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Trade, Remittances, Institutions, and Economic Growth

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Abstract

This paper empirically investigates the role of trade, remittances, and institutions in economic development in a large sample of developing countries using recently developed instruments for all these variables. Both cross country (over 30 years) and dynamic panel data (over 5-year periods) regressions of growth rates on instrumented trade, remittances, and institutions provide evidence of a significant impact of trade, institutions, and remittances on growth. While institutions foster growth, remittances hamper it. The effect of trade on growth is positive in cross sectional regressions but ambiguous in dynamic panel data regressions. These results are indicative of a more important role for trade in explaining growth in the very long run than over shorter horizons.

Keywords: economic growth, trade, remittances, institutions

JEL classification: F14, F24, O43

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1- Introduction

What are the fundamental determinants of per capita income growth? For long, many economists have attempted to answer this question. Although there is still an on-going debate on the answer, most economists refer to institutions, openness, and remittances as some of the main factors affecting economic growth.

There is a long and distinguished line of literature that places institutions at the center of analysis. In this respect, institutions, especially in the form of property right protection and less distortionary policies, affect incentives to invest to achieve desirable economic outcomes (North 1990). This has been supported by econometric results presented in many recent empirical papers, such as Hall and Jones (1999), Acemoglu *et al.* (2001), and Rodrik *et al.* (2004).

The second school of thought put emphasis on the role of international trade as the main conduit of economic development. Influential papers in this school include Sach and Warner (1995), Frankel and Romer (1999), and Dollar and Kraay (2003). In these papers, trade strongly fosters economic convergence among countries and regions.

The third group of explanations focuses on remittances or the flow of cash that overseas working migrants send back to their home country. There is a considerable debate regarding the contribution of remittances to economic development in developing countries. The positive view conjectures that remittances help improve recipients' standard of living, encourage households' investment in education and healthcare. Remittances are also necessary for financing imports, which is good for the balance of payment. However, opponents of remittances persist that remittances fuel inflation and reduce incentives to work, which are obviously harmful for growth. Empirical studies on

economic impact of remittances also produce mixed results (see, for examples, Glytsos 2002, Leon-Ledesma and Piracha 2004, and Chami *et al.* 2005).

The above picture suggests the three possible factors which determine how successful countries are in creating higher income levels. This paper focuses on the extent to which institutions, trade openness, and remittances explain about the variation of economic growth across countries and on investigating if they are complements or competitors in economic development. To this end, a sample of aggregate data on trade, remittances, and institutions from 67 developing countries for over 30 years (1970-2000) is collected. This sample has an advantage of offering large cross-sectional variation. Unlike most of the papers in the literature using a levels framework, for example, measurement errors and omitted variable bias, this study chooses a growth framework for its regressions. This framework serves several purposes. First, it helps avoid potential problems of the levels framework as indicated by Dollar and Kraay (2003). Second, it accounts for the conditional convergence story as projected by the Neo-classical growth synthesis (through the inclusion of the initial income variable). However, when this paper draws together the three strands of literature to look at the partial effects of trade, remittances, and institutions on growth, it confronts with a fundamental identification problem. Countries that have good economic performance often seem to have better institutions, trade more with others, and receive relatively less remittances (measured by the size of GDP). This endogeneity problem has been stressed in the literature (see, for example, Dollar and Kraay 2003, Chami *et al.* 2005). To overcome this problem, this study employs popularly-used instruments for all trade, remittances, and institutions. Also, to make the results more informative about the relative importance of the three factors in the long-run, this paper estimates both cross-sectional regressions and panel dynamic regressions.

When estimating the partial effects of trade, remittances, and institutions on growth using cross-sectional data, this paper finds that ordinary least squares regressions of log difference of real per capita income on trade shares, remittance shares, and measures of institutional quality deliver statistically significant coefficients on all variables. When all these interested variables are instrumented using the instruments used intensively in the literature, it is found that the obtained coefficients of these variables are even larger (in terms of magnitude) as compared to previous ordinary least squares results. This indicates that all these factors are important in predicting growth in the long run: trade and institutions foster growth, but remittances hamper it. Although there may exist multicollinearity in the second stage regressions, this problem is not so severe.

This paper next turns to the increase in growth in developing countries over the last three decades to see how much growth can be explained by improved institutional quality, greater trade volumes, and changes in remittance flow. To this aim, it estimates dynamic regressions of 5-year changes in log level of GDP per capita on its lagged variable, log difference of trade shares, log difference of remittance shares, and difference in measures of institutional quality using a dynamic panel data technique. To control for possible reverse causation from growth to changes in trade, remittances, and institutions, this paper utilizes lagged log levels of these variables as their instruments. Results obtained indicate a strongly significant and economically relevant effect of changes in trade, remittances, and level of institutional quality on growth. In other words, there is enough evidence of the important roles of these factors in both long and short run.

The rest of this paper is structured as follows. Section 2 documents the cross-sectional evidence on trade, remittances, and institutions. Section 3 presents results of the dynamic regressions. Section 4 ends the paper with some concluding remarks. Detailed variable

description, data sources, and list of countries in the sample can be found in the Appendices at the end of the paper.

