Dual-Citizenship-Driven Remittances and Impact on Social Welfare Indicators: A Study of Developing Countries

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Table of Contents

Abstract

Recent research has focused upon rising remittance inflows into developing countries as a consequence of growing international migration and how this plays a central role in their economy. On the other hand, dual citizenship is increasingly being recognized in a number of countries as a strategy to stimulate diaspora investments. This paper studies the effect of dual-citizenship-driven remittances on household welfare in migrant-sending countries. Analyzing a large panel dataset of 154 developing countries over the period 1960-2010, we find that dual-citizenship-driven remittances positively affect classical welfare indicators such as child survival and life expectancy. The findings are robust to the inclusion of a range of control variables, and when using plausible instruments to address possible endogeneity issues associated with remittances. The analysis suggests that foreign remittances improve household welfare by raising consumption.

1. Introduction

International migration has vast implications for growth and poverty alleviation in both origin and destination countries. According to the United Nations, more than 230 million people were living outside of their country of birth in 2013. This figure is expected to increase in the coming years with the ongoing trend of globalization, climate change, political tension, etc. Migration has mobility embedded in it, which essentially means migrating workers choose to be in a place where they are more productive as opposed to their home country, hence the aggregate outcome and income for both the sending and receiving country rise. Household surveys tend to show that remittances are often a crucial element of survival and livelihood strategies for mainly poor (chiefly rural) households (Rapoport and Docquier, 2004). Diasporas can prove to be an important source of trade, capital, technology and knowledge for countries of origin and destination. Remittance elevates a family’s standard of living, contributes to business formation and leads to community improvements; it represents a tangible accomplishment (Durand et al., 1996). On the other hand, when the diaspora are in countries that grant dual citizenship, the members can retain several benefits in their origin country, like smooth access to investment opportunities and maintaining relations with family and community, hence expediting the development of cross-nation solidarity and business networks (Oloufade and Pongou, 2013).

According to lawyers and political scientists, dual citizenship is considered as a political institution (Staton et al., 2007). Oloufade and Pongou (2013) argue that the dual-citizenship access also has important economic and social influences. This paper attempts to examine the impact of remittances - driven by dual citizenship - on various social welfare indicators such as child and infant mortality rates and life expectancy through the period of 1960 to 2010 across 154 developing nations. Furthermore, the study tries to document the channel through which remittances impact those welfare indicators.

1.1 Conceptual Framework

The primary hypothesis of this research is that remittances, stimulated by dual citizenship legislation, should have a positive impact on the livelihood of receiving communities, raising their non-labor income, increasing their consumption, and improving their ability to purchase healthcare, all of these resulting in lowering child mortality and increasing life expectancy.

We test this hypothesis using data on developing countries only. The reason is that developing countries tend to have collectivistic cultures in comparison to developed countries, which are more likely to have principally nuclear family structures (Greif, 1994, 2005; Todaro and Smith, 2012). Collectivistic cultures imply that migrants will tend to send more money to support their family back home.

Money sent back by migrants to their relatives and friends has implications for the economy of the origin countries. It acts as a major support for their balance of payments (Dustmann 1997). It also raises the income of the receiving households, which in turn determines the health of the children by protecting them from debilitating conditions (Case et al., 2002).

Our hypothesis is consistent with empirical studies that have shown that remittances decrease poverty in migrant-sending countries (Adams & Page, 2005; Spatafora, 2005). Remittances may therefore improve infant health by virtue of raising standards of living and improving nutrition, access to medical care and other necessities (Frank and Hummer, 2002). On a community level, Kanaiaupuni and Donato (1999) find evidence that remittances' effect on infant health is not linear. They show that societies characterized by low infant mortality were those in which migration had become an institutionalized feature of the social structure, whereas communities where people recently started international migration were characterized by higher infant death rates.

1.2 Overview of the results

We first estimate the effect of foreign remittance inflows on under-five child mortality rate. As we use a panel dataset, our estimation strategy exploits cross-country and cross-time variation in the amount of remittances sent. We find that the under-five child mortality reduces by 0.08% when there is a 10 percent increase in remittances. In a similar manner, we estimate the impact of remittance inflows on infant mortality and life expectancy at birth. Findings show that with every 10% rise in remittances, infant mortality rate goes down by 0.05% and life expectancy improves by 0.03%. The findings are robust to controlling for country and year fixed effects, as well as the inclusion of a range of other controls.

We also address possible issues of endogeneity associated with remittances. Remittances might be endogeneous for many reasons. Migrants might send money to respond to emergency situations. For instance, health situations leading to death might force migrants to remit more. In this case, remittances are driven by these situations. This reverse causality issue is the one we address by using instruments. The first instrument is the percentage of the diaspora population living in countries that recognize dual citizenship. The second is the fraction of countries belonging to the same continent that recognize dual citizenship..

The first-stage regressions show 87% of the variation in remittances is explained by the instruments. The fraction of the country's diaspora living in countries granting dual citizenship is considered to be those most likely to exert pressure on the origin country government for the dual-citizenship legislation. They are the ones who fight legally to get their host country citizenship without having to lose their first citizenship (Oloufade and Pongou, 2013). Therefore, the larger this fraction of the population, the more remittances is supposed to be. Furthermore, this fraction of diaspora cannot be said to have any direct relation with the outcome variables of the origin country (under five mortality, infant mortality and life expectancy) – which is a highly necessary quality of an instrument. On the other hand, when a country makes the decision of recognizing the dual-citizenship law, there is an implicit tendency of its neighbouring countries (belonging to the same continent) to be influenced. Presumably, many countries may eventually pass the same legislation. So according to our second instrument, the fraction of countries in a continent with laws allowing dual-citizenship over time has a positive relationship with remittances but should have no impact on the child and infant mortality rates nor life expectancy. Carrying out the two-stage least square (2SLS) estimation, findings can be construed as to agree with our claim of endogeneity. Controlling for all the factors along with the country and time fixed effects, instrumentation shows that child and infant mortality rates decrease by 1% when there is a ten percent rise in remittances, even retaining its statistical significance. Life expectancy increases by 0.06% with a ten percent increase in remittances. We carry out the weak instrument test and the Sargan test of over-identification, and the results cannot reject the validity of our instruments.

We conduct mechanism tests by estimating the effect of remittance inflows on household consumption expenditures repeating the same technique described earlier. The first set of results with all the controls reports a rise of 0.12% in the consumption level when remittances increase by ten percent. Following the instrumentation, this effect increases to 1.1% with all the controls remaining highly statistically significant. These values indicate how having dual citizenship incorporated in the model works as a catalyst to encourage the diaspora to be more connected and have easy access to the resources in their homeland. Thus, dual citizenship also takes care of the endogeneity problem. Among the two dominant theories of immigrant propensity and their connection to the homeland, one theory focuses on the altruistic behavior on migrants' part. This theory argues that migrants are more determined to improve the living standards of the people left behind. So, looking from this theoretical point of view, remittances act as a mechanism to increase aggregate consumption in the country of origin (Stark, 1995) or mediates as insurance to smooth consumption during exogenous shocks (Lucas and Stark, 1985).

Along with the introductory section, this paper is organized into six sections. Section 2 presents a discussion reviewing the literature on the impact of remittances on different social welfare measures like growth, poverty, child health, etc. The database and primary variables used to carry out our empirical analysis are described in detail in the third section. The fourth section outlines the empirical strategy used in this paper, presenting the results of the empirical analysis. The fifth section discusses in detail the process of solving the endogeneity problem through instrumentation. The last section summarizes the main findings of this study followed by the Appendix A which attempts to test the mechanism through remittances impact the social welfare indicators we consider. The descriptions and sources of the different variables used in the analysis are presented in Appendix B.

