

Remittances, Institutional Quality, and Entrepreneurship

Nathan J. Ashby¹ Ousmane Seck²

April 2012

Abstract:

The importance of economic institutions and remittances in economic development has been demonstrated thoroughly in economic research. This study analyzes the impact of these on new business formation using a sample of up to 100 countries between 2002 and 2008. Employing two-stage least squares on an unbalanced panel data set we find robust evidence of a positive impact of remittances on new business formation. This impact is augmented by the presence of high quality institutions. These results apply to low and middle income countries.

Keywords: remittances, institutions, development, entrepreneurship, international

JEL Codes: F24, P48, L26

¹Email: njashby@utep.edu. Address: 500 West University Avenue, Department of Economics and Finance, University of Texas at El Paso, 79968.

² Email: oseck@utep.edu. Address: 500 West University Avenue, College of Business Administration, University of Texas at El Paso, 79968

1. INTRODUCTION

In Victor Hugo's (1862) classic novel, *Les Misérables*, Fantine, a young working-class woman participates in a summer-long affair with a man above her in station which leaves her pregnant with no hope of marriage or financial support. She ends up giving away her child, Cosette, to an unscrupulous couple while she works to support the needs of her beloved daughter. The corrupt caretakers constantly deceive Fantine into thinking the financial needs for supporting Cosette are greater than they are in actuality. Instead of using the money to the benefit of the young child, they use the money for their own purposes while abusing her and forcing her to labor for their own benefit.

For many remittance recipients in developing countries, the situation may be analogous to that described in Hugo's classic tale. The institutions and the powers that be may require bribes at the hands of recipients which fail to benefit the intended recipient. In such cases any positive impact from the remittances may be reduced and might actually make the situation worse for these recipients.

Although there is good reason to think that in many instances remittances will be spent more efficiently than foreign aidⁱ, anecdotal examples of ineffective uses of remittance income are not uncommon. Mexican kidnappers, for instance, have sought Mexican emigrants along the U.S. border and held them for ransoms of \$1,500 to \$10,000 which they try to extort out of relatives living in the United States or elsewhere (Lacy, 2009). To the extent that kidnappers are successful at extracting funds in this manner, it arguably increases the probability that such attempts will increase in the future making for a more dangerous environment for potential emigrants and Mexicans in general. Such funds may be used to finance other criminal activities which undermine the institutions and economic opportunities in the region. In Tajikistan where

remittances were estimated at 46 percent of GDP in 2008, country residents have been buying shares to build a hydropower plant. Rather than optimism of high returns, the motive is allegedly the fear of repercussions from corrupt government officials should they not comply with requests for assistance (Ozkan, 2010).

This study deals with the issue of remittances sent by migrants back to their home countries and under which conditions these remittances are more likely to lead to better economic outcomes. There have been numerous studies analyzing the impact of remittances on economic development in recipient countries. Most studies demonstrate a positive relationship (Adelman and Taylor, 1992; Taylor et al., 1996; Acosta, Calderon, Fajnylber, and Lopez, 2006; Catrinescu, Leon-Ledesma, Piracha, and Quillon, 2006; Giuliano and Ruiz-Arranz, 2006; Mishra, 2007) although some do suggest that the relationship may be small (El-Sakka and McNabb, 1999) or even negative (Chami, Fullenkamp, and Jahjah, 2005). The impact of remittances is certainly complex and likely depends on the institutional environment of the recipients' countries.

In the right situation with the right incentives and economic opportunities, remittances may be spent in a way that improves the well-being of the recipients and their relatives. The money may be used for better education, investment in new businesses, or to cover other needs that otherwise would not be met. The effectiveness of remittances depends on the opportunities of those in the home country to use these funds in a productive manner. If markets are poorly developed, then there may be little use for these funds other than feeding a cycle of inflation. If the regulations on business formation are tight, it will be extremely difficult to invest these funds in entrepreneurial activities that will improve the well-being of potential business owners and consumers. Remittances sent to countries where private resources are tightly regulated, highly

taxed, or even expropriated, may merely increase inequality and strengthen the grip of the governments that more often than not serve their own needs rather than fulfill the actual role of government which economic theory would suggest is their basic role (Buchanan, 1975).

On the other hand, in many developing countries the poor are credit-constrained due to the lack of physical assets to use as collateral. If the institutions in these countries tend to protect individual property rights, remittances may be a promising component in alleviating poverty. The importance of private property and other market institutions have been discussed by North (1990), Demsetz (1967), Williamson (1985), and De Soto (1989, 2003), among others. The empirical validity of these theorists has been demonstrated through hundreds of published articles (see Acemoglu, Robinson, and Johnson, 2001; Easton and Walker, 1997; Rodrik, Subraminian, and Trebbi, 2004; La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1999).

The conjecture that remittances are likely to be a positive factor on business formation conditional on the institutional quality of the recipient country is discussed and tested empirically in this paper. We use an unbalanced panel data set between 2002 and 2008. To measure institutions we employ principal component analysis on the World Governance Indicators (Kauffman, Kraay, and Mastruzzi, 2009). We also utilize instrumental variables to control for the endogeneity of the remittances variable. The instrument used is constructed following Acosta, Calderon, Fajnyzylber, and Lopez (2008). Specifically, this instrument which they call Distance is the weighted inverse of the distance of each recipient country to the ten countries with the highest net migration rates during the period multiplied by the GDP per capita of these ten countries for each given year.

Our estimates of the partial effect of the endogenous variables do not represent the average of effect of the whole population of countries in our sample, but the average effect of the

compliant population, which is made up of the countries with high (low) remittances and high (low) values of the Distance instrument variable [see Angrist Pischke (2009) pp. 158-61].

The empirical results support our hypotheses while controlling for endogeneity between remittances and entrepreneurship in the home country. We find that remittances have a robust positive impact on new business formation and that this impact is stronger in countries with high quality institutions.