2- Remittances, trade, institutions, and growth in a cross-section of countries

This paper starts by examining the effects of trade, remittances, and institutions on per capita income growth in a cross-section of countries. To capture growth performance of countries, the log-difference of per capita GDP is regressed on measures of international market size, remittance inflow, and institutional quality:

$$\log Y_{iT} - \log Y_{i0} = \alpha_0 + \alpha_1 \log Y_{i0} + \alpha_2 \log TS_{iT} + \alpha_3 \log RS_{iT} + \alpha_4 I_{iT} + \Delta X_{iT} + \varepsilon_{iT} \quad (1)$$

where Y_{iT} is real GDP per capita at year T , Y_{i0} is real GDP per capita at the beginning of the period, TS_{iT} is the trade–GDP ratio, RS_{iT} is remittances-GDP ratio, I_{iT} is the quality level of institutions, and X_{iT} is a vector of other explanatory variables.

In this study, the growth framework is chosen ahead of the levels framework, which is used extensively in the literature, to capture the conditional convergence effect (through the log of initial income) which is often found in empirical growth models, either Neo-classical models, e.g. Mankiw *et al.* (1992), or models of international technological transfer, e.g. Dowrick and Rogers (2002).¹ An additional advantage of this approach is that it helps overcome two problems of the levels approach, as indicated by Dollar and

¹ The economic intuition behind is the steady state distribution of income levels. As shown in Mankiw *et al.*, if economies are not in their steady states, the transitional dynamics of the Neo-classical model are captured by the addition of the ‘initial’ income level in a growth regression. If economies are in their steady states, the addition of the lagged dependent variable should add no explanatory power.

Kraay (2003), which cause endogeneity through reverse causality and omitted variable bias.²

There is a voluminous number of existing papers that examine the effects of institutional quality on level of per capita income such as Hall and Jones (1999), Kaufmann *et al.* (1999), Acemoglu *et al.* (2001), Dollar and Kraay (2003), and Rodrik *et al.* (2004). Frankel and Romer (1999) use the levels framework to estimate the effect of trade integration on growth. Meanwhile, Chami *et al.* (2005) and Catrinescu *et al.* (2006) investigate the impact of remittances on economic development borrowing the growth framework. All these suggest a good case for the importance of the above mentioned factors on a country's economic performance. Apparently, property right protection and fair enforcement of contracts can affect the incentives to invest/work and innovate. In addition, the access to international trade and remittance income may also affect these incentives and, hence, growth.

To measure the quality of institution, this paper employs the aggregate index of economic freedom of the Fraser Institute (Gwarteny and Lawson 2007). This composite indicator, which draws on survey data from the *Global Competitiveness Report* and the *International Country Risk Guide*, measures the extent to which institutions in a country provide secure protection of property rights, assure fair enforcement of contracts and a stable monetary environment, allow free exchange with foreigners, and lift restrictions on entry into occupations and business activities. It is computed for 123 countries in the base year of 2000, and, by construction ranging from 0 to 10 where 10 implies the highest institutional quality. This paper recognizes several other available measures of institutional quality in the literature, for example, the composite index by Kaufmann *et al.* (2003), the anti-

² In addition, from equation (1), it can be easily shown that the levels regression is nested within the growth regression. Hence, the growth framework is more general than the levels framework.

expropriation index by Acemoglu *et al.* (2001) and the rule of law index by Rodrik *et al.* (2004). However, these data sets have a very limited time-series dimension which can hardly be used for panel estimation. As a result, the economic freedom index is chosen for its wide range of coverage, long time-series dimension, and broad scope of definition.³

This paper measures real GDP per capita for the period 1970-2005 in 1990 dollars using data from the United Nations Statistics Division. Human capital, the only control variable used in this paper, is proxied by fraction of adult population completing post-secondary education from Barro and Lee (2000) database. Trade openness is measured by total trade as a fraction of GDP. These data come from Summers, Heston, and Bettina's Penn World Tables version 6.2. Finally, data on remittances are collected from the International Monetary Fund Balance of Payment Statistics Yearbook and the World Bank's Migration and Remittances Datasets.⁴

Table 1 provides results estimated by simple ordinary least squares (OLS) regressions for a cross-section of countries in the period 1970-2000. In the first column, average growth of GDP per capita is regressed on the logarithm of initial GDP per capita level in 1970 and on the logarithm of education variable. In the next columns, each time, one variable on trade openness, remittances, and institutions is added separately and finally added all together in the regressions. It can be seen that the coefficient on initial income term is always negative and highly significant which confirms the convergence story of the Neo-

³ Recently, Marshall *et al.* (2008) construct Polity IV data on qualities of democratic and autocratic authority for 162 countries over the period 1800-2006. This data set measures key issues such as qualities of executive recruitment, constraints on executive authority, political competition, and changes in the institutionalized qualities of governing authority. Although this data set is focused more on the political side than the economic side of institutions, it is a potentially good measure of institutional quality for future research on the issue.