2. Literature Review

There is a broad literature on the impact of remittances on economic outcomes including growth, inequality, income distribution, poverty, and population health indicators. Research on dual citizenship legislation has also become popular in recent years. The amalgamation of the broader topic down the line of remittance as a by-product of dual-citizenship legislation and its impact on mortality rates and life expectancy has been less dealt with in the literature.

Bloemraad (2004) proposes that non-white poor immigrants from developing countries are usually in favor of dual citizenship and pertinent for leading transnational lives. In his article he referred to Basch, Glick Schiller and Szanton Blanc (1994), mentioning how individuals from developing countries use cross-border activities, such as, trade and investment. The reason is to combat their social, economic and racial positions in the foreign receiving country. Chami et al. (2008) are one of the first studies to examine the impact of remittance on government behavior. Their model targeted how remittance potentially has an undesirable effect on the receiving country institution. Suspecting a spurious correlation between remittance and corruption, they also use instruments for remittance. The two instruments used in their paper are the coastal area of the country and a measure of the distance between the receiving country and the largest remitting source nearest to it. Specifically for the second instrument, they mention how having a small distance between the highest remittance sending country and the developing countries leads to having higher remittance. Their conclusion implies that although remittance inflows have a positive impact on welfare for the receiving household, the benefit is still reduced by corruption as it encourages governments to "steal".

On the other hand, Catrinescu et al. (2009) replicated Chami et al.'s work to draw results along the line of remittance, institution and economic growth, but essentially contested Chami et al's hypothesis. Their proposition rather targeted how countries with perfect institutions will reap benefits from migrants' remittances on aggregate income. Their way of controlling the endogeneity issue of remittance is by using dynamic panel regression models. Their finding points out especially how remittance has higher growth effect in countries with high-quality institutions and policies. Catrinescu et al. (2009) also find that such institutions affect the amount and efficiency of investment, indicating that remittances can be channeled more effectively if there are proper institutions present, which ultimately leads to positive growth. Oloufade and Pongou (2013) compared the effectiveness of dual citizenship with other institutional variables like government stability and absence of internal and external conflicts on reducing child mortality. They found the former to have more influence particularly in the developing countries but less in developed countries.

Our paper also contributes to the literature that studies the impact of institutions on economic outcomes. Almond et al. (2006) illustrated how in rural south Mississippi federally mandated unification of hospitals improved the infant mortality rate immensely. That desegregation was part of the Civil Rights legislation of the 1960s. Their estimation results determine how the benefit of reduction in under-one child deaths due to the establishment of this institution is equivalent to $27.5 and $41.9 billion for black parents from 1965-2002. They conclude that the introduction of Civil Rights institution and its benefits goes beyond the labor market and is more significant than earlier recognized. Acemoglu and Johnson (2005) on the other hand, argued how institutions are an important determinant of economic growth and development. They considered property rights and contracting rights-institutions as their endogenous variable of interest. By using legal origin and colonization strategy as instruments, they carried out a 2SLS estimation to find robust impact of property right institution on long-run economic growth, financial development and investment. All these results prove to be consistent with our hypothesis that dual-citizenship can be a favourable institution for remittance-enhancing policies.

Ross (2006) in his paper discussed the government's impact on infant and child mortality rates and how they are mainly a function of the assistance a government gives to low-income households. Democratic systems will thus only affect infant and child mortality rates if they supply more benefits than nondemocratic systems do to low-income households. He shows how democratic countries concentrate on delivering mortality-averting goods and services to households that are not income constrained at the margin. Hence, he also argues how subsidies have no net effect on aggregate child and infant mortality levels (using these rates as a measure of poverty) as they do not go to the poorest section of the population. Ravallion and Bidani (1997) in their analysis report how the incidence of consumption poverty determines the aggregate health indicators. They continue by mentioning how cross-national differences are more helpful to compare the differences in health conditions of the poor than of the non-poor. The reason for concentrating on low-income countries in our paper can be justified by the above-made argument, especially, when the authors mention how better-off populations are in favourable situations as they can substitute public health spending by private.

Generally, most people agree that the fall in child mortality expresses to some extent, increasing incomes along with distribution of less costly health interventions like childhood immunization and oral rehydration therapy (Cutler, Deaton, and Lleras-Muney, n.d.; Hill and Amouzou, 2004; Hill and Pande, 1997). Kakwani (1993) also used child and infant mortality as an aggregate welfare measure for standard of living across countries. His estimation suggested that a livelihood is more reactive to per capita income in the poorer countries than in the richer ones.

The active study of remittance and its much talked about economic influence in the literature focuses on two primary approaches: micro-economic and macro-economic. While the results of these past studies are informative, their conclusions are often inadequate due to the small sample size. Most studies on migration and its patterns also stem down to remittance, including factors such as behaviors of remitters and the impact on the receiving end. Early sociological studies highlighted how remittances affected mainly finance consumption and housing expenditures with rarely any dynamic effect. One of the first at the micro-economic level has been Lucas and Stark (1985) who found in their study in Botswana that not only does remittance raises with the size of the migrant's income, but there is also a positive relationship between the level of remittances and the receiving household's income pre-remittance. Other researchers have utilized aggregate data and looked into the macro-economic issues of remittance. They basically suggest that macro-economic factors — like interest rates, exchange rates, and political instability — all have an impact on the level of international remittances received by countries (El-Sakka and McNabb, 1999; Faini, 1994; Glytsos, 1997; Higgins, Hysenbegasi and Pozo, 2004). Their findings primarily point out that interest and exchange rates need to be competitive and that states require political stability in order to boost the flow of remittances to labor-sending countries. Giuliano and Arranz (2009) suggest in their analysis that agents compensate for the lack of development of local financial markets using remittances to ease liquidity constraints, channeling resources towards efficient investments, all leading to stimulated economic growth.

One study that is frequently cited in the field of remittance is that of Adams et *al*. (2005), which used data from 71 developing countries. Subsequently, Richard & Adams (2009) compiled new data from 76 low and middle-income developing countries and examined the demographic, economic and financial causes of international remittances. The evidence on the explicit effect of remittances on poverty and inequality appears to differ according to the sample (Adams, 1991; Barham and Boucher, 1998). Their findings show how countries received less per capita remittances when they sent high-skilled migrants compared to low-skilled migrants keeping all else constant. The similarity between this paper and the above-mentioned study is that they used the instrumental variable approach, but their endogenous variables are skill level of migrants, stocks of migrants abroad and poverty. The instrument that is similar to this paper is the distance (miles) between the labor-sending country and the main remittance sending region for skill level of migrants. In this paper, however, remittance is considered the endogenous variable and one of the instruments is the fraction of countries in the same region (continent) that provides the dual citizenship. The reasoning is discussed in section five.

McCormick and Wahba (2000) describe a model that shows remittances rise with foreign country income, fall when number of dependants is more and increases as the number of migrants increases. Similar relations are also shown by Elbadawi and Rocha in their study of the times series model of remittances and low-income countries, to support how remittances are proportional to the stock of migrants. In our paper, stock of migrants is kept as a control variable justifying the high correlation it has with remittances.