2. BACKGROUND

(a) Remittances

Lucas and Stark (1985) develop a theory in which they analyze the motive to remit and test their hypothesis in the case of Botswana. They argue that motivations may range from purely altruistic concern for family members left behind in the home country to enlightened self-interest where the remitters hope to be compensated in the future whether it be through inheritance, shared investment in land or other assets, or greater prestige upon returning home. Remittances, they further postulate, are a result of an implicit coinsurance contract between the migrant and family members which would increase during times of crop failure or other economic hardships in the home country. Although altruism may be a big part of the motive for remittances, they find that this alone does not explain remittance behavior, at least not in the case of Botswana. Honddinott (1994) finds similar results which suggest that remittances are motivated by expectations of bequests.

Opinions differ when it comes to the impact of remittances on economic development. Some economists argue that remittances create a valuable source of funds that can assist family members and friends in the recipient countries to meet basic needs or invest in businesses

(Woodruff and Zenteno, 2007; Massey and Parrado, 1998; Durand et al, 1996; Yang, 2004; León-Ledesma and Piracha, 2004). At the other end of the spectrum, other researchers argue that remittances may discourage work and lead to lower development in the recipient country (Amuedo-Dorantes and Pozo, 2006a; Airola, 2008).

This has been on the minds of empirical economists who have produced numerous studies on this subject. Teasing out the impact of remittances on economic growth is a difficult task given the strong potential for endogeneity between remittances and various outcomes. For instance, remitters may be productive labor resources migrating towards higher returns not available in the home country. This results in a less productive labor pool which all else equal may worsen the local economy. When these migrants send back remittances it may not offset the negative impact of the initial outward migration. However, when controlling for the endogeneity through some type of instrumental variable technique, it would be expected that remittances would improve well-being at the margin. Most studies dealing with remittances recognize this potential problem and address it with econometric techniques instrumenting for endogeneity.

Most research has found the impact of remittances on economic development to be positive. Adelman and Taylor (1992), Taylor et al. (1996), Acosta, Calderon, Fajnzylber, and Lopez (2006), Catrinescu, Leon-Ledesma, Piracha, and Quillon (2006), and Giuliano and Ruiz-Arranz (2006) find a significant relationship between remittances and economic growth while Mishra (2007) finds evidence of a positive impact on wages in Mexico. Others find that they reduce poverty (Acosta, Calderon, Fajnzylber, and Lopez, 2008; Fajnzylber and Lopez, 2008; Adams and Page, 2005). The results with regard to the impact of remittances on inequality are mixed. Acosta, Calderon, Fajnzylber and Lopez (2008), Koechlin and Leon (2007), McKenzie and Rapaport (2007), and Barham and Boucher (1998) find that the impact lowers inequality

while Acosta, Calderon, Fajnzylber and Lopez (2006) find that they have no impact on inequality. Edwards, and Ureta (2003) find evidence that remittances increase schooling in El Salvador.

Beine, Docquier, and Rapaport (2003), Massey and Parrado (1998), and Woodruff and Zenteno (2001) find evidence of a positive impact on productive investment. There are some studies which have yielded negative results. Chami, Fullenkamp, and Jahjah (2005) find that remittances restrict growth suggesting that remittances are not profit driven; rather they are used to support other family members.

Our study specifically analyzes the impact of remittances on entrepreneurship as a measure of development. Amuedo-Dorantes and Pozo (2006b) find that although remittances are attracted to investment opportunities in the home country, they do not promote entrepreneurship in the case of the Dominican Republic. Funkhouser (1992) finds evidence that remittances increase self-employment in Nicaragua while Yang (2008) finds that entrepreneurship increases in the Philippines.

(b) Institutions

Nobel Laureate and economic historian Douglas North postulates institutional constraints are "...analogous to the rules of the game in competitive sports," (1990, p.4). New institutional economics recognizes the existence of transaction costs which often prevent the realization of predictions derived from neoclassical models. Institutions that lower the transaction costs of economic exchange yield more productive outcomes. North and others have demonstrated the importance of institutions of property rights and market economies in the success of today's developed economies. Demsetz (1967) discussed how property rights lower transaction costs by internalizing the external costs of economic activities as individuals in an economic region

become more interdependent. Without well defined and enforceable property rights, theft and expropriation will characterize human activity rather than mutually beneficial exchange and productive activity. De Soto (1989, 2003) has discussed the importance of property rights in Peru.

Econometric techniques have been utilized to demonstrate whether or not institutions are in fact essential in economic development. Easton and Walker (1997) adapt a model originally estimated by Mankiw, Romer, and Weil (1992) to show that economic freedom is an important condition for economic growth. Rodrik, Subraminian, and Trebbi (2004) demonstrate the “primacy of institutions” over geographic and trade considerations. Perhaps the most sophisticated analysis of the importance of institutions is the study by Acemoglu, Robinson, and Johnson (2001) which demonstrates that former colonies in which extractive institutions were established are the same countries which are suffering today. The fortunate examples are the United States, Canada, Australia whereas the less fortunate examples include Mexico and other Latin American countries, and most of Africa. Results of studies analyzing the importance of institutions have varied. The results of studies analyzing the importance of democratic institutions have been much less robust as studies demonstrating the importance of market institutions in explaining economic development (Barro, 1999; Acemoglu et al, 2008).

Notwithstanding the positive empirical results, there have been some detractors. In particular, Glaesar, La Porta, Lopez-de-Silanes, and Shleifer (2004) provide evidence that institutional measures are not robust and that other measures such as human capital are more important and that institutions tend to be the result of economic development rather than the cause.

(c) Institutions, Entrepreneurship and Remittances

The positive relationship between institutions and entrepreneurship has been demonstrated in many studies (Campbell and Rogers, 2007; Kreft and Sobel, 2005). Kerr and Nanda (2009) find that changes in U.S. financial institutions led to a considerable increase in entrepreneurship as well as business closures.

Introducing institutions into the equation has helped researchers improve understanding of various puzzles. One of these puzzles is the convergence puzzle in which economic evidence had failed to demonstrate that countries income per capita would tend to converge over time as less developed countries benefit from greater investment. By introducing institutions into the equation, empirical evidence actually does support the conditional convergence prediction (Easton and Walker, 1997; Sachs and Warner, 1997).

