.081)	-0.302*** (0.078)	-0.251** (0.122)	-0.262** (0.118)	-0.267** (0.112)	0.180* (0.094)	0.166* (0.090)	0.170** (0.085)
Nat. increase	-0.772 (1.076)			-2.338 (1.475)			-0.992 (1.095)		
Dep. ratio		-0.048 (0.070)			-0.147 (0.098)			-0.094 (0.069)	
Old dep. ratio			-0.063 (0.189)			-0.231 (0.181)			-0.032 (0.192)
Young dep. ratio			-0.048 (0.069)			-0.149 (0.097)			-0.094 (0.069)
Aging rate		-0.007 (0.187)	-0.005 (0.183)		0.056 (0.279)	0.071 (0.289)		-0.087 (0.213)	-0.096 (0.209)
Fiscal bal.	0.022 (0.021)	0.021 (0.021)	0.021 (0.021)	-0.050 (0.033)	-0.053 (0.032)	-0.055* (0.033)	-0.053*** (0.012)	-0.053*** (0.012)	-0.052*** (0.012)
Lag. NFA	0.646** (0.271)	0.655** (0.271)	0.655** (0.272)	1.136 (1.027)	0.972 (1.030)	0.948 (1.039)	0.942 (0.849)	0.865 (0.848)	0.880 (0.846)
Ln(GDP p.c.)	1.196 (1.054)	1.134 (1.027)	1.161 (1.099)	2.426* (1.325)	2.042 (1.292)	2.166 (1.385)	1.828 (1.383)	1.613 (1.286)	1.505 (1.406)
GDP Growth	-0.812*** (0.315)	-0.812*** (0.312)	-0.811*** (0.314)	0.104 (0.221)	0.106 (0.218)	0.111 (0.219)	0.839*** (0.249)	0.825*** (0.251)	0.822*** (0.252)
Trade open.	-0.013 (0.016)	-0.013 (0.017)	-0.013 (0.017)	0.010 (0.017)	0.011 (0.017)	0.012 (0.017)	0.018 (0.019)	0.019 (0.019)	0.019 (0.019)
TOT change	0.056 (0.093)	0.048 (0.095)	0.048 (0.095)	0.066 (0.100)	0.038 (0.104)	0.037 (0.105)	0.005 (0.081)	-0.011 (0.082)	-0.011 (0.083)
Financial open.	-0.909 (1.606)	-0.802 (1.581)	-0.761 (1.753)	-3.508 (2.375)	-3.217 (2.393)	-2.992 (2.407)	-2.069 (1.952)	-1.781 (1.954)	-1.956 (2.163)
Financial dev.	-0.018 (0.023)	-0.019 (0.023)	-0.018 (0.023)	-0.036 (0.024)	-0.039* (0.023)	-0.038 (0.023)	-0.028 (0.024)	-0.026 (0.025)	-0.027 (0.025)
Oil exp. dummy	7.389** (3.033)	7.169** (3.166)	7.115** (2.953)	10.686*** (2.789)	10.026*** (2.698)	9.730*** (2.681)	4.337* (2.361)	4.202* (2.475)	4.430* (2.345)
Constant	-0.371 (5.383)	1.941 (7.505)	2.016 (7.594)	14.348** (6.647)	21.490** (10.035)	22.146** (9.453)	12.465** (6.243)	18.258** (7.490)	17.858** (7.407)
Observations	238	238	238	222	222	222	229	229	229
R-squared	0.402	0.403	0.402	0.355	0.356	0.354	0.428	0.433	0.433
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
K-P F-stat	13.73	11.49	16.27	10.61	8.217	11.30	10.77	8.095	11.91
SY 10% max IV size	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38
SY 25% max IV size	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530

Notes: Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5% and 1% confidence level, respectively. K-P F-stat is the Kleibergen and Paap (2006) rk Wald F-stat test of weak identification that has to be compared with Stock and Yogo (2005) critical values (SY 10% /25% max IV size).