⁴ It is necessary to stress the poor quality of data on remittances. This is due to the fact that large quantities of international remittances are transmitted through various unofficial channels such as friends, family members and are, therefore, not recorded in the balance of payments of many countries. As a result, unofficial figures may underestimate the actual flows of remittances.

classical growth school of thought. Similarly, the impact of education on growth is positive and significant. This result supports theories of growth in which human capital generates significant technological externalities as per Lucas (1988) and is also in line with empirical evidence by Benhabib and Spiegel (1994) among others. Turning to the variables of interest, it is found that the signs of trade openness and institutions are as expected, positive, and statistically significant. Throughout the table, the coefficients on remittances enter negatively and statistically significant or close to being so. This supports the perception of the remittance opponents who content that remittances could have a net harmful impact on national economic growth because they have the potential to fuel inflation, disadvantage the tradable sector by appreciating the domestic currency, and reduce incentives to work as receiving households can opt to live off of foreign transfer rather than by working. Overall, results obtained indicate that countries with stronger institution, more integration (in trade), and lower inflow of remittances are likely to grow faster.

(Insert Table 1 about here)

However, as discussed extensively in the literature, there are some potential problems with the OLS regressions of this kind. The first one is the endogeneity of the interested variables due to reverse causality. Countries may have good institutions because they are rich (the ‘halo effects’ as per Dollar and Kraay 2003) and rich countries tend to trade more. In addition, as remittances are more likely a compensation for unfavorable economic conditions, such as low output, poor countries tend to receive large amount of remittances relatively to their GDP. The second problem is the likely measurement error

of subjective institutional quality.⁵ To address these problems, this paper employs a two-stage least squares (2SLS) estimation procedure using instruments used previously in the literature. In order to preserve as large a sample as possible, this paper uses legal origin and the religious composition of the population (percentages of Catholics, Protestants, Muslims, and other religions) as suggested by La Porta *et al.* (1999) as instruments for institutions. These instruments are intended to capture the impact of colonial origin on institutional quality.⁶ Acemoglu *et al.* (2001) suggest settler mortality as an appealing instrument but this is only available for a smaller number of countries in the sample considered in this study. To instrument trade, this paper uses Frankel and Romer (1999) measure of fitted values of trade predicted by a gravity model. As for remittances (as share of GDP), following Chami *et al.* (2005), this paper instruments the variable by income gap with the US. These instrumental variables have been demonstrated to perform fairly well in the sense of producing strong second stage results (e.g. Acemoglu *et al.* 2001, Dollar and Kraay 2003, Glaeser *et al.* 2004, Chami *et al.* 2005). The results of the two-stage least squares estimates are reported in Table 2.

(Insert Table 2 about here)

Panel A of Table 2 presents all regressions undertaken in Table 1, however, using an instrumental variable (IV) technique. All regressions include an unreported constant. It is found that all variables are significant in the intuitive direction. While trade and institutions affect growth positively, the impact of remittances on growth is always negative. The coefficients of trade share, remittance share, and institutions in the IV

⁵ There is also some concern about the potential endogeneity of the education variable. However, when performing the Hausman test for the exogeneity of this variable, this paper can not reject the hypothesis that the variable is exogenous at usual confidence levels (p-value = 0.131).

⁶ La Porta *et al.* (1999) classify the theories of determinants of institutional performance into three different groups: economic (the efficiency view), political (the redistribution view), and cultural (the trust or beliefs view). Accordingly, they suggest per capita income, legal origin, and religious affiliations as three important determinants which capture these three dimensions of the quality of institutions.

estimations are generally larger (in absolute value) than in the corresponding OLS estimation. This suggests that the endogeneity problem cause great bias in the OLS estimates. All regressions confirm the importance of institutions, trade openness, and workers' remittances in explaining the cross-countries variation in development.⁷

It can be seen that the main findings of Frankel and Romer (1999) and Dollar and Kraay (2003) also hold in this sample. Per capita GDP growth is highly and positively correlated with access to foreign markets (measured by trade as a share of GDP), especially in regressions (5) and (8). Results in column (2) say that an increase in the log of trade share by one unit leads to an increase in growth by 17.9 percent over 30 years or roughly 0.6 percent per annum. In column 3, it is found that remittances exert a negative impact on growth with an estimated coefficient of -0.230. This means that if log of remittance share increases by one unit, income growth will be lower by 23 percent in 30 years or 0.76 percent a year. This result supports the findings of Chami *et al.* (2005). The positive role of institutions to economic performance as found in many previous papers, such as Acemoglu *et al.* (2001), and Rodrik *et al.* (2004), is also confirmed in this paper as in column 4. Here, a unit (positive) shock to the institutional quality equation results in an increase in income growth of 58.7 percent over 30 years which is equivalent to 1.93 percent annually. To examine the partial effects of trade, remittances, and institutions, this paper combines these specifications in the rest columns of the table. Regressions in these columns provide significant coefficients with intuitive signs on all the interested variables.