A puzzle also exists with regard to the benefit of remittances. As mentioned earlier, estimates on the impact of remittances on economic development range from large and positive to small or even negative. We postulate that the impact is in general positive but that it will vary conditional on the institutional setting. Consider the following simplified equation:

$$(1) E = \alpha_0 + \gamma_1 R + \gamma_3 R * I$$

where E is entrepreneurship, R is remittances, and I the institutional quality. The expected impact of an increase in remittances would be:

$$(2) \quad \partial E / \partial R = \gamma_1 + \gamma_3 * I$$

The impact of a change in remittances can be analyzed in three scenarios: high institutional quality, medium institutional quality, and low institutional quality. Shaver (2007) suggests analyzing interaction effects at the minimum and maximum values as well as the mean. Instead, we chose the first, second, and third quartiles to reduce the effects of outliers.

When the institutional quality of the home country is of a higher quality, it is expected that the remittances will lead to a strong, unambiguous improvement in entrepreneurship in the recipient country. On the other hand, when institutional quality is low, the expected outcome is ambiguous. Since lower quality institutions are associated with a less friendly environment for entrepreneurs, it is expected that any positive impacts from additional funds flowing into the country may be outweighed by the negative environment. This is an empirical issue which is analyzed further in this study. As mentioned above, Amuedo-Dorantes and Pozo (2006b) finds that remittances are not associated with greater entrepreneurship in Mexico whereas Yang (2008) and Funkhouser (1992) find that entrepreneurship increases with remittances. It may be that the outcome is dependent on institutional quality. The hypothesized outcome is that when remittances are received in countries with higher quality institutions, entrepreneurship will increase whereas when they are received in countries with lower quality institutions, these positive effects will be mitigated to the extent that the overall impact may be quite small, absent, or even negative. The empirical model used to test this hypothesis is developed in the next section.

There are two other papers that analyze the relationship between institutions and remittances. Abdih, Chami, Dagher, and Montiel (2008) test the impact of remittances on corruption using Granger causality tests. The question in this paper is much different than the question that these authors explored. This study is analyzing the impact of remittances on entrepreneurship conditional on institutional quality; it is not analyzing the impact that remittances have on institutions in the recipient country. Vaaler (2011) analyzes the impact of remittances in developing countries and finds a positive impact when countries have smaller public sectors.

3. THE DATA AND METHODOLOGY

(a) Model Description and Estimation Methods

The general form of the model used to test our hypotheses is the following:

$$(3) \quad y_{it} = \mathbf{X}'_{it} \boldsymbol{\beta} + \boldsymbol{\alpha}'_i \mathbf{Z}_i + \varepsilon_{it},$$

Where y_{it} is our dependent variable measured for country i at time t , $\boldsymbol{\beta}$ is a k by one vector of parameters, \mathbf{X}_{it} is a k by one vector of time varying country characteristics (Remittances, institutions, interaction of remittances and institutions, fraction of urban population, level of education, and GDP per capita), \mathbf{Z}_i is a vector of country characteristics that do not change over time, and ε_{it} are the idiosyncratic disturbances.

The specific econometric equation is as follows:

$$(4) \quad \ln(\text{New Businesses}_{it}) = \gamma_0 + \gamma_1 \text{Remittances}_{it} + \gamma_2 \text{Institutions}_{it} + \gamma_3 \text{Remittances}_{it} \\ * \text{Institutions}_{it} + \gamma_4 \text{Education}_{it} + \gamma_5 \text{Urban}_{it} + c_i + \varepsilon_{it}$$

where c_i is the unobserved heterogeneity. The dependent variable is a function of the number of newly registered businesses in a given year taken from the World Development Indicators and World Bank Entrepreneurship Group (World Bank, 2010a, 2010b)ⁱⁱ.

Since new businesses is a count variable, consideration was given as to whether or not a Poisson estimator would have been appropriate. Since the number of integrable points is quite large this was deemed unnecessary. Note the dependent variable is specified as a natural logarithm. The variable Remittances_{it} is total remittances received by a given country i at time t divided by its GDP. It is expected that remittances will impact business formation in a positive manner.

Our second variable is a measure of the quality of the institutions in the home country. There are many quality sources that could be used for institutions. Numerous studies have utilized economic freedom indices constructed by the Fraser Institute (Gwartney and Lawson, 2009) and the Heritage Foundation (Miller and Holmes, 2010). In this paper, we use the World Governance Indicators (WGI) are used to construct a measure of institutions through principal component analysis. The six measures included in the WGI are Voice and Accountability (r1), Political Stability and Absence of Violence (r2), Government Effectiveness (r3), Regulatory Quality (r4), Rule of Law (r5), and Control of Corruption (r6). These measures are available for 1996, 1998, 2000, and 2002-2008. We aggregated these six measures of rule of law (r_i , i=1 to 6) into a single component using the well-known method of principal component analysis. We first standardized each measure r_i into z_i by subtracting its mean \bar{r}_i and dividing by its standard deviation S_i . Let \mathbf{Z} denote the N by 6 matrix ($z_1, z_2, z_3, z_4, z_5, z_6$). We then choose as our aggregated measure of Institutions the vector INST such that $INST = \mathbf{Z}d_1$ where d_1 is the largest of the 6 characteristic roots of the sample correlation matrix $\mathbf{Z}'\mathbf{Z}/(N-1)$. We found (5.11813, 0.398226, 0.273471, 0.115083, 0.0525395, 0.042547) as the vector of characteristic roots, which show the component associated with the largest root (5.11813) explains 85.3 percent of the variation of the six measures of rule of law.

The next variable is the interaction term between remittances and institutional quality. The purpose of the interaction term is to test the moderating effect of institutions quality on the impact of remittances on business formation in the recipient country. Its coefficient can be positive or negative. Assuming a positive coefficient for the variable $Remittances_{it}$, a positive coefficient of the interaction variable indicates that the positive effect of remittances increases

with the quality of institutions. A negative interaction variable coefficient means that countries with lower quality institutions see a larger effect of remittances on entrepreneurship.