In a study carried out in rural Mexico, Stark and Taylor (1989) find that ‘‘relatively deprived’’ households are expected to participate more in international migration than are ‘‘better-off’’ households. In a similar manner, in rural Egypt, Adams (1991) finds that the number of poor households falls by 9.8% when international remittances are included in household income. He also finds remittances account for 14.7% of total income of poor households. These studies can be assumed to serve as an example of how developing (low and middle income) countries sending more unskilled labor than developed countries will be receiving more remittances. These are the countries suffering from acute poverty and struggling with the basic welfare indicators and an extra bit of income from remittance has a positive lift to their family status. Gupta et al. (2009) on the other hand use a smaller sample comprised of 24 countries in sub-Saharan Africa in their paper and find that remittances have a direct poverty-alleviating effect and a positive effect on financial development. The diaspora's remittance facilitates in removing the budget constraints of the recipients in the origin country and helps them to have a sort of base in the formal financial sector. Acosta et al. (2008) carried out a study in Latin America to show how migration and remittances have statistically significant poverty-reducing effects. Their discussion includes how remittance increases the per capita income of those receiving countries and also has an influence on reducing inequality. Their study also concentrated on instrumenting for remittance. They constructed one of the instruments by taking the top ten migrant-receiving countries, weighting it by the inverse of their distance with the remittance receiving country. This paper, on the other side, used the fraction of countries giving dual citizenship in the same continent as the receiving country as an instrument.

There has been limited study done specifying remittance and its prospective impact on improving health indicators, which are often considered as a proxy for social welfare. Most literature deals with migration and how it may affect health and mortality by altering economic resources and investment forms, moving social networks and supplying new information about health and lifestyles. Kanaiaupuni and Donato (1999) analyze the effects of migration on survival outcomes for Mexican infants and find that the results are more over time than immediate. They also stress how the benefits do not stop with infants in families of migrants but extend to the whole community. Their overall result indicates how the social and economic processes of migration particularly to the US become increasingly prominent in the household's livelihoods and that essentially furthers infant survival. Hildebrandt and McKenzie (2005) investigated the impact of migration on human capital accumulation by focusing on child health outcomes in Mexico. They point out how it is a vital aspect of well-being and a crucial determinant of future productivity. Their paper mentions that the initial channel of effect of migration on income and wealth is through remittances and savings in the receiving country and how households spend more on food and health services. Families' budget constraints are eased, allowing more spending on nutritional and medical inputs essentially for children. Hence, remittance enhances liquidity. Migrants gain health knowledge through exposure to developed country practices (Hildebrandt, and McKenzie, 2005). The authors further suggest that indirect benefits of remittance should be taken into consideration for designing efficient migration policies.

Among the first researchers working on remittances and anthropometric measures like height and weight are Acosta, Fajnzylber and Lo´pez (2007). Their findings in Guatemala suggest remittance has a positive effect on child weight, immunization and doctor visits. They only used OLS technique, unlike Anto´n (2010) who, using an instrumental variable analysis, finds a positive and significant effect on short and medium term child nutritional status of remittance in Ecuador. The paper considered remittance as an endogenous variable and instrumented it by the number of Western Union offices per 100,000 people in each province. Other related literature includes the study of Frank and Hummer (2002), who also focused on Mexico to find how a migrant in the family increases birth weight, and the study of Chauvet, Gubert, and Mesple´-Somps (2008) who show using cross-section data that the flow of remittance helps reduce infant mortality and malnutrition.

Some studies reveal a different story of the effect of remittance, particularly on income distribution and inequality. For example, a sample of households in Bluefields, Nicaragua by Barham and Boucher (1998) shows the result of the impact of migration and remittance. They find a rise in income inequality when compared with a "no migration" control group. As discussed above, Chami et al. (2005), in a previous study using a 113 country aggregate panel dataset, reason that remittance can have adverse effects on the receiving country's economic growth. Their argument is based on the fact that remittances channel through asymmetric information and create moral hazard problems. Other studies include Kandel and Kao (2001) who suggest that having parents as migrants allows children in Mexico to get economic opportunities, but discourages human capital accumulation.

In spite of such studies, the majority of literature points towards the positive impacts of remittance. The remittance income is different and temporary with respect to normal income, as mentioned by McKenzie and Sasin (2007). Following the permanent income hypothesis, remittance is more likely to be invested in child health (if health is seen as an investment by parents), unlike usual consumption. Moreover, since money is remitted for a definite purpose, it supports investment over consumption. Additionally, the presence of sound institutions in the origin country and the indication that dual-citizenship legislation contains potential institutional qualities can be proven to improve population health and social welfare measures.

3. Data and Methodology

Our evaluation of the impact of remittances on social welfare indicators in developing countries is based on a new data set that is assembled combining the dataset used in the Oloufade and Pongou (2013) reference paper and data on few additional variables (instruments). A selection of 154 developing nations is used from the total of 192 countries present in the data set. Countries are included based on data availability. The list of countries used for this paper is included in Table B.2 of Appendix B.

The advantage of using panel data is mainly to control for variables that cannot be observed or measured, and variables that change over time but not across entities (i.e. national policies, federal regulations, international agreements, etc.). So it compensates for individual heterogeneity. Some drawbacks include data collection issues, and in some cases — when such a number of countries are chosen — that correlations between countries tend to exist. As the dataset is a panel, the software created individual country and year dummy variables. The effect of remittance (or log of remittance) is mediated by the differences across countries and years because each dummy absorbs the effects particular to each country and year (Hildebrandt, 2005). This way the paper estimates the pure effect of a particular independent variable by controlling for the unobserved heterogeneity.

Details on collected and created variables will be mentioned extensively in the following sections.

3.1 Dependent Variables

We estimate the effect of remittances on three outcomes. The first outcome variable is the under-five mortality rate per thousand children — the probability that a child would die before turning five. The second variable is the infant mortality rate— the probability that a child would die before turning one—, and the third outcome is life expectancy at birth. Remittance data are mostly available from the period 1970-2010 and are obtained from the World Development Indicators (WDI, 2011) of the World Bank.

3.1.1 Under-five Child Mortality

The under-five mortality rate is defined as the probability of dying between birth and exactly five years of age. For most of the developing countries, where the maximum of under-five deaths occur, the data are obtained from censuses and household surveys.

Recent statistics and figures retrieved from UNICEF show that in 2012, the under-five mortality rate in low-income countries was 82 deaths per 1,000 live births, which was more than 13 times the average rate in high-income countries (6 deaths per 1,000 live births). These data suggest the extent of the inequality across countries. Worldwide, under-five mortality fell by 47% from the assessed rate of 90 deaths 48 deaths per 1,000 live births between 1990 and 2012. According to the Global Health Observatory under World Health Organization, the average annual rate of reduction in under-five mortality has grown from 1.2% a year over the period 1990-1995 to 3.9% for 2005-2012. This figure is still insufficient to reach the Millennium Development Goals. Overall, about 17,000 fewer children died every day in 2012 than in 1990 (1990 being the baseline year for measuring progress). The MDG target is still two-thirds short of the achievement so far in the reduction of child mortality. So, to achieve the goal of 30 deaths per 1,000 live births (the MDG target) by 2015, accelerated development is necessary.

3.1.2 Infant Mortality

The infant mortality rate (IMR) is defined as the number of deaths in children below one year of age per 1,000 live births in the same year. It has been considered to be an extremely sensitive proxy measure of population health in the past. The relationship among the causes of infant mortality and other issues (that most likely affect the health status of the whole population) can be identified as the country's economic development, overall living conditions, social status, illness rates, the quality of the environment and maybe even governance. IMR easily reacts to structural changes along with any disease epidemics, making it a crucial indicator. Since subtle and swift changes in the determinants of population health can be captured by changes in the IMR, it proves to be an efficient and comparatively inexpensive measure of population health status.