The first-stage regressions as reported in panel B also offer interesting results. In all first stage regressions, while the lagged income variable does not show significant impact,

⁷ Although results are not reported here, a test of overidentifying restrictions for the institutional variable is run for each set of estimates (since there are more than one instruments used for this variable). As the test fails to reject the null hypothesis of no overidentifying restrictions, it supports the choice of instruments in this paper.

education has positive effects on trade volume, remittance inflow as share of GDP, and institutions. The finding about the positive role of education is in line with the Glaeser *et al.* (2004)'s view that better education system leads to more benign polity, more dialogue than violence, more law and order and democratic accountability, and more political stability. It also confirms that more human capital enables countries to benefit more from trade. In addition, the hypothesis that higher level of education will give (migrant) workers working overseas better opportunities to find higher income jobs and then send more money back home is supported by results of this paper. Besides education, there are other factors that influence interested variables. In the first-stage regression for trade share, fitted trade instrument has a significant coefficient. In the specification for remittance share, legal origin, fitted openness, and income gap with the US all strongly predict remittances. Meanwhile, only legal origin has strong explanatory power for institutions.

(Insert Table 3 about here)

Table 3 illustrates the relationships among openness, remittance inflow, and institutions. Trade, remittances, and institutional quality are separately regressed on income at the beginning of the period and education and on each other. The way of instrumenting the endogenous variables is the same as before. While it is possible that there exist non-linear relationships among these variables, this paper tries to keep the specifications as simple and linear as in all baseline specifications. The OLS regressions indicate that trade openness exerts a significant and positive impact on remittances but remittances do not significantly affect trade. Like trade, remittances do not significantly induce institutions. The impacts of institutions on remittances and trade are insignificant. In the IV regressions, institutions do not significantly affect trade and remittances and are not affected by these factors either. However, trade and remittances are found to have a

significant and positive effect on each other. This confirms the remittance supporters' view that remittances may be a good source of finance for imports and to some extent, trade and remittances are complementary in economic development process. However, the overall impact of remittances on economic performance is found to be negative as in Table 2. Results in Table 3 indicate that there may be multicollinearity among these variables although it is not so severe.⁸ The highest value of R-squared in the first stage regressions is 0.399 (in the trade equation) points out that there is no perfect linear relationship among the right-hand side variables in the second stage regressions of the instrumental variables. To get more informative results about the roles of trade, remittances, and institutions, it may be better to make use of a dynamic framework. This will be addressed in the section below.

3- Remittances, trade, institution, and growth in a dynamic framework

In Section 2, cross-sectional regressions showed that very long-run growth is significantly affected by the changes in the intensity of trade and remittances and the level of institutional quality. A disadvantage of those cross-sectional regressions is that it is difficult to separate the pure effects of those variables from potential unobserved factors that explain differences in growth rates across countries but vary very little with time such as geographical or climate conditions. To overcome this limitation, in this section, a dynamic framework relating growth rates of real GDP per capita over time to changes in variables of interest will be utilized. For a start, the following cross-country regression is considered:

$$\log Y_{it} = \alpha_{i0} + \alpha_1 \log Y_{it-k} + \alpha_2 \log TS_{it} + \alpha_3 \log RS_{it} + \alpha_4 I_{it} + \Delta X_{it} + \gamma_t + \varepsilon_{it} \quad (2)$$

⁸ Columns (5) and (8) indicate that trade becomes significant whenever remittances variable is also considered.

where α_{i_0} is a country fixed effect that does not vary over time, γ_t is a period effect that is common across countries, k is the number of years lagged (which is chosen to be equal to 5 in this paper), and others are as previously denoted. While the inclusion of the country specific effect helps pick up omitted time invariant country characteristics such as geographical factors, the period specific effect will pick up omitted shocks happened in all countries similarly, like the ups and downs or the business cycle of the whole world.

Similar to Dollar and Kraay (2003), this paper employs the estimation technique developed by Caselli *et al.* (1996) which transforms the level regression in equation (2) to regression in differences as follows:

$$\begin{aligned} \log Y_{it} - \log Y_{it-k} = & \alpha_1 (\log Y_{it-k} - \log Y_{it-2k}) + \alpha_2 (\log TS_{it} - \log TS_{it-k}) + \alpha_3 (\log RS_{it} - \log RS_{it-k}) \\ & + \alpha_4 (I_{it} - I_{it-k}) + \Delta (X_{it} - X_{it-k}) + (\gamma_t - \gamma_{t-k}) + (\varepsilon_{it} - \varepsilon_{it-k}) \end{aligned} \quad (3)$$

This transformation presents a regression of growth of output on its own lag and on growth of different explanatory variables. This dynamic framework offers many desirable features in terms of addressing measurement errors, omitted variables, and endogeneity problems (Dollar and Kraay 2003).