As control variables, we include some of the standard variables that are considered in the entrepreneurship literature (Glaeser, Rosenthal, and Strange, 2010). $Education_{it}$ is the net enrollment in primary education as a percentage of the appropriate age group that corresponds to this level of education. This variable is used to measure the amount of human capital available. The predicted relationship between this variable and new business formation is positive. Urban economic research also suggests that agglomeration results in positive externalities that increase innovation thus leading to greater entrepreneurship. In order to capture this effect we include $Urban_{it}$ which is the fraction of a country's total population living in an urban location. With the exception of $Institutions_{it}$, all the variables are taken from the World Development Indicators (World Bank, 2010a, 2010b).

[Insert Table 1 Here]

Remittances may impact business formation by increasing the availability of funds to be used as capital. However, this result may be biased by the fact that those sending the remittances may be potential entrepreneurs that would otherwise be starting businesses in the home country. The importance of remittances may also be the result of a lack of opportunities, which increases from the burden of migrants living abroad to support their family back in their home countries. Therefore, remittances should be analyzed as endogenous.

We use a measure of distance as an exogenous source of variation in remittances. The instrument is similar to that used by Acosta, Calderon, Fajnyzylber, and Lopez (2008) they call Distance. Specifically, this instrument is the weighted inverse of the distance of each recipient country to the ten countries with the highest net migration rates during the period multiplied by

the GDP per capita of these ten countries for each given year. The distance between countries is calculated by Mayer and Zignano (2006) using great circle distances. Since annual net migration rates are unavailable, the average of 2000 and 2005 are used. Given that the ten countries do not vary, neither will the inverse distance. GDP per capita on the other hand will vary over time. It should be noted that the current GDP per capita provided by the World Bank is used as opposed to real GDP per capita. We maintain two assumptions on the instrument. We assume that distance affects entrepreneurship only through its effects on remittances, the so-called exclusion restriction. We also assume that Distance is correlated with remittances (i.e., it is not a weak instrument) and we will test that assumption by looking at the results of our first stage regressions of remittances on the instrumental variable Distance.

An assumption made in most panel data models which is often not tested or discussed is that of strict exogeneity. This assumption is violated whenever there is contemporaneous correlation between the error term and one explanatory variable. It is also violated when there is inter-temporal correlation between past or current shocks to the dependent variable and future values of one or many explanatory variables as in the case of the inclusion of a policy variable as an explanatory variable. Since the variable $Remittances_{it}$ is potentially endogenous, we have already established contemporaneous correlation. In identifying a robust estimation method, we only needed to test for intertemporal correlation which we did using the method described in Wooldridge (2010, p. 325). The output is available upon request. The results show no evidence of correlation between errors and our explanatory variables across time periods. In addition, we assume that the error term in equation 4 might be correlated with the unobserved heterogeneity c_i . Therefore, the parameters of our models can be consistently estimated using Fixed Effect-Instrumental Variable, which we implement using STATA 11 `xtivreg2`.

The variable $Remittances_{it}$ is potentially endogenous. As a result, the variable capturing its interaction to the variable $Institutions_{it}$ is also endogenous. Wooldridge (2002, 2010) suggests regressing the interaction variable on different combinations of the exogenous component of the interaction term (in our case, $Institutions_{it}$) and the instrument ($Distance_{it}$). In other words, the approach consists of regressing $Remittances_{it} * Institutions_{it}$, on the interaction terms $Distance_{it} * Institutions_{it}$, $Distance_{it}^2 * Institutions_{it}$, $Distance_{it}^3 * Institutions_{it}$, $Distance_{it}^2 * Institutions_{it}^2$, $Distance_{it}^2 * Institutions_{it}^3$, $Distance_{it}^3 * Institutions_{it}^2$, $Distance_{it}^3 * Institutions_{it}^3$. The implementation of the approach would lead to using the predicted values of $Remittances_{it} * Institutions_{it}$ are an instrument for the endogenous interaction variable.

In dealing with the difficulties of having an endogenous interaction term, Angrist and Pischke (2009) (See their blog entry at the book *Mostly Harmless Econometrics* <http://www.mostlyharmlesseconometrics.com/2010/02/multiple-endogenous-variables-what-now/>) argue against including such an interaction that would create more endogenous variables in the first place. They recommend splitting the sample instead. For instance, in the case in which the researcher is interested in testing if gender is a moderator of the effect of an endogenous variable on an outcome variable, they recommend splitting the sample into two: a male sample and a female sample instead of including an interaction of the endogenous variable and gender.

We combine both approaches in this paper. First, we split our sample into two sub-samples: one containing the countries with high quality institutions (the results are referred to as SH case), and another with the countries with low quality institutions (SL case). In creating these two sub-samples, we ordered the countries based on the levels of our institutions quality indicator. We

then considered countries with high quality institution as being countries above the 70th percentile, and countries with lower quality institutions as being those below the 70th percentile.

We also adopted the other approach consisting of having the endogenous interaction variable. That model is estimated on the whole sample (hence our use of the name WS case to indicate models estimated on the non-split sample). We use the predicted value of the interaction variable in equation 4 ($Remittances_{it} * Institutions_{it}$) as discussed above as an instrument for the endogenous interaction variable. We will compare these two methods as a robustness check. This follows from Stroup (2007) who defines countries with high levels of economic freedom as the top third of countries in terms of economic freedom scores. Our threshold for institutional quality is slightly higher.

The descriptive statistics are included in Table 1. The sample includes 98 countries with between two to nine years of data for each country. In other words the sample is unbalanced in that countries are included regardless of whether or not data exist for all years considered in the sample. The maximum number of observations is 449. Significant effort was made to maximize the number of observations. Approximately seventeen percent of the observations are low income countries—as defined by the World Bank—while the shares of countries that are classified as middle income and high income are approximately 47 and 37 percent respectively. A list of the countries in our sample is included in the Appendix.