3.1.3 Life Expectancy

Life expectancy at birth compares the average number of years lived by a group of people born in a particular year if mortality at each age remains constant in the future (The World Facebook, CIA). A population's overall mortality level is usually given by life expectancy at birth. It condenses the mortality pattern that prevails through all age groups in a given year (children and adolescents, adults and the elderly). The 2012 figure shows that life expectancy at birth for both sexes globally was 70 years, ranging from 62 years in least-developed and developing countries to 79 years in developed countries (WHO, Life Expectancy, World Health Organization). This represents a ratio of 1:3 between the two income groups.

Worldwide, the overall life expectancy at birth has increased by six years since 1990. In Europe during the 1990s this value was stationary, but in Africa it even fell. According to UNICEF, for Europe the phenomenon was perhaps because of adverse mortality trends in the former Soviet Union countries and a decrease in Africa may have been caused by HIV/AIDS. But the recent availability of antiretroviral therapy has reduced the spread of the epidemic, and the mortality due to HIV/AIDS has been decreasing since about 2005 (WHO, Life Expectancy, World Health Organization). This allowed life expectancy at birth to increase again on average from 50 years in 2000 to 58 years in 2012. Life expectancy at birth is also sometimes compared to health-adjusted life expectancy (HALE) at birth to evaluate whether the added years of life are spent in good health. Life expectancy at birth is nothing but the average lifespan of someone born in a country. It can be affected by many events like wars, natural disasters and disease, but it can be concluded that the higher the life expectancy, the more developed the country is.

3.2 Main independent variable: Remittances

Our main independent variable is the amount of foreign remittance inflows into a developing country. Officially recorded remittances to developing countries were an estimated $404 billion in 2013, marking an increase of about 3.3% over the previous year and overall global remittance flows, including those to high-income countries. The countries receiving the highest officially recorded remittances in 2013 are India ($70 billion), China ($60 billion), the Philippines ($25 billion) and Mexico ($22 billion). Other large recipients included Nigeria, Egypt, Bangladesh, Pakistan, Vietnam and Ukraine. However, as a share of GDP, remittances were larger in smaller and lower income countries with the tops being Tajikistan (52%), Kyrgyz Republic (31%), Nepal and Moldova (both 25%) and Samoa and Lesotho (both 23%). The amount of remittances sent to developing countries is almost equivalent to threefold of that sent to developed countries. This study plans to look at the impact that remittances have on welfare measures like child and infant mortality rates and life expectancy, based on the data available from 154 developing countries.

Global remittances are expected to reach $581 billion in 2014 despite the current feeble economic condition, of which $436 billion will flow into developing countries. Though remittance costs have continuously fallen in recent years, they remain high in Africa and in small countries where remittances provide sustenance to the poor. The average remittance price has been reduced to 5 percent, in line with G8 and G20 targets, which can save migrants around $14 billion a year (The World Bank, News & Broadcast). Economic theory suggests that remittances should generally tend to reduce the level and severity of poverty, which can lead to higher human capital accumulation, greater health and education spending, better access to information and communication technologies, developed access to formal financial sector services, enhanced small business investment, more entrepreneurship, higher preparedness for adverse shocks, and reduced child labor. Remittances are often recognized as informal social arrangements within extended families and communities. Primarily, a common motivation to remit is simply because the migrants are concerned about those left behind, such as parents, spouses, children and members of other social circles (Rapoport and Docquier, 2004).

Macro level study on remittance and its impact can become quite difficult because of the absence of quality data. Problems within the micro level study are mostly in distinguishing competing theories of remittances that are more or less similar for the common determining variables. Any additional control variables which prove to be helpful also have the same issues of inaccessible data. In spite of all these limitations, extensive research on remittance and its influence on welfare economics are considered a significant contribution to the existing literature.

3.3 Basic Model Specification

To explore the relationship between remittances and household welfare indicators the paper uses a panel data set for the period 1960 to 2010 and a total of 154 developing nations. These are necessarily the countries with higher child mortality rates and lower life expectancy.

As a starting exercise, the paper estimates the impact of remittances on under-five mortality, infant mortality and life expectancy by ordinary least squares (OLS). The econometric model refers to the one discussed in Oloufade and Pongou (2013); this paper, however, uses a log-log model to better express the marginal changes.

$$\boldsymbol{logy_{c,t} \ = \ \alpha_0 + \ \alpha_1 logremitance_{c,t} + X_{c,t}\alpha_2 + \theta_c + \gamma_t + \varepsilon_{c,t}}$$

Where $log\boldsymbol{y_{c,t}}$ gives the log value of each of the outcome variables measured for country c and year t; log remittance is the log value of the workers' remittances and compensation of employees received in current US$. $\boldsymbol{X_{c,t}}$ is a vector of control variables; $\boldsymbol{\theta_c}$ is a dummy variable for country and $\boldsymbol{\gamma_t}$ is a dummy variable for the period. $\boldsymbol{\varepsilon_{c,t}}$ is an error term which in the beginning is assumed to have no correlation with remittances, given all the control variables. The main parameter of interest is the coefficient $\boldsymbol{\alpha_1}$ and $\boldsymbol{\alpha_2}$.With the former, we want to test whether the marginal impact of remittance on child mortality, infant mortality and life expectancy is statistically significant, and the latter is the coefficient vector which reflects the effects of control variables.

The model is consistent with the previous literature which had similar variables of interest. There will be more independent variables added in the above-mentioned model in order to correct for any suspected endogeneity problem, and these will be discussed later in the instrumental variables section.

3.3.1 Potential Endogeneity of Remittances

It is plausible that the model presented above can face endogeneity problems. Selection bias, omitted variable bias, measurement errors or simultaneity are likely. Hence, a range of control variables are included. Year fixed effect regressions are estimated first to control for period trends — which can be a source of endogeneity that is the same for all countries in a specific time, but varies over time. Country fixed effect regressions are carried out to control for country time-invariant factors. So the identification comes from comparing the changes in the level of the three outcomes with the changes in remittances. To account for the factors that might cause the endogeneity problem in remittances several control variables are included for most of the analysis (in sync with the reference paper by Oloufade and Pongou, 2013). The list of control variables includes the total size of the diaspora — the migrant population who mainly send the remittance. The larger the total international migrant stock, the higher the remittance is supposed to be. Control for GDP in constant prices for the base year 2000 in US dollars is included as well. The gross domestic product of a country represents its yearly total income and production and growth. A high GDP means higher income for the country. That is, higher public spending on health and development factors leads to a positive impact on the child survival rates of a country as a whole and improved life expectancy. Additional controls include inflation rate, that is measured by the GDP deflator in percentage (annually); total population of countries; and financial development, which is measured by the domestic credit to private sector in percent of the GDP.

The first set of OLS regressions does not address the issue of endogeneity. Theoretically, however, it is possible and very likely that remittance will have a causal relationship with the above explained outcome variables. So the first set of results can be an overstatement of the impact of remittance on these population health indicators and can provide biased parameters and inconsistent results.

3.3.2 Organizing the Analysis

The analysis is conducted in two main parts. First, the estimation results are presented for all three variables of interest that reflect the impact of remittance on the social welfare indicators. Second, the endogeneity issue associated with remittance is discussed and solved using instrumental variables. To better explain how remittances influence our outcome variables, one potential mechanism is tested in Appendix A.

4. Empirical Analysis

This section starts by investigating the effect of remittances on population welfare indicators.