By focusing on changes in growth rates over different 5-year periods, it is expected to get more informative results about the partial effects of changes in trade, remittances, and institutions on growth. It is assumed that while trade volumes, remittance flow, and institutional quality may be correlated with the contemporaneous and lagged shocks to GDP growth, they are uncorrelated with future shocks to GDP growth. This implies that the 5-year lags of trade, remittances, and institutional quality can be used as instruments in growth regressions. It has been suggested that when estimating panel data regressions with lagged dependent variable and fixed effects, the results are subject to an estimation bias,

especially when T is small. To avoid this bias, this paper employs the generalized method of moments (GMM) for dynamic panel data in which the differencing transformation above is an important first step to obtain regression results.⁹

Table 4 and 5 presents regression results using the first differenced GMM technique mentioned above. This paper starts with an unbalanced panel of 229 observations on growth in 1970, 1975, 1980, 1985, 1990, 1995, 2000, and 2005 for about 49 countries. The dependent variable is the log difference of income per capita, which captures the average annual growth if it is divided by 5, and the explanatory variables include a lag of the log difference of income per capita, log difference of education, log difference of trade as share of GDP, log difference of remittances as share of GDP, and level difference of institutional quality. All regressions include an unreported time dummy.

(Insert Table 4 about here)

(Insert Table 5 about here)

Table 4 shows the results which are estimated by least squares method. Although this estimation method is inconsistent and its results should be treated with caution, it helps to depict the partial correlations in the data. It can be seen that remittance share, trade share, and institutional quality are all strongly correlated with growth.

Of more interest are results shown in Table 5 where all the variables are instrumented as described above. Coefficients on trade share, remittance share, and institutions are all statistically significant and have smaller magnitudes as compared to the least squares results. Interestingly, the trade variable does not always show positive impact on growth. It has a negative coefficient in equation (2) when it stands alone. There is a qualitatively

⁹ The author would like to thank an anonymous referee for this useful comment.

similar result when remittances variable is also considered in equation (5). However, the coefficient on trade becomes positive in equation (6) when institutional quality is introduced and in equation (8) when all interested variables are examined simultaneously. It is quite striking that the estimated coefficient on trade variable varies dramatically across specifications, ranging from -0.305 to 0.294.

Remittances are found to have a significant negative effect on growth throughout all regressions. The largest (negative) impact is found in equation (3) when the variable stands alone (without trade and institutions being considered). However, the magnitude of its coefficient is reduced somewhat when trade and institutional variables are taken into account.

The institutional variable always enters the regressions positively and significantly. Its coefficient varies from 0.083 when both trade and remittances are simultaneously examined in equation (8) to 0.095 when only remittances variable is introduced in equation (7).

In short, dynamic panel regression results strongly confirm the effective role of changes in trade, remittances, and institutions to economic growth as found previously in cross-sectional regressions. While the impact on growth of institutions is persistently positive, of remittances is persistently negative, the impact of trade on growth is somehow ambiguous.

The first-stage regressions for changes in trade, remittances, and institutions in Table 6 provide interesting results. Human capital does not necessarily lead to institutional improvement, which is inconsistent with the view that high human capital growth leads to faster institutional improvement. This may be due to some mean reversion in the measure of institutions given a relatively short horizon of 5 years. There exists a negative

relationship between previous trade volumes and subsequent changes in trade. This result can be explained by the fact that many developing countries opted for protectionist measures to protect their domestic production which results in reduction in trade volumes, especially in 1960s and 1970s (Dollar and Kraay 2003). This result holds even when previous institutional quality level and previous remittance share are added to the regressions. The main purpose for adding those two lagged variables to the regressions is to see whether the outcomes of trade, remittances, or institutions come first. If one factor comes first then its lagged value should strongly predict changes in the others. It can be seen that the previous values of institutional and remittances variables enter positively, however, insignificantly.

(Insert Table 6 about here)

Changes in remittances also have a negative correlation with its previous value. In the contrary to the results reported in Table 2 and 3, lagged trade volumes do not have strong explanatory power for remittances. The rate of change in institutional quality is negatively correlated with its previous value. This reflects the somehow persistency in institutional economic policies. While the lagged level of trade has very strong explanatory power for changes in institutional quality, which is consistent with the argument of Rodrik (2000), the lagged level of remittances exerts an insignificant impact on institutions. In short, results obtained in Table 6 suggest that the relationship between trade, remittances, and institutions may be mutually bidirectional.

4- Conclusions

This paper tries to explain the dynamics of income in the last 30 years in which initial income term (in cross-sectional data) is incorporated to control for historical factor. In a

large cross-section of countries, it is found that in the long-run, growth is strongly correlated with high level of trade and better quality of institutions but with low level of remittances. This suggests that trade, remittances, as well as institutions are all important in understanding differences in growth rates across countries in the long run.