[Insert Table 2 Here]

4. EMPIRICAL RESULTS

Table 2 shows results from the first stage regressions. The table reports the estimates from the model of the whole sample of all countries (WS case), on the sample of countries with high quality institutions (SH case), and the on the sample of countries with low quality institutions (SL case). In all three cases, they indicate a statistically significant relationship between remittances and our instrument, the Distance variable. The coefficient is significant at 5 percent in all cases. This finding is confirmed by the F test of excluded instruments (in this case of just identified model, there is one excluded instrument). Therefore, we conclude that our instrument is informative. The other coefficients in our first stage are coherent. No other variable is significant in explaining the endogenous variable in the full model and in the model for high quality institutions. However, in the model with low quality institutions, low education levels and lower urbanization are associated with a higher proportion of remittances on GDP. This result can be seen as intuitive. Among countries with low quality institutions, higher education and urbanization levels is associated with more internal opportunities and less reliance on remittances. The variable measuring institutions fails to yield a statistically significant relationship with remittances in any of the first-stage regressions.

[Insert Table 3 Here]

We estimated equation 4 without the interaction variable using two-stage least squares on the full model, and the two split samples. We compared the 2sls estimates to the ordinary least squares estimates and the results are reported in Table 3. The overall results are consistent with the existence of a negative bias. All OLS estimates of the effect of remittances on new business formation are smaller than their 2SLS counterparts. The estimates support that the remittances have a positive effect on new business in countries with low quality institutions as well as in countries with high quality institutions. However, the effect is much larger in countries with high

quality institutions. Another finding is that institutional quality, education and urbanization affect positively new business formations in countries with low quality institutions. In countries with high quality institutions, their effects are not statistically significant. Low variability in these two variables among high income countries might explain this result.

The finding that the effect of remittances on new business formations is higher in high quality institutions than in countries with low quality institutions is confirmed by the model with the interaction term reported in Table 4. As Greene (2008, pp. 123-24) points out, new standard errors have to be recalculated using the delta method in order to assess the statistical significance of the interaction. We calculated the correct standard errors from the parameter estimates in equation 4 and Table 4, and the results are in Table 5.

The table illustrates the marginal effects of remittances conditional on the quality of institutions. The marginal effects are estimated for countries with low, medium and high quality institutions. At the 5 percent significance level, the marginal effect of remittances is not statistically significant for very low quality institutions, at the 15th percentile of institutional quality and below. For low quality institutions in the first quartile and the median, the marginal effect of remittances on new business formation is positive and statistically significant. The marginal effects are also economically significant. At the first quartile, a 1 percentage point increase in remittances as a proportion of GDP increases in entrepreneurship by 22 percent, while at the median it would increase by about 32 percent. These effects are statistically significant, even at the 1 percent significant level.

Similarly, for countries with high quality institutions, the marginal effect of remittances is statistically significant at the 1 percent. It is also economically meaningful as a 1 percentage

point increase in remittances as a proportion of GDP increases new business formation by an estimated 53 percent.

As in any study using just identified instrumental variable estimator, the results are average effects for compliers (Angrist and Pischke, 2009; Imbens and Angrist, 1994). Figures 1a through 1c show the population of compliers, those countries whose remittances as a proportion of GDP is dictated by their distance variable. From the results in the first stage estimation of equation 4, compliers are expected to lie within the 95 percent confidence interval of the predicted value of the endogenous variable remittances. All countries which fall within the gray bands in the figures are compliers while those outside these bands are non-compliers. Figure 1(a) shows that low income countries are all compliers, with the exception of Haiti. Figures 1(b1) and 1(b2) show that most middle income countries are also compliers, the exceptions being Algeria, Belarus, Jordan, Latvia, Lesotho, Lithuania, Macedonia, Poland, Russia, Samoa, Tonga, Tunisia, and Turkey. No high income country is a complier, as illustrated in Figure 1(c). Therefore, the findings of our paper are valid for low and the majority of middle income countries. As Figure 1c shows, for high income countries, remittances are an insignificant proportion of GDP regardless of the level of the Distance variable.

[Insert Table 4 Here]

[Insert Table 5 Here]

[Insert Figure 1 Here]

5. IDENTIFICATION OF COMPLIERS AND NON-COMPLIERS

It is now well-understood that the instrumental variable estimator consistent estimates the average effect of the endogenous regressor for the whole population only under very strong

conditions. One of the conditions is that the effect is constant across all subpopulations. In our case, it would be unreasonable to assume that the effect of remittances on entrepreneurship is the same for developing as well as developed countries. In developing countries, difficulties in accessing credit may make business starter more dependent on remittances than in developed countries where financial instruments are more developed and credit more available. In the first, the effect of remittances may be important, while in the latter it may be marginal.

Even with one of our hypotheses being that the effect of remittances is moderated by institutions, the heterogeneity of the effects of remittances would be present. We shall pay particular attention in identifying which group of countries our results apply to, given our choice of the instrumental variable. Identification of our population of interest is made more crucial by our model, which is just identified, with exactly one instrumental variable for each endogenous regressor.

It has been found that in just identified models, two different valid instruments may yield different parameter estimates. More interestingly these different parameter estimates may all be correct, but estimate the effects of the endogenous regressor for two distinct subgroups of the total population. Hence the concept of local average treatment effect (LATE), in reference to consistency of the estimator for the subpopulation for which we are estimating the effect.

Following Imbens and Angrist (1994), we refer to subpopulation of countries whose effects of remittances on entrepreneurship we are estimating as the compliers. Our two-stage least squares reported above are local average effects of remittances on entrepreneurship for the compliers, and we did not estimate the effects of remittances for the non-compliers. The complier versus non-complier terminology comes from assignments of units in randomized experiments, and the term compliers refers to units that would take the treatment when they are

assigned to the treatment group, or not take it when they are assigned to the control group. The non-compliers would be the units that do the complement of the assignment: that would find a way to take the treatment when they are assigned to the control group, or they would not take the treatment when they are assigned to the treatment group. In this paper, the non-compliers would consist of the units that would have a level of remittances not consistent with what their level of the instrumental variable (Distance) would dictate. The compliers would behave in accordance with what the instrument predicts.