4.1 Effects of remittances on Under-five Mortality Rate

The estimated effects of log remittance (current US$) on child mortality are presented in Table 1. In Column 1, only log remittance is included. In Column 2, additional control variables like log of gross domestic product, inflation rate, total population, financial development and international migrant stock are included. In order to keep the number of observations high, dummies for each of the control variables are included to compensate somewhat for the missing value issue, but are not put in the tables for aesthetic purposes. In Column 3, controls for country and year fixed effects, along with all the above-mentioned variables, are added for the developing countries. In this way, it is easier to distinguish among the results of the steps of the different method of estimation. When looking at the individual effect of remittance in column one, findings suggest that a 10 percent increase in remittances will decrease under-five child mortality rate (UMR) by 1.04% — marking a statistically significant value. When adding the control variables it remains significant but the magnitude of the effect increases to 1.25%. So the inclusion of all the control variables does not by any means reduce the effect of remittance on child mortality. However, controlling for country and year fixed effects in column 3 reduces the coefficient of remittances to 0.08%, but the effect is still significant at 5% level. All the control variables are significant in the OLS regressions except inflation. The international migrant stock, which is assumed to increase remittance flows and reduce child mortality, becomes insignificant in the fixed effect model, unlike the OLS estimation. It also shows that a rise in the stock of migrants does not lower the UMR rate. The R-squared value obtained when the fixed effect model is estimated is higher (97.1%) than the rest of the models, indicating a better fit.

Table 1 Effect of Remittance on Under-Five Mortality Rate (UMR)

Variables	**OLS**	**OLS**	**FE**
Log Remittance	-0.104***	-0.125***	-0.008**
	(0.01)	(0.01)	(0.00)
Log GDP (con)		-0.028***	-0.005***
		(0.00)	(0.00)
Log Inflation		-0.007	0.014***
		(0.01)	(0.00)
Log Total Population		0.269***	0.147***
		(0.01)	(0.03)
Log Stock of Migrant		-0.095***	0.012
		(0.01)	(0.01)
Log Domestic Credit to Private Sector (DCP)		-0.409***	-0.075***
		(0.02)	(0.01)
Constant	5.888***	5.074***	3.104***
	(0.11)	(0.11)	(0.53)
Country Fixed Effect	**No**	**No**	**Yes**
Period Fixed Effect	**No**	**No**	**Yes**
No. of Observations	**3529**	**3529**	**3529**
R-Squared	**0.085**	**0.452**	**0.971**

Standard errors are in parentheses. * $p<0.10$; ** $p<0.05$; *** $p<0.001$

The result of the fixed effect model also suggests that the gross domestic product of a country and its financial development have a reducing effect on child mortality, whereas inflation and population size have worsening effects. Overall, these findings are consistent with the arguments presented earlier, in the sense that remittances do have poverty alleviating and consumption smoothing effects on the receiving end (Barajas et al., 2009).

4.2 Effects of Remittance on Infant Mortality

The analysis of infant mortality is presented in Table 2. The findings show that a ten percent increase in remittance tends to reduce infant mortality rate by 0.86%, and the value is highly significant. The effect increases to 1.02 % when all the control variables are included, keeping its statistical significance. The one difference that is observed when estimating the fixed effect model for developing countries, unlike the UMR, is that the effect of a 10 percent rise in remittance reduces infant mortality further to 0.05%, being significant at the 10% level. The rest of the control variables remain highly significant except for migrant stock, like the previous outcome, indicating infant mortality condition worsens as total migrant stock increases. Results from this outcome variable maintain the high R-squared value (96.8%) for the fixed effect model as well.

Table 2 Effect of Remittance on Infant Mortality Rate (IMR)

Variables	OLS	OLS	FE
Log Remittance	-0.086***	-0.102***	-0.005*
	(0.01)	(0.01)	(0.00)
Log GDP (con)		-0.024***	-0.004***
		(0.00)	(0.00)
Log Inflation		0.007	0.014***
		(0.01)	(0.00)
Log Total Population		0.232***	0.210***
		(0.01)	(0.03)
Log Stock of Migrant		-0.089***	0.008
		(0.01)	(0.01)
Log Domestic Credit to Private Sector (DCP)		-0.355***	-0.070***
		(0.01)	(0.01)
Constant	5.271***	4.582***	1.848***
	(0.09)	(0.10)	(0.48)
Country Fixed Effect	**No**	**No**	**Yes**
Period Fixed Effect	**No**	**No**	**Yes**
No. of Observations	**3529**	**3529**	**3529**
R-Squared	**0.077**	**0.443**	**0.969**

Standard errors are in parentheses. * p<0.10; ** p<0.05; *** p<0.001

4.3 Effects of Remittances on Life Expectancy at Birth

The estimated effects of remittances on life expectancy at birth are presented in Table 3. The impact of remittances alone is positive and statistically significant. A ten percent rise in remittances improves the life expectancy rate by 0.23%, whereas when the controls are added without the domestic credit to private sector (DCP), the effect increases to 0.32% but remains more or less the same (0.25%) with the financial development variable. The increments in life expectancy as a percentage is very small (0.03%) when both the fixed effect models (with and without domestic credit for private sector) are estimated for developing countries, but still stay highly statistically significant. The R-squared values for the fixed effect models remain high. Similar to the previous outcomes, the total migrant stock variable is not significant and depicts a negative impact on life expectancy at birth. The effect of inflation in both the fixed effect models gives the same magnitude of fall of life expectancy, but the one without the financial development variable is significant at 5% while the one including that variable is significant

10%. The negative sign in the fixed effect models suggests that increasing inflation in the economy has a negative effect on the life expectancy at birth. It is quite normal to expect the rising prices to become a barrier for extra spending on child nutrition and health care for low-income households.

Table 3 Effect of Remittance on Life Expectancy at Birth

Variables	OLS	OLS	FE	OLS	FE
Log Remittance	0.023***	0.032***	0.003***	0.025***	0.003***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log GDP (con)		0.007***	0.002***	0.004***	0.002***
		(0.00)	(0.00)	(0.00)	(0.00)
Log Inflation		0.002	-0.002**	0.010***	-0.002*
		(0.00)	(0.00)	(0.00)	(0.00)
Log Total Population		-0.042***	0.087***	-0.036***	0.099***
		(0.00)	(0.01)	(0.00)	(0.01)
Log Stock of Migrant		0.003	-0.002	0.007***	-0.002
		(0.00)	(0.00)	(0.00)	(0.00)
Log Domestic Credit to Private Sector (DCP)				0.068***	0.011***
				(0.00)	(0.00)
Constant	3.717***	3.816***	2.952***	3.857***	2.015***
	(0.02)	(0.02)	(0.11)	(0.02)	(0.21)
Country Fixed Effect	**No**	**No**	**Yes**	**No**	**Yes**
Period Fixed Effect	**No**	**No**	**Yes**	**No**	**Yes**
No. of Observations	**3326**	**3326**	**3326**	**3326**	**3326**
R-Squared	**0.137**	**0.309**	**0.933**	**0.398**	**0.933**

Standard errors are in parentheses. * p<0.10; ** p<0.05; *** p<0.001

Overall, it can be understood from the analysis so far that remittances do have a beneficial impact on the chosen welfare indicators. Even after controlling for multiple variables and country and year fixed effects, the results are found to be fairly favourable towards the hypothesis made earlier. At the macroeconomic level, lower income countries that tend to suffer from issues of high death rates (both child and infant) do in fact get a portion of money from their citizens who migrate to other countries. The diaspora belonging to the developing countries most likely migrate to improve the conditions of immediate family back home. The money that they send as remittance works as a leverage to boost income for families whose consumption behaviour is supposed to change. It can be postulated that this extra income of the family primarily allows them to spend more on living standard, health and education.

