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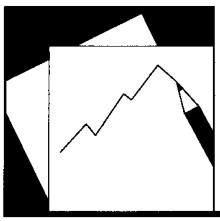

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Remittances and Institutions: Are Remittances a Curse?

Yasser Abdih, Ralph Chami,
Jihad Dagher, and