the sensitivity of the results to the inclusion and exclusion of such control variables. Finally, to limit the bias of omitted variables, we include other control variables used in the literature, such as a democracy index to proxy for the quality of institutions, the exchange rate regime, and GDP per capita (squared) to account for the possible non-linear effect of income.¹⁷

The results of these different robustness tests are summarized in Table 10. Using the net diaspora rate as an instrument, we obtain the results shown in columns 1 to 3. Although the number of observations has been considerably reduced, the impact of the net migration rate on the current account is higher and remains positive, significant at the 1% statistical level. The absence of controls (column 4), the exclusion of demographic variables and the rates of openness to trade and capital (column 5) or only demographic variables (column 6) do not affect the robustness of our findings. Similarly, our results remain valid even

¹⁷We use the level of democracy as a measure of the quality of institutions. This variable, which is an index ranging from 0 (the least democratic) to 10 (the most democratic), is extracted from the Freedom House database, and reflects the level of civil liberties and political rights. Regarding the exchange rate regime, we use the binary classification (peg *versus* non peg) of Shambaugh (2004).

with the inclusion of more control variables (columns 7 to 9). Overall, the additional checks confirm the robustness of our main conclusions to endogeneity issues.

Table 10: Pooled 2SLS estimates using stocks, sensitivity to controls

Variables	Diaspora as an instrument			Exclusion of controls			Inclusion of more controls		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Net mig. stock	0.247*** (0.061)	0.234*** (0.063)	0.238*** (0.065)	0.217*** (0.037)	0.157*** (0.044)	0.167*** (0.048)	0.163*** (0.056)	0.160*** (0.057)	0.166*** (0.058)
Nat. increase	-1.588** (0.744)						-1.177* (0.629)		-2.791** (1.320)
Dep. ratio		-0.063 (0.050)							
Old dep. ratio			0.024 (0.122)					-0.026 (0.099)	-0.151 (0.110)
Young dep. ratio			-0.073 (0.048)					-0.035 (0.042)	0.078 (0.066)
Aging rate		-0.081 (0.122)	-0.129 (0.122)					0.014 (0.112)	0.056 (0.112)
Fiscal bal.	0.035 (0.030)	0.031 (0.029)	0.034 (0.030)		0.072 (0.061)	0.070 (0.061)	0.076 (0.064)	0.073 (0.064)	0.073 (0.064)
Lag. NFA	0.858** (0.388)	0.855** (0.383)	0.879** (0.390)		1.108*** (0.403)	1.046** (0.407)	1.047*** (0.395)	1.048*** (0.399)	0.983** (0.391)
Ln(GDP p.c.)	0.795 (0.915)	1.095 (0.832)	0.875 (0.940)		1.610*** (0.584)	1.901*** (0.594)	0.097 (2.607)	0.309 (2.638)	0.072 (2.640)
GDP Growth	-0.551*** (0.182)	-0.546*** (0.197)	-0.550*** (0.197)		-0.560* (0.289)	-0.546** (0.273)	-0.579** (0.281)	-0.571** (0.283)	-0.562** (0.280)
TOT change	0.147* (0.077)	0.142* (0.078)	0.143* (0.078)		0.064 (0.059)	0.059 (0.060)	0.049 (0.061)	0.046 (0.061)	0.054 (0.063)
Financial dev.	-0.016 (0.012)	-0.012 (0.012)	-0.013 (0.012)		-0.021** (0.010)	-0.021** (0.010)	-0.020** (0.010)	-0.020** (0.010)	-0.019* (0.010)
Oil exp. dummy	4.807** (2.028)	4.202** (2.006)	4.458** (2.049)		5.799*** (1.510)	5.389*** (1.585)	6.156*** (1.696)	5.817*** (1.718)	6.141*** (1.738)
Crisis	-3.681 (9.864)	-1.514 (9.525)	-2.826 (9.712)		1.532 (10.842)	0.873 (11.481)	-1.072 (12.170)	-0.994 (12.222)	-1.799 (11.794)
Trade open.	0.004 (0.008)	0.003 (0.008)	0.005 (0.008)			-0.005 (0.008)	-0.001 (0.009)	-0.002 (0.010)	-0.003 (0.009)
Financial open.	-1.253 (1.325)	-1.014 (1.352)	-1.209 (1.420)			-0.986 (1.117)	-1.091 (1.082)	-1.092 (1.123)	-0.831 (1.104)
Ln(GDP p.c.) sq.							0.197 (0.383)	0.189 (0.388)	0.239 (0.387)
Democracy							-0.057 (0.164)	-0.040 (0.167)	0.013 (0.172)
Pegged ERR							-1.258* (0.663)	-1.258* (0.671)	-1.122* (0.674)
Constant	-0.963 (4.159)	0.756 (4.796)	0.868 (4.786)	-2.142*** (0.420)	-6.298** (2.888)	-6.492** (2.947)	-1.447 (4.379)	-1.252 (5.660)	-2.357 (5.734)
Observations	338	338	338	804	577	561	546	546	546
R-squared	0.421	0.420	0.421	0.172	0.418	0.440	0.452	0.450	0.454
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
K-P F-stat	79.01	74.33	73.08	31.35	33.31	29.81	32.76	33.02	34.58
SY 10% max IV size	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38	16.38
SY 25% max IV size	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530	5.530