5. Instrumental Variable Analysis

This section uses instrumental variables (IV) to address possible endogeneity issues associated with remittances. There are two main requirements for using an IV:

- The instrument must be correlated with the endogenous explanatory variables, conditional on the other covariates.
- The instrument cannot be correlated with the error term in the explanatory equation - that is, the instrument cannot suffer from the same problem as the original predicting variable.

Finding out effective and fitting instruments is always a hard task. Rajan and Subramanian (2005) used the distance from the country of origin. The problem with this variable is that it does not change over time, so using it in a panel framework might not give efficient results. Still, in an attempt to create a fresh distance variable, during the study the geographical distances between all the 192 countries were calculated in kilometers using the “haversine” formula. This process included finding out the latitude and longitude coordinates of each country and incorporating the earth’s radius. The countries in the data set were divided into continents, and the distances were mainly noted between individual countries and all other countries on the same continent as the origin country. For each year, we computed the minimum distance between each country and the nearest country (on the same continent) that grants dual-citizenship. We also computed the fraction of regional countries that grant dual citizenship. This latter variable showed much variation in the data, unlike just the distance variable, and is chosen to be one of the instruments for the second set of empirical analysis. It is a pertinent instrument because as the number of countries giving access to dual-citizenship grows in individual continents, it is more likely that there will be an effect on the other regional countries to give the same access and to attract foreign remittances from the diaspora.

The second instrument is the percentage of the diaspora population living in countries that grant dual citizenship. The findings from Oloufade and Pongou (2013) already suggest how dual citizenship along with protecting the rights of members of the diaspora in their homeland has a positive impact on remittance and takes a different approach than the other mentioned institutions in the literature. The main argument is that the more people live in the countries that grant dual-citizenship, the more the chance of getting easy access to remittance. The probability of remitting more money is high as the rules become flexible, and situations become less hostile.

5.1 Instrumental Variable Estimation: First Stage

In this part of the analysis, we study the effects of our instruments on remittances. The findings are presented in Table 4. Ordinary least squares regressions show that the instruments positively affect remittances. Controlling for other variables in the second column and additionally for country and year fixed effects in the third column does not affect the statistical significance of the effects of the instruments on remittances.

Table 4 First Stage IV Estimation

Variables	IV	IV	FE-IV
Log % of Diaspora in Dual Citizenship	0.085**	0.204***	0.218***
Granting Countries	(0.03)	(0.02)	(0.02)
Fraction of Regional Country	5.464***	4.241***	1.529***
(giving dual-citizenship)	(0.26)	(0.21)	(0.29)
Log of GDP (con)		0.038***	0.006
		(0.01)	(0.01)
Log Inflation		-0.101***	-0.055**
		(0.03)	(0.02)
Log Total Population		0.736***	-0.074
		(0.03)	(0.23)
Log Stock of Migrant		-0.063*	-0.193***
		(0.03)	(0.05)
Log Domestic Credit to Private Sector (DCP)		0.618***	0.100**
		(0.04)	(0.04)
Constant	15.439***	3.122***	22.814***
	(0.16)	(0.30)	(4.81)
Country Fixed Effect	**No**	**No**	**Yes**
Period Fixed Effect	**No**	**No**	**Yes**
No. of Observations	**3295**	**3295**	**3295**
R-Squared	**0.141**	**0.525**	**0.868**

Standard errors are in parentheses.* p<0.10; ** p<0.05; *** p<0.001

For all three estimations, the coefficients are significant statistically. This in a way indicates that there is a high correlation between the instruments and remittances, or more precisely, the instruments explain some variation in remittances. Moreover, when including the fixed effects, the regression gives a high R-squared value pointing to a higher goodness of fit.

5.2 Two-Stage Least Squares Estimation (2SLS)

We estimate the effect of remittances on each of our outcomes using a two-stage least squares regression in which remittances are instrumented by the fraction of neighboring countries granting dual citizenship and the fraction of the diaspora population living in countries that grant dual citizenship. Furthermore, three diagnostic tests are carried out to test for: (i) endogeneity; (ii) over-identification; and (iii) strength of the instruments.

5.2.1 IV Estimation: Under-five Child Mortality Rate

The results of the 2SLS estimation for under-five mortality rate along with the diagnostic test results are presented in the following table.

Table 5(a). Instrumental Variable Analysis: Under-five Child Mortality Rate

Variables	IV	IV	FE-IV
Log Remittance	-0.573***	-0.478***	-0.110***
	(0.03)	(0.02)	(0.02)
Log GDP (con)		-0.008	0.005**
		(0.01)	(0.00)
Log Inflation		-0.096***	0.004
		(0.02)	(0.00)
Log Total Population		0.515***	0.148***
		(0.02)	(0.04)
Log Stock of Migrant		-0.115***	0.005
		(0.02)	(0.01)
Log Domestic Credit to Private Sector (DCP)		-0.116***	-0.063***
		(0.03)	(0.01)
Constant	14.393***	6.765***	3.927***
	(0.49)	(0.19)	(0.99)
Country Fixed Effect	**No**	**No**	**Yes**
Period Fixed Effect	**No**	**No**	**Yes**
No. of Observations	**3272**	**3272**	**3272**
R-Squared	**-0.419**	**-0.033**	**0.963**
Endog. Test (p-value)[1]	**0.000**	**0.000**	**0.000**
Sargan (p-value)	**0.463**	**0.000**	**0.733**
Cragg-Donald Stat[2]	**266.28**	**332.71**	**74.32**
Nominal 5% Wald Test[3]	**19.93**	**19.93**	**19.93**

Standard errors are in parentheses. * p<0.10; ** p<0.05; *** p<0.001

[1] This is equivalent to the Durbin score and the Wu-Hausman test for endogeneity.
[2] Cragg and Donald (1993) minimum eigenvalue statistics are used as a test of weak instrument.
[3] The nominal 5% Wald test critical values pertain to Stock and Yogo's (2005) second characterization of weak instruments. This characterization defines a set of instruments to be weak if a Wald test at the 5% level can have an actual rejection of rate of no more than 10%.

Findings indicate that remittances have economically and statistically significant effects on under-five mortality. After controlling for all the variables and fixed effects, results indicate that with a 10% rise in remittances, under-five mortality rate falls by 1.1%. This value is much higher than the OLS estimate of 0.08%. Inflation is no longer significant in the fixed effect model, although the sign remains consistent. Stock of migrants remains insignificant as usual, still showing positive relation with under-five child mortality. The rest of the controls retain their sign and statistical significance. After carrying out the diagnostic tests, starting with the test of endogeneity, the Durbin and Wu-Hausman scores are highly significant, supportive of our earlier prediction for the existence of the problem of endogeneity. When the Sargans test for over-identification is carried out, the p-values are not significant statistically. This shows that the instruments are not invalid, or the model specification was not an issue. This is considered to be a favorable result. When we carried out the weak instrument test, the Cragg-Donald statistic value exceeded the critical Wald test value for each of the model. These findings suggests that when we are willing to accept a rejection rate of no more than 10%, the result leads to the rejection of the null-hypothesis that the instruments are weak.

5.2.2 IV Estimation: Infant Mortality Rate

Table 5(b) presents the results of the analysis of infant mortality rate after we instrument for remittances. The results are very similar to under-five mortality rate including the relationships of the variables. A ten percent rise in remittance reduces infant mortality 1.04% when all the controls are included. This effect is statistically significant at the 0.1% level. All the controls behave in a similar manner as for the UMR, and inflation and stock of migrant remains insignificant too. After going through the diagnostic tests, the test for endogeneity indicates a highly significant value for the Durbin and Wu-Hausman test. That means that there is an endogeneity problem associated with remittances. The Sargan test of over-identification gives a higher p-value, which suggests that none of the instruments are invalid, or mostly the model is not specified incorrectly. The test for weak instrument results gives the Stock and Yogo's second characterization of weak IVs, and since the statistics is greater than the critical value for all the estimations, the hypothesis that the instrumental variables are weak, can be rejected.