Over shorter periods of time, results obtained, to a certain extent, lend strong support to the above conclusion. Given that the lag of income per capita growth and the rate of change in educational level are controlled for, 5-year average growth exhibits substantial persistence with the variation in remittances and institutions. The only exception is that changes in trade share do not give an unambiguous prediction of changes in growth rates (the coefficient on trade is sometimes positive and sometimes negative). These imply that trade affects growth more significantly in the longer run than in the shorter run. An explanation for this outcome is as follows. In general, trade is strongly linked with common geographical and historical issues. The longer the time period is considered, the better the combined effects of trade with those issues on economic performance are revealed. Trade is also often affected by short-run fluctuations in exchange rate, interest rate, etc. However, those short-run movements do not necessarily lead to changes in growth as it may take longer for growth to respond.

As trade may positively affect institutions, which in turn affects growth, it can be drawn from this result that as a policy maker, one needs to formulate appropriate policies which can strengthen both institutional quality and trade liberalization. To this end, countries should adopt policies and an institutional structure that assure effective enforcement of contracts and fair regulation of credit and labor, and allow free exchange with foreigners. While the positive role of trade and institutions towards growth has been, to some extent, established in the literature, the impact of remittances on growth, whether it is hampering or enhancing, is still controversial. The fact that the results of this paper somehow support

the hypothesis that remittances might not be a stable source of capital for development because it can reduce recipients' economic incentive to work and participate in the labor market which results in a net harmful effect on growth is a challenging finding. If it is true, it is hard to think about appropriate policies to limit its adverse effect on growth without a more thorough analysis of the relationship between remittances and economic development. Because it is just the beginning of telling a story, it is expected to have more research works devoted to this interesting topic in the future.

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Table 1- Remittances, trade, institutions, and growth: OLS regressions (cross section)

		Dependent variable: GDP per capita growth							
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Log GDP per capita in 1970	-0.214** (0.094)	-0.264*** (0.094)	-0.260** (0.109)	-0.251** (0.096)	-0.337*** (0.109)	-0.285*** (0.096)	-0.321*** (0.112)	-0.378*** (0.113)	
Log Education	0.242*** (0.073)	0.251*** (0.070)	0.261*** (0.079)	0.190** (0.078)	0.280*** (0.074)	0.208** (0.074)	0.206** (0.080)	0.232** (0.076)	
Log Trade Share		0.309** (0.127)			0.364*** (0.127)	0.265** (0.121)		0.319*** (0.120)	
Log Remittance Share			-0.061 (0.044)		-0.088* (0.044)		-0.085* (0.045)	-0.104** (0.044)	
Institutions				0.189** (0.087)		0.149* (0.080)	0.227** (0.094)	0.188** (0.087)	
Observations	67	67	67	67	67	67	67	67	
R^2	0.140	0.221	0.167	0.198	0.274	0.255	0.248	0.328	
Adjusted R^2	0.113	0.183	0.127	0.160	0.227	0.207	0.199	0.273	

All regressions include an unreported constant. White corrected standard errors are in parentheses. Significance at the 1, 5, and 10 percent levels are denoted respectively by ***, **, and *.

Table 2- Remittances, trade, institutions, and growth: 2SLS regressions (cross section)

Dependent variable: GDP per capita growth								
Explanatory variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: Second stage regressions (Dependent variable is GDP per capita growth)</i>								
Log GDP per capita in 1970	-0.214** (0.094)	-0.243*** (0.092)	-0.385*** (0.121)	-0.328*** (0.119)	-0.596*** (0.159)	-0.347*** (0.123)	-0.478*** (0.124)	-0.653*** (0.170)
Log Education	0.242*** (0.073)	0.247*** (0.071)	0.314*** (0.092)	0.079 (0.140)	0.378*** (0.103)	0.087 (0.138)	0.162 (0.136)	0.246* (0.142)
Log Trade Share		0.179 (0.222)			0.693** (0.219)	0.140 (0.202)		0.631* (0.384)
Log Remittance Share			-0.230** (0.093)		-0.368*** (0.113)		-0.217** (0.100)	-0.345*** (0.128)
Institutions				0.587* (0.324)		0.573* (0.309)	0.534* (0.321)	0.438 (0.306)
Observations	67	67	67	67	67	67	67	67
<i>Panel B: First stage regressions for endogenous variables (Trade Share, Remittance Share, and Institution)</i>								
		Log Trade Share			Log Remittance Share			Institutions
Log GDP per capita in 1970		0.014 (0.107)			-0.363 (0.331)			0.072 (0.206)
Log Education		0.121* (0.075)			0.505** (0.211)			0.238* (0.132)
English Common Law legal origin		0.091 (0.181)			0.845** (0.337)			0.557** (0.246)
Catholic		-0.004 (0.003)			0.003 (0.008)			0.005 (0.004)
Protestant		0.005 (0.005)			-0.023 (0.019)			-0.006 (0.008)
Muslim		-0.002 (0.003)			0.004 (0.006)			0.000 (0.004)
Log Constructed Openness		0.377*** (0.082)			0.964*** (0.215)			-0.022 (0.124)
Income gap/10,000		-0.071 (0.436)			3.310*** (1.180)			-0.736 (0.657)
Observations		67			67			67
R^2		0.399			0.384			0.332
Adjusted R^2		0.316			0.299			0.240

All regressions include an unreported constant. White corrected standard errors are in parentheses. Significance at the 1, 5, and 10 percent levels are denoted respectively by ***, **, and *.