Notes: Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5% and 1% confidence level, respectively. K-P F-stat is the [Kleibergen and Paap \(2006\)](#) rk Wald F-stat test of weak identification that has to be compared with [Stock and Yogo \(2005\)](#) critical values (SY 10% /25% max IV size).

6 Conclusion

This paper contributes to the recent literature on two highly topical subjects in international macroeconomics, namely global imbalances and migration. While previous studies address these two phenomena separately, we aim at investigating their dynamics in a unified framework. Specifically, relying on a

theoretical relationship derived from an overlapping generations model, we assess the role played by international migration in the evolution of global imbalances.

Considering a large panel of developed and developing economies over the period 1990-2014, we show that migration significantly improves the current account position of the host country, while having the opposite effect in the home country. Furthermore, we highlight that this impact of migration on the current account operates through the positive (negative) effect of immigration (emigration) on the saving rate of the host (home) country, with a mixed influence on investment due to remittances.

To deepen the analysis, we decompose our whole panel between advanced and developing countries to apprehend a potential heterogeneous effect of migration depending on the economies' level of development. We then find that the impact of net immigration on the current account balance and savings is particularly acute for developing countries compared to developed economies, and is attenuated by international remittances.

On the whole, our results emphasize that international migration has to be accounted for when studying the dynamics of global imbalances. Since a current account surplus (deficit) reflects a nation's financing capacity (need), our findings underline the key role played by international migration in driving capital flows around the world.

Appendix

List of countries

Advanced countries (34 countries): Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, United Kingdom, United States.

Developing countries (128 countries): Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bahrain, Bangladesh, Belarus, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Costa Rica, Cote d'Ivoire, Croatia, Democratic Republic of Congo, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Ethiopia, Fiji, Gabon, Gambia, Georgia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, India, Indonesia, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyz Republic, Laos, Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Malaysia, Maldives, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russia, Rwanda, Saint Vincent and the Grenadines, Samoa, Saudi Arabia, Senegal, Sierra Leone, Solomon Islands, South Africa, Sri Lanka, Sudan, Suriname, Swaziland, Tajikistan, Tanzania, Thailand, Togo, Tonga, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, Uruguay, Vanuatu, Venezuela, Vietnam, Zambia, Zimbabwe.

Oil-exporting countries (22 countries, based on IMF classification in which oil-exporting countries—or fuel-exporting countries—include countries that have mineral fuels, lubricants, and related materials comprising over 50 percent of their exports): Algeria, Angola, Azerbaijan, Bahrain, Chad, Congo, Ecuador, Equatorial Guinea, Gabon, Iran, Iraq, Kazakhstan, Kuwait, Libya, Nigeria, Norway, Oman, Qatar, Russia, Saudi Arabia, United Arab Emirates, Venezuela.