To distinguish between compliers and non-compliers, we use the results of the first stage regression of the endogenous variable $Remittances_{it}$ on the instrumental variable $Distance_{it}$ and the other covariates in our model 4. This regression determines the level of remittances that the level of Distance would dictate. Since this forecast is a random variable, we calculated its 95 percent confidence interval. Figures 1a through 1c display in gray these confidence bounds along with the different countries actual level of remittances, given their level of the variable Distance. Non-compliers are expected to lie outside of the confidence region of the forecast, while compliers are expected to lie within the bands. The figures were constructed for low income, middle income and high income countries. The middle income countries are displayed in two separate graphs (1b1 and 1b2) for the purpose of facilitating the interpretation by avoiding a crowded graph.

Figure 1(a) shows that low income countries are all compliers, with the exception of Haiti. All such countries lie within the confidence bounds. Figures 1(b1) and 1(b2) show that most middle income countries are also compliers, the exceptions being Algeria, Belarus, Jordan, Latvia, Lesotho, Lithuania, Macedonia, Poland, Russia, Samoa, Tonga, Tunisia, and Turkey which are non-compliers. These countries are clearly outside of the 95 percent confidence

interval. No high income country is a complier, as illustrated in Figure 1(c). Their low level of remittances is highly at odd with their level of the Distance variables. They are non-compliers, and we can clearly conclude that the findings of our paper do not apply to high income countries.

6. CONCLUSION

Two rich strands in economic literature in recent years involve empirical analyses of the impact of remittances on the economic development of recipient countries and the importance of economic institutions in economic development. This paper combines these two strands to analyze the impact of remittances in different institutional situations. In particular, we analyze the impact of remittances on new business formation in 100 countries between 2002 and 2008. While employing two-stage least squares, the results support the hypothesis that remittances lead to greater entrepreneurial endeavors, but that this impact is higher in countries with high quality institutions than in countries with lower quality institutions. This impact is statistically and economically significant. For countries with very weak institutions (below the 20th percentile of institutional quality), this impact is null statistically.

Our results apply to low and mostly middle income countries, which is our population of compliers. As any instrumental variable estimator in the just identified case of one instrumental variable for each endogenous regressor, it calculates the average effect of compliers. In this case, they are the countries that have high remittances as a proportion of GDP and a high value of the Distance variable, or low importance of remittance and low value of the Distance variable.

As the world becomes more global and the costs of immigration are lowered, then remittances can be an important source of economic development if accompanied with reforms that improve economic and political institutions in low and middle income countries.

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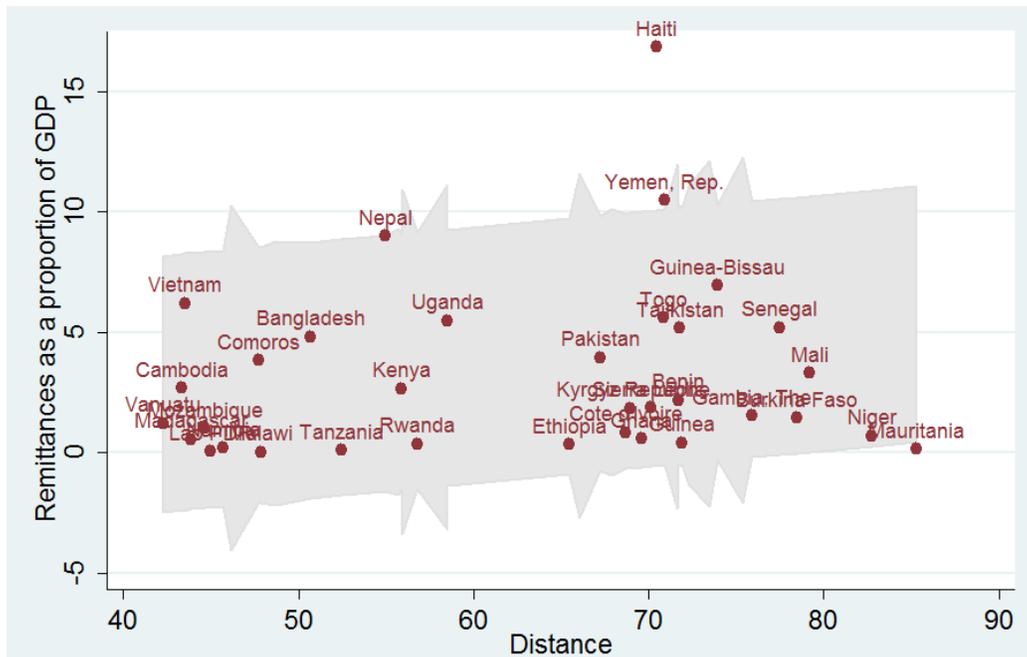
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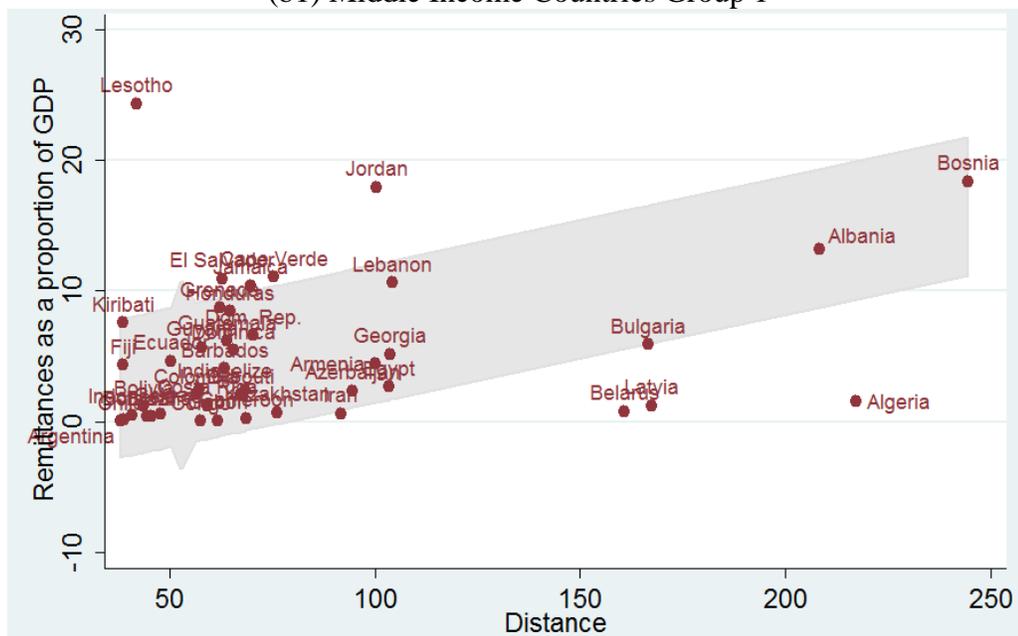
ⁱ Studies on foreign aid yield conflicting results. Sachs (2006) argue that foreign aid has been a necessary resource for poor countries whereas Easterly (2002, 2006) argues that foreign aid has actually resulted in worse outcomes for recipient countries.