Table 3- Relations among trade, remittances, and institutions (cross section)

	Log Trade Share	Log Remittance Share	Institutions
<i>Panel A: OLS estimates</i>			
Log GDP per capita in 1970	0.178 ^{***} (0.067)	-0.892 ^{***} (0.247)	0.218 (0.149)
Log Education	-0.082 (0.070)	0.224 (0.206)	0.259 ^{**} (0.109)
Log Trade Share		0.517 [*] (0.312)	0.239 (0.162)
Log Remittance Share	0.061 (0.038)		0.086 (0.064)
Institutions	0.123 (0.085)	0.377 (0.283)	
Observations	67	67	67
R^2	0.131	0.193	0.293
Adjusted R^2	0.074	0.141	0.247
 <i>Panel B: Second stage IV estimates</i>			
	Log Trade Share	Log Remittance Share	Institutions
Log GDP per capita in 1970	0.278 ^{***} (0.101)	-0.887 ^{***} (0.276)	0.132 (0.224)
Log Education	-0.134 (0.116)	0.463 (0.349)	0.299 ^{**} (0.127)
Log Trade Share		1.425 ^{**} (0.629)	0.142 (0.398)
Log Remittance Share	0.203 ^{**} (0.081)		-0.052 (0.131)
Institutions	0.151 (0.286)	-0.390 (0.778)	
Observations	67	67	67

All regressions include an unreported constant. White corrected standard errors are in parentheses. Significance at the 1, 5, and 10 percent levels are denoted respectively by ***, **, and *. The first stage IV estimates are the same as those provided in Panel B of Table 2.

Table 4- Remittances, trade, institutions, and growth: least squares regressions (panel data)

		Dependent variable: 5-year average GDP per capita growth							
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Average GDP per capita growth in previous 5 years	-0.119*	-0.100*	-0.121*	-0.136	-0.105*	-0.095	-0.131	-0.096	
	(0.068)	(0.060)	(0.065)	(0.089)	(0.060)	(0.081)	(0.083)	(0.079)	
<i>Average change in previous 5 years of:</i>									
Log Education	0.086**	0.089**	0.074**	0.177***	0.078**	0.167***	0.153***	0.148***	
	(0.041)	(0.039)	(0.036)	(0.050)	(0.036)	(0.053)	(0.054)	(0.057)	
Log Trade Share		-0.377***			-0.310***	-0.391***		-0.347***	
		(0.064)			(0.062)	(0.080)		(0.071)	
Log Remittance Share			-0.114***		-0.098***		-0.091*	-0.074*	
			(0.032)		(0.030)		(0.047)	(0.045)	
Institutions				0.113***		0.122***	0.115***	0.122***	
				(0.043)		(0.042)	(0.039)	(0.040)	
Observations	276	276	276	229	276	229	229	229	
R^2	0.471	0.517	0.524	0.482	0.553	0.531	0.515	0.553	
Adjusted R^2	0.455	0.500	0.508	0.461	0.537	0.510	0.493	0.530	

All regressions include an unreported time dummy. White corrected standard errors are in parentheses. Significance at the 1, 5, and 10 percent levels are denoted respectively by ***, **, and *.

Table 5- Remittances, trade, institutions, and growth: GMM regressions (panel data)

		Dependent variable: 5-year average GDP per capita growth							
Explanatory variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Average GDP per capita growth in previous 5 years	0.268***	0.178***	0.096*	0.580***	0.066	0.552***	0.559***	0.478***	
	(0.044)	(0.048)	(0.051)	(0.062)	(0.056)	(0.065)	(0.071)	(0.082)	
<i>Average change in previous 5 years of:</i>									
Log Education	0.058	-0.098*	0.041	0.658***	-0.077	0.652***	0.698***	0.727***	
	(0.042)	(0.051)	(0.057)	(0.093)	(0.055)	(0.091)	(0.119)	(0.118)	
Log Trade Share		-0.305***			-0.228***	0.190**		0.294***	
		(0.053)			(0.065)	(0.085)		(0.092)	
Log Remittance Share			-0.112***		-0.092***		-0.033*	-0.069***	
			(0.021)		(0.022)		(0.020)	(0.026)	
Institutions				0.094***		0.089***	0.095***	0.083***	
				(0.032)		(0.028)	(0.034)	(0.032)	
Observations	276	276	276	229	276	229	229	229	

All regressions include an unreported time dummy. White corrected standard errors are in parentheses. Significance at the 1, 5, and 10 percent levels are denoted respectively by ***, **, and *.