Table A-1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.
Current account balance (as % of GDP)	-3.23	9.04	-68.98	38.10
Saving (in % of GDP)	20.05	11.52	-47.36	57.78
Investment (in % of GDP)	23.59	8.27	4.15	90.07
Net migration flow rate (per 1,000)	-0.42	10.23	-74.75	96.32
Net migration stock rate (in %)	-1.22	16.06	-55.40	86.99
Natural increase rate (in %)	1.58	1.09	-0.72	3.84
Dependency ratio (in %)	66.45	19.61	16.85	111.14
Old-age dependency ratio (in %)	11.08	7.00	0.98	38.05
Young-age dependency ratio (in %)	55.37	24.29	15.27	105.86
Aging rate (in %)	4.29	5.14	-3.82	27.64
Fiscal balance (as % of GDP)	-2.52	12.45	-300.81	32.00
Net Foreign Assets (as % of GDP)	-0.42	1.57	-20.09	11.77
GDP growth rate (in %)	2.19	4.62	-37.03	50.79
Ln(GDP per capita (PPP, 2011 USD))	3.85	1.18	1.11	6.65
Trade openness (as % of GDP)	83.70	50.21	0.22	440.74
Terms of trade (change in %)	0.54	4.25	-27.05	27.25
Financial openness index	0.50	0.36	0.00	1.00
Financial dev. (credit as % of GDP)	43.98	42.79	0.62	261.54
Ln(GDP per capita (PPP, 2011 USD)) sq.	16.17	8.99	1.23	44.26
Democracy	6.10	3.19	0.00	10.00
Pegged exchange rate regime	0.43	0.50	0.00	1.00

Source: Authors' computations based on data from the following databases: United Nations, Department of Economic and Social Affairs, UNCTAD, WDI, WEO, PWT, GFDD, [Chinn and Ito \(2006\)](#), and [Lane and Milesi-Ferretti \(2007a\)](#).

Table A-2: Descriptive statistics on remittances

Variables	Mean	Std. Dev.	Min.	Max.
Remittances, whole sample				
received (% of Exports)	8.04	11.28	0.00	49.49
received (% of GDP)	3.25	5.08	0.00	29.16
paid (% of Imports)	2.76	4.90	0.01	42.58
paid (% of GDP)	1.19	2.08	0.00	17.83
Remittances, developing countries				
received (% of Exports)	10.21	12.26	0.00	49.49
received (% of GDP)	4.01	5.55	0.00	29.16
paid (% of Imports)	3.17	5.51	0.01	42.58
paid (% of GDP)	1.34	2.24	0.00	17.83
Remittances, advanced countries				
received (% of Exports)	1.71	2.53	0.05	18.39
received (% of GDP)	0.70	0.90	0.01	5.24
paid (% of Imports)	1.49	1.58	0.01	8.26
paid (% of GDP)	0.69	1.32	0.01	12.45

Source: Authors' computations based on data extracted from the WDI database.

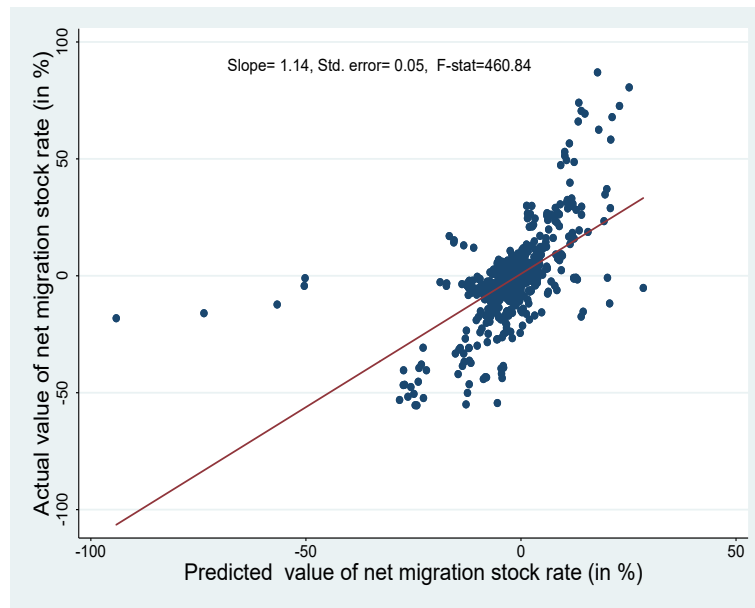
Notes: Outliers—Remittances received (% of Exports) > 50%, Remittances paid (% of Imports) > 50%, Remittances received (% of GDP) > 30%, Remittances paid (% of GDP) > 30%—are excluded. Depending on the variable, they represent between 0 and 7% of total observations.

Table A-3: Gravity regression

Variables	(1) Net immig.	(2) Net emig.
Ln 1960 population at destination	-0.382*** (0.012)	
Ln 1960 population at origin		-0.218*** (0.013)
Ln Distance*I(1990)	-1.071*** (0.086)	-1.419*** (0.158)
Ln Distance*I(1995)	-1.065*** (0.086)	-1.460*** (0.110)
Ln Distance*I(2000)	-1.049*** (0.086)	-1.455*** (0.098)
Ln Distance*I(2005)	-1.037*** (0.085)	-1.397*** (0.089)
Ln Distance*I(2010)	-1.040*** (0.089)	-1.397*** (0.086)
Border	0.497*** (0.094)	0.545*** (0.128)
Colonial ties	1.372*** (0.145)	1.588*** (0.101)
Common official language	0.290** (0.127)	0.762*** (0.101)
Common ethnic language	0.894*** (0.142)	0.562*** (0.124)
Constant	9.648*** (0.948)	7.775*** (1.438)
Observations	37,079	172,645
R-squared	0.437	0.283
Origin-time dummies	Yes	No
Destination-time dummies	No	Yes
Year dummies	Yes	Yes

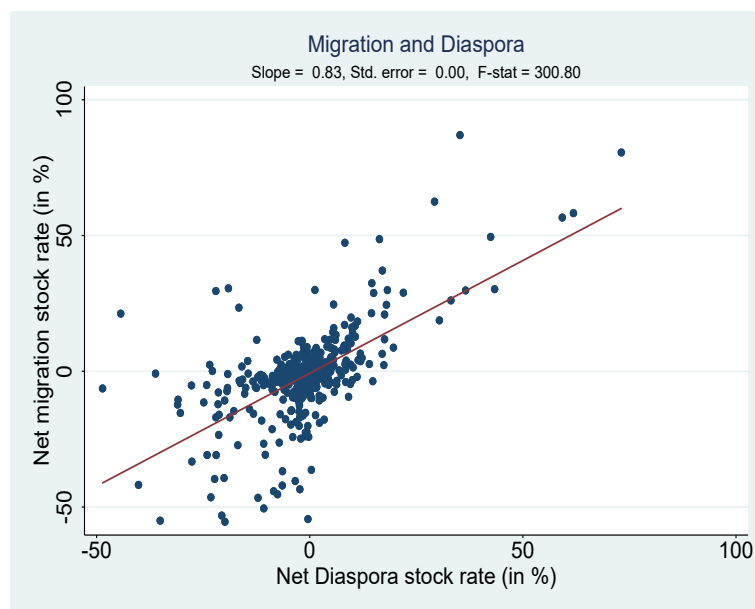
Notes: Robust standard errors clustered by destination country are in parentheses. *** denotes significance at the 1% confidence level.

Figure A-1: Observed and predicted values of net im(e)migration stock rate



Notes: Predicted values are issued from the estimation of Equations (25) and (26) (see Table A-3).

Figure A-2: Net im(e)migration stock rate and net diaspora stock rate



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