Figure 1. Importance of Remittances versus Distance from High Immigration Countries

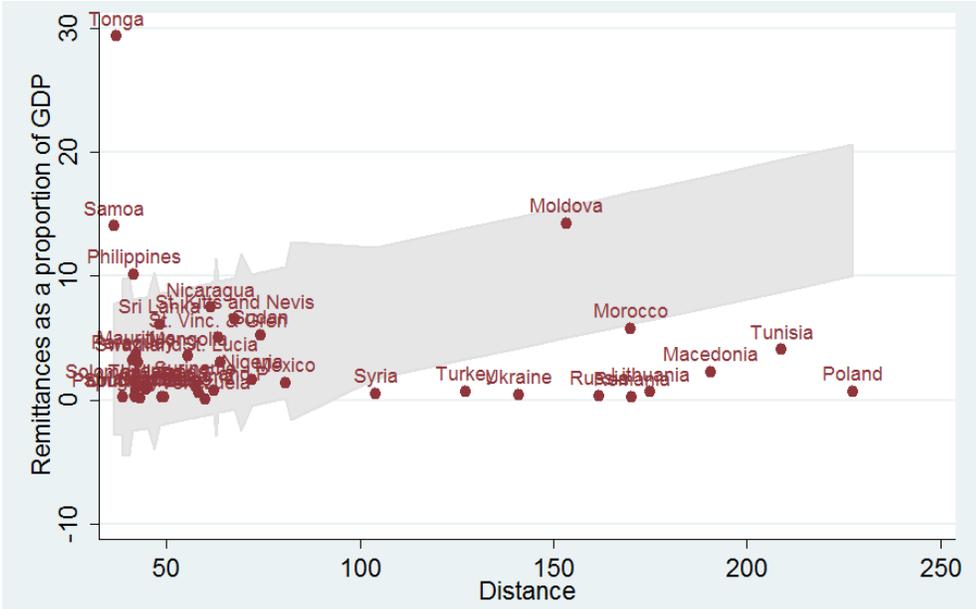
(a) Low Income Countries



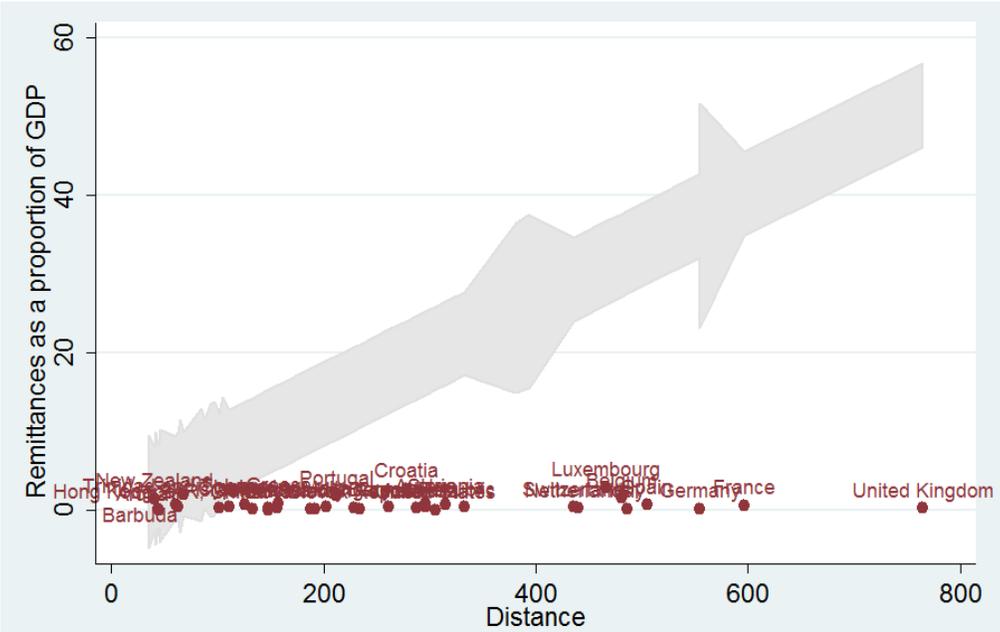
(b1) Middle Income Countries Group 1



(b2) Middle Income Countries Group 2



(c.) High Income Countries



Note: Distance is the weighted inverse of the distance of each recipient country to the ten countries with the highest net migration rates during the period multiplied by the GDP per capita of these ten countries for each given year

Table 1. *Descriptive Statistics*

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>Ln (New Businesses_{it})</i>	884	8.87	2.1	0.7	13.4
<i>Remittances_{it}</i>	1554	0.04	0.06	0	0.52
<i>Institutions_{it}</i>	2328	0	2.3	-5.9	4.9
<i>Education_{it}</i>	1420	0.87	0.1	0.3	1.0
<i>Urban_{it}</i>	2090	0.54	0.2	0.1	1.0