Table 6 – Regressions for endogenous variables (Trade Share, Remittance Share, and Institutions)

Explanatory variable	Dependent variable											
	5-year change in Log Trade Share				5-year change in Log Remittance Share				5-year change in level of Institutions			
	(2)	(5)	(6)	(8)	(3)	(5)	(7)	(8)	(4)	(6)	(7)	(8)
Average GDP per capita growth in previous 5 years	0.075*** (0.027)	0.075*** (0.026)	0.101** (0.046)	0.100** (0.046)	-0.002 (0.233)	0.014 (0.226)	0.071 (0.283)	0.063 (0.287)	-0.063 (0.088)	-0.037 (0.087)	-0.064 (0.087)	-0.035 (0.086)
Average change in previous 5 years of Log Education	0.025 (0.018)	0.026 (0.018)	-0.012 (0.019)	-0.013 (0.020)	-0.102 (0.117)	-0.090 (0.124)	-0.231* (0.128)	-0.227* (0.138)	-0.216** (0.102)	-0.235** (0.097)	-0.215** (0.107)	-0.233** (0.100)
Log Trade Share 5 years before	-0.133*** (0.013)	-0.141*** (0.020)	-0.123*** (0.014)	-0.130*** (0.025)		-0.089 (0.071)		-0.056 (0.118)		0.169** (0.066)		0.214*** (0.078)
Log Remittance Share 5 years before		0.006 (0.007)		0.004 (0.008)	-0.116*** (0.036)	-0.105*** (0.040)	-0.098** (0.038)	-0.092** (0.043)			-0.006 (0.019)	-0.029 (0.021)
Institutions 5 years before			0.015 (0.014)	0.018 (0.016)			-0.070 (0.055)	-0.049 (0.073)	-0.213*** (0.030)	-0.275*** (0.032)	-0.213*** (0.031)	-0.293*** (0.041)
Observations	276	276	229	229	276	276	229	229	229	229	229	229
R^2	0.285	0.288	0.276	0.277	0.119	0.124	0.122	0.123	0.251	0.275	0.251	0.283
Adjusted R^2	0.261	0.261	0.242	0.240	0.089	0.090	0.081	0.079	0.220	0.242	0.217	0.247

All regressions include an unreported time dummy. White corrected standard errors are in parentheses. Significance at the 1, 5, and 10 percent levels are denoted respectively by ***, **, and *.

Appendix 1- List of developing countries included in the analysis

Algeria	Dominican Republic*	Kenya*	Papua New Guinea
Argentina*	Ecuador*	Madagascar*	Paraguay*
Bangladesh*	Egypt*	Malawi	Peru
Barbados*	El Salvador*	Malaysia*	Philippines*
Belize*	Fiji*	Mali*	Rwanda
Benin*	Gabon	Malta*	Senegal*
Bolivia*	Ghana*	Mauritius	Sierra Leone
Botswana*	Guatemala*	Morocco*	South Africa*
Brazil*	Guinea-Bissau	Myanmar*	Sri Lanka*
Cameroon*	Guyana	Namibia	Syria*
Chile*	Haiti*	Nepal	Thailand*
China*	Honduras*	Nicaragua	Togo*
Colombia*	India*	Niger*	Trinidad and Tobago*
Congo	Indonesia*	Nigeria*	Tunisia*
Costa Rica*	Iran	Oman	Uganda
Cote d'Ivoire*	Jamaica*	Pakistan*	Uruguay
	Jordan*	Panama*	Venezuela*

Note: * indicates that a country is included in the panel data sample.

Appendix 2- Data sources and definitions

Variable	Description	Source
<i>GDP per capita growth (1970-2005)</i>	Calculated for 81 countries using logarithmic formula with real GDP per capita in 1990 dollars	United Nations Statistics Division database
<i>Log GDP per capita</i>	Natural log of real GDP per capita	United Nations Statistics Division database
<i>Log Education</i>	Natural log of fraction of adult population completing post-secondary education	Barro and Lee (2000)
<i>Log Trade Share</i>	Natural log of total trade (exports plus imports) as percentage of GDP	Penn World Tables version 6.2
<i>Log Remittance Share</i>	Natural log of remittance flow as percentage of GDP	IMF Balance of Payment Statistics Yearbook and The World Bank
<i>Institutions</i>	Index of Economic Freedom of the World by Fraser Institute which includes the following: size of government, legal structure and property rights, access to sound money, freedom to exchange with foreigners, regulation of credit, labor and business	Gwarteny and Lawson (2007)
<i>English Common Law legal origin</i>	Dummy variable taking value 1 if the law system of the country originates from English Common Law and 0 otherwise	La Porta <i>et al.</i> (1999)
<i>Catholic</i>	Fraction of population chooses Roman Catholic as the religion	La Porta <i>et al.</i> (1999)
<i>Protestant</i>	Fraction of population chooses Protestantism as the religion	La Porta <i>et al.</i> (1999)
<i>Muslim</i>	Fraction of population chooses Islam as the religion	La Porta <i>et al.</i> (1999)
<i>Log Constructed Openness</i>	Natural log of constructed openness calculated by fitting actual trade share in a bilateral trade equation (gravity model) taking into account the influence of geographic factors	Frankel and Romer (1999)
<i>Income gap</i>	The absolute value of the difference between GDP per capita of a country with GDP per capita of the US	United Nations Statistics Division database