Table 5(b). Instrumental Variable Analyses: Infant Mortality Rate

Variables	IV	IV	FE-IV
Log Remittance	-0.491***	-0.411***	-0.104***
	(0.02)	(0.02)	(0.01)
Log GDP (con)		-0.006	-0.005**
		(0.00)	(0.00)
Log Inflation		-0.071***	0.004
		(0.01)	(0.00)
Log Total Population		0.448***	0.202***
		(0.02)	(0.04)
Log Stock of Migrant		-0.107***	-0.000
		(0.01)	(0.01)
Log Domestic Credit to Private		-0.096***	-0.058***
Sector (DCP)		(0.02)	(0.01)
Constant	12.613***	6.052***	2.420**
	(0.43)	(0.16)	(0.90)
Country Fixed Effect	**No**	**No**	**Yes**
Period Fixed Effect	**No**	**No**	**Yes**
No. of Observations	**3272**	**3272**	**3272**
R-Squared	**-0.300**	**-0.028**	**0.959**
Endog. Test (p-value)	**0.000**	**0.000**	**0.000**
Sargan (p-value)	**0.902**	**0.000**	**0.371**
Cragg-Donald Stat	**266.28**	**332.71**	**74.32**
Nominal 5% Wald Test	**19.93**	**19.93**	**19.93**

Standard errors are in parentheses. * p<0.10; ** p<0.05; *** p<0.001

5.2.3 IV Estimation: Life Expectancy

We estimate the effect of remittances on life expectancy using the instruments. The results are given in the Table 5(c). The only change we incorporate here, is that, compared to the previous analyses, we choose to. When IV estimation is carried out with both the models inclusive and exclusive of DCP, remittance shows highly significant results indicating a 0.8% increase in life expectancy when remittance rises by 10%. This result is already a big increase in magnitude compared to the initial result of a 0.23%-0.25% improvement in life expectancy. But when the fixed effect estimation is performed the magnitude falls to 0.06% but still is higher than the initial 0.03% increase in life expectancy. The major difference is that when the regression excludes the financial development variable, remittance gives a statistically significant value at significance level of 10%, while in the one which includes the variable, remittance is no longer significant.

Table 5(c). Instrumental Variable Analysis: Life Expectancy

Variables	IV	IV	FE-IV	IV	FE-IV
Log Remittance	0.094***	0.087***	0.006*	0.082***	0.006
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log GDP (con)		0.002**	0.002***	0.001	0.002***
		(0.00)	(0.00)	(0.00)	(0.00)
Log Inflation		0.022***	-0.001	0.024***	-0.001
		(0.00)	(0.00)	(0.00)	(0.00)
Log Total Population		-0.081***	0.085***	-0.076***	0.097***
		(0.00)	(0.01)	(0.00)	(0.01)
Log Stock of Migrant		0.011***	-0.002	0.012***	-0.003
		(0.00)	(0.00)	(0.00)	(0.00)
Log Domestic Credit to Private Sector (DCP)				0.025***	0.010***
				(0.00)	(0.00)
Constant	2.444***	3.609***	2.926***	3.576***	2.779***
	(0.08)	(0.04)	(0.14)	(0.03)	(0.14)
Country Fixed Effect	**No**	**No**	**Yes**	**No**	**Yes**
Period Fixed Effect	**No**	**No**	**Yes**	**No**	**Yes**
No. of Observations	**3160**	**3160**	**3160**	**3160**	**3160**
R-Squared	**-0.008**	**-0.001**	**0.935**	**-0.000**	**0.935**
Endog. Test (p-value)	**0.000**	**0.000**	**0.4576**	**0.000**	**0.498**
Sargan (p-value)	**0.000**	**0.000**	**0.1522**	**0.000**	**0.018**
Cragg-Donald Stat	**280.95**	**350.74**	**73.74**	**316.92**	**72.57**
Nominal 5% Wald Test	**19.93**	**19.93**	**19.93**	**19.93**	**19.93**

Standard errors are in parentheses. * $p<0.10$; ** $p<0.05$; *** $p<0.001$

The results from the diagnostics test are also different from the ones mentioned earlier for the mortality rates. The Durbin and Wu-Hausman tests scores are no longer significant (either with or without financial development proxy variable), suggesting that we cannot reject the null hypothesis, i.e. remittance cannot be treated as endogenous in this case. The over-identification test, on the other hand gives two different results for both models. For the one which includes DCP, it gives a significant p-value. But when DCP is not included, the Sargans tests score suggests that the result is favourable, and the model is specified properly. The instruments still pass the weak instrument test, indicating they are not weak. If we exclude domestic credit to the private sector, the consequences of this variable exclusion are not likely to produce any misspecification problem as the R-squared values for both the fixed effect models do not change (0.935) when that variable is included.

For each of the three outcome variables, remittances have been instrumented, they all produced less biased estimates. Thus, the overall findings imply that remittances improve welfare in receiving countries.

6. Conclusion

This study attempted to analyze how dual-citizenship-driven remittance affects household welfare in developing countries. Remittances are part of a private welfare system, and purchasing power is transferred from the higher income members of a family to lower income ones (Gupta et al., 2009). With the help of this additional resource, households consume more, which translates into welfare gains.

The study uses a freshly assembled data set from 1960 to 2010 to test for the impact of remittances on three classical welfare indicators: under-five mortality rate, infant mortality rate, and life expectancy. In our preferred model, we instrument remittances by the fraction of neighboring countries (countries in the same continent) that grant dual citizenship and the fraction of the diaspora population that reside in countries recognizing dual citizenship. The rationale is that these factors increase the probability of a country to recognize dual citizenship, and dual citizenship recognition attracts more remittances (Oloufade and Pongou, 2013). We find that a 10% increase in remittances decreases under-five and infant mortality rates by 1% and increases life expectancy by 0.06%, these effects being statistically significant. We further show that a possible channel through remittances improves those welfare measures is by increasing household consumption.

In developing economies where household earnings are low, international migration of family members provides a major source of income through the remittance of wage earnings. People from developing countries choose to migrate to developed countries to earn higher income. Data suggests that the countries that disallow dual-citizenship are mostly developing countries. However, the analysis shows that recognition of dual citizenship boosts remittances, raising welfare indicators. Establishment of this institution is vital.

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Appendix A: Mechanism Test

In order to help better explain the channel through which remittances improve welfare in receiving countries, a mechanism test is conducted focusing on household consumption expenditure as an intermediate variable. Household consumption expenditure per person is also known to be a preferred indicator of individual living standard (Ravallion and Bidani, 1997). According to the earlier surveyed literature, most of the remittance money is usually spent on household consumption and it becomes part of an extra income, which results in improving household welfare. We test this channel, first performing OLS estimates of the effect of remittances on household consumption. The results are presented in Table A.1 below.