Table 2. *Results of the First Stage Regression*

Dependent variable: *Remittances_{it}* (as a fraction of GDP)

	WS case		SH case		SL case	
<i>Institutions_{it}</i>	0.007	(-1.20)	0.001	(0.58)	-0.005	(-0.63)
<i>Education_{it}</i>	-0.01	(-0.35)	-0.048	(-1.58)	-0.06**	(-2.21)
<i>Urban_{it}</i>	-0.029	(-0.19)	0.075	(1.33)	-0.648***	(-2.62)
<i>Distance_{it}</i>	0.001***	(2.90)	0.00**	(2.35)	0.007***	(4.51)
Observations	533		218		315	
Countries	95		34		61	
F test of excluded instruments	8.39		5.51		20.31	
Prob > F (p-value)	0.004		0.02		<0.000001	

Notes: In parenthesis, we report the t statistics. WS, SL and SH cases refer to the whole sample, the sample of countries with low rule of law, and countries with high rule of law respectively. Statistical significance as follows: *** = 1%, ** = 5%, * = 10%. Results were obtained using STATA/SE 11.1. WS, SL and SH cases refer to the whole sample, the sample of countries with low rule of law, and countries with high rule of law respectively.

Table 3. *Second Stage Estimates vs OLS Estimates*

Dependent Variable: $\ln(\text{New Businesses}_{it})$

Dependent Variables	WS case			
	2SLS		OLS	
<i>Remittances_{it}</i>	24.851***	(3.64)	1.999*	(1.95)
<i>Institutions_{it}</i>	0.076	(0.60)	0.219***	(2.63)
<i>Education_{it}</i>	1.877***	(2.60)	1.480**	(2.40)
<i>Urban_{it}</i>	11.895***	(3.19)	14.058***	(4.37)
<i>Observations</i>	533		541	
<i>Countries</i>	95		100	

Dependent Variables	SL case			
	2SLS		OLS	
<i>Remittances_{it}</i>	7.458***	(4.79)	1.909*	(1.91)
<i>Institutions_{it}</i>	0.218**	(2.27)	0.268**	(2.17)
<i>Education_{it}</i>	2.035***	(4.13)	1.963***	(3.28)
<i>Urban_{it}</i>	12.123***	(5.89)	12.516***	(3.90)
<i>Observations</i>	315		319	
<i>Countries</i>	61		65	

Dependent Variables	SH case			
	2SLS		OLS	
<i>Remittances_{it}</i>	185.925**	(2.47)	10.116**	(2.48)
<i>Institutions_{it}</i>	0.023	(0.07)	0.198**	(2.16)
<i>Education_{it}</i>	7.763	(1.20)	-1.981	(-0.78)
<i>Urban_{it}</i>	-2.045	(-0.14)	18.381**	(2.04)
<i>Observations</i>	218		222	
<i>Countries</i>	34		35	

Notes: In parenthesis, we report the t statistics, calculated using robust standard errors. WS, SL and SH cases refer to the whole sample, the sample of countries with low rule of law, and countries with high rule of law respectively. Statistical significance as follows: *** = 1%, ** = 5%, * = 10%. Results were obtained using STATA/SE 11.1.

Table 4. *Estimates on whole sample with Interaction*
Dependent Variable: Ln (New Businesses_{it})

Dependent Variables	2SLS	
<i>Remittances_{it}</i>	30.946***	(3.85)
<i>Remittances_{it}* Institutions_{it}</i>	6.674	(1.35)
<i>Institutions_{it}</i>	-0.054	(-0.54)
<i>Education_{it}</i>	2.340***	(3.07)
<i>Urban_{it}</i>	11.723***	(3.26)
<i>Observations</i>	533	
<i>Countries</i>	95	

Notes: In parenthesis, we report the t statistics, calculated using robust standard errors. Statistical significance as follows: *** = 1%, ** = 5%, * = 10%. Results were obtained using STATA/SE 11.1. Two-stage least squares with within estimator is used to estimate these parameters. The marginal effects of remittances and their standard errors are calculated and reported in Table 5.

Table 5. *Marginal effects: Impact of remittances conditioned on quality of institutions*

Quartiles of quality of institutions	Marginal effect of remittances	Standard errors	t-statistic
1 st percentile	2.71	16.59	0.16
5 th percentile	9.83	11.82	0.83
10 th percentile	12.62	10.09	1.25
15 th percentile	15.79	8.30	1.90
Q1 (25th percentile)	19.94***	6.53	3.06
Q2 (median)	27.97***	6.74	4.15
Q3 (75th percentile)	42.53***	15.20	2.80

Notes: Statistical significance as follows: *** = 1%, ** = 5%, * = 10%. Results were obtained using STATA/SE

11.1.

Table A.1. *Countries in Sample*

Albania	Ethiopia	Macao	Russia
Algeria	Finland	Macedonia	Rwanda
Argentina	France	Madagascar	Senegal
Armenia	Georgia	Malawi	Slovenia
Azerbaijan	Germany	Malaysia	South Africa
Bangladesh	Ghana	Maldives	Spain
Belarus	Greece	Malta	Sri Lanka
Belgium	Guatemala	Mauritius	Suriname
Belize	Hong Kong	Mexico	Sweden
Bolivia	Hungary	Moldova	Switzerland
Botswana	Iceland	Morocco	Syria
Brazil	India	Netherlands	Tajikistan
Bulgaria	Indonesia	New Zealand	Tanzania
Burkina Faso	Ireland	Nicaragua	Thailand
Cambodia	Israel	Niger	Togo
Chile	Italy	Nigeria	Tunisia
Colombia	Jamaica	Norway	Turkey
Croatia	Japan	Oman	Uganda
Cyprus	Kazakhstan	Pakistan	Ukraine
Denmark	Kenya	Panama	United Kingdom
Dominica	Kyrgyz Republic	Peru	United States
Ecuador	Latvia	Philippines	Uruguay
Egypt	Lebanon	Poland	Vanuatu
El Salvador	Lithuania	Portugal	Yemen, Rep.
Estonia	Luxembourg	Romania	Zambia