Table A.1. Effect of Log Remittance on Log Household Consumption

Variables	OLS	OLS	FE	OLS	FE
Log Remittance	0.532***	0.152***	0.016***	0.121***	0.012**
	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)
Log GDP (con)		0.336***	0.035***	0.288***	0.028***
		(0.01)	(0.01)	(0.01)	(0.01)
Log Inflation		-0.031***	-0.043***	0.008	-0.041***
		(0.01)	(0.01)	(0.01)	(0.01)
Log Total Population		0.410***	-0.651***	0.438***	-0.504***
		(0.01)	(0.06)	(0.01)	(0.06)
Log Stock of Migrant		0.386***	0.072***	0.143***	0.073***
		(0.01)	(0.01)	(0.01)	(0.01)
Log Domestic Credit to Private Sector (DCP)				0.334***	0.145***
				(0.02)	(0.01)
Constant	12.622***	4.608***	23.632***	4.055***	21.719***
	(0.19)	(0.12)	(0.73)	(0.12)	(0.72)
Country Fixed Effect	**No**	**No**	**Yes**	**No**	**Yes**
Period Fixed Effect	**No**	**No**	**Yes**	**No**	**Yes**
No. of Observations	**3199**	**3199**	**3199**	**3199**	**3199**
R-Squared	**0.452**	**0.891**	**0.987**	**0.904**	**0.987**

Standard errors are in parentheses. * p<0.10; ** p<0.05; *** p<0.001

The results are consistent with our expectation. Remittances alone explain 45% of variation in household consumption. When the country and period fixed effects are added for the developing countries, a ten percent increase in remittance will increase household consumption expenditure by 0.16% for the model without DCP and 0.12% for the model with DCP, the effect remaining highly significant in both cases. Both fixed effect models show all the variables are highly significant and maintain their respective signs. The few differences are the fact that inflation does not show a negative relationship with consumption and is not even significant in the model, where DCP is included without fixed effects. Otherwise, the model without DCP has a higher magnitude for all the variables, indicating a bigger impact on consumption. The more the household consumption expenditure, the higher the injection into the economy, and the more the resources and investments are mobilized. This process, in turn, helps expand the economy and develop household living conditions.

Furthermore, to try solving for the endogeneity issue, the 2SLS estimation is carried out again and the output is presented in the following table.

Table A.2. Two-Stage Least Square Estimation for Household Consumption

Variables	**IV**	**IV**	**FE-IV**	**IV**	**FE-IV**
Log Remittance	0.421***	0.422***	0.110***	0.408***	0.095***
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Log GDP (con)		0.246***	0.034***	0.231***	0.028***
		(0.01)	(0.01)	(0.01)	(0.01)
Log Inflation		0.070***	-0.032***	0.083***	-0.031***
		(0.02)	(0.01)	(0.02)	(0.01)
Log Total Population		0.254***	-0.662***	0.272***	-0.536***
		(0.02)	(0.06)	(0.02)	(0.06)
Log Migrant		0.147***	0.084***	0.155***	0.082***
		(0.01)	(0.02)	(0.01)	(0.01)
Log Domestic Credit to Private				0.118***	0.123***
Sector (DCP)				(0.03)	(0.01)
Constant	14.619***	3.206***	33.834***	3.013***	31.212***
	(0.53)	(0.19)	(1.45)	(0.18)	(1.41)
Country Fixed Effect	**No**	**No**	**Yes**	**No**	**Yes**
Period Fixed Effect	**No**	**No**	**Yes**	**No**	**Yes**
No. of Observations	**2992**	**2992**	**2992**	**2992**	**2992**
R-Squared	**0.424**	**0.816**	**0.985**	**0.825**	**0.986**

Standard errors are in parentheses. * p<0.10; ** p<0.05; *** p<0.001

These results confirm that even after instrumenting dual citizenship, remittance has a strong effect on household consumption, suggesting that it is a proper channel for remittance to have a beneficial impact on the household welfare. For all three methods of regression and both the models (with and without DCP), the coefficient for remittance is significant and positive. When adding the country and period fixed effects, a ten percent increase in remittance increases the household consumption expenditure by 0.95% when DCP is included, but 1.1% when DCP is not included. This value is higher in magnitude when compared to the OLS models.

Appendix B

Table B.1. List of Variables and Data Sources

Variables	Definition and Sources
Dependent Variables	
Child Mortality Rate (per thousand)	Risk of dying from birth to turning five years old measured per 1000; obtained from World Development Indicators (WDI), World Bank (2011)
Infant Mortality Rate	Number of deaths under one year of age per 1000 live births; obtained from WDI, World Bank (2011).
Life Expectancy at Birth	The expected total number of years of life at Birth, per 1000, obtained from WDI, World Bank (2011)
Household Expenditures [a]	Final consumption expenditures of households, obtained from WDI, World Bank (2011)
Independent Variables	
Workers' Remittance [b]	Monetary resources sent from foreign countries known as worker's remittances and employee compensations, received (current US$); obtained from WDI, World Bank (2011)
GDP [a]	Gross Domestic Product (constant 2000 US$); obtained from WDI, World Bank (2011)
Inflation Rate	GDP Deflator (annual %); obtained from WDI, World Bank (2011)
Domestic Credit to Private Sector [a]	Financial resources given to the private sector (% of GDP); obtained from WDI, World Bank (2011).
Stock of Migrants [b]	Total International Migrant Stock; obtained from WDI, World Bank (2011)
Population (billion)	Total Population (midyear estimates); obtained from WDI, World Bank (2011)
% of Diaspora in Dual-Citizenship-granting countries	Oloufade D. K & Pongou R. (2013) estimation on data provided by Ozden et al. (2011)

All the variables with "a" & "b" indices are in US$ trillion and US$ billion, respectively.

Table B.2. List of Developing Countries in the Study

Developing Countries			
Afghanistan	El Salvador	Mauritania	Sudan
Albania	Equatorial Guinea	Mauritius	Suriname
Algeria	Eritrea	Mexico	Swaziland
Angola	Estonia	Micronesia	Syria
Antigua and Barbuda	Ethiopia	Moldova	Tajikistan
Argentina	Fiji	Mongolia	Tanzania
Armenia	Gabon	Morocco	Thailand
Azerbaijan	Gambia	Mozambique	Timor-Leste
Bangladesh	Georgia	Myanmar	Togo
Barbados	Ghana	Namibia	Tonga
Belarus	Grenada	Nepal	Trinidad and Tobago
Belize	Guatemala	Nicaragua	Tunisia
Benin	Guinea	Niger	Turkey
Bhutan	Guinea-Bissau	Nigeria	Turkmenistan
Bolivia	Guyana	North Korea	Tuvalu
Bosnia and Herzegovina	Haiti	Oman	Uganda
Botswana	Honduras	Pakistan	Ukraine
Brazil	Hungary	Palau	Uruguay
Bulgaria	India	Panama	Uzbekistan
Burkina Faso	Indonesia	Papua New Guinea	Vanuatu
Burundi	Iran	Paraguay	Venezuela
Cambodia	Iraq	Peru	Vietnam
Cameroon	Jamaica	Philippines	Yemen
Cape Verde	Jordan	Poland	Zambia
Central African Republic	Kazakhstan	Romania	Zimbabwe
Chad	Kenya	Russia	
Chile	Kiribati	Rwanda	
China	Kyrgyzstan	Saint Kitts and Nevis	
Colombia	Laos	Saint Lucia	
Comoros	Latvia	Saint Vincent and the Grenadines	
Congo, Democratic Republic of the	Lebanon	Samoa	
Congo, Republic of the	Lesotho	San Marino	
Costa Rica	Liberia	São Tomé and Príncipe	
Cote d'Ivoire	Libya	Senegal	
Croatia	Liechtenstein	Serbia	
Cuba	Lithuania	Seychelles	
Czech Republic	Macedonia	Sierra Leone	
Djibouti	Madagascar	Slovakia	
Dominica	Malawi	Solomon Islands	
Dominican Republic	Malaysia	Somalia	
Ecuador	Maldives	South Africa	
Egypt	Mali	South Korea	
	Malta	Sri Lanka	
	Marshall Islands		

The World Bank classification of developing countries has been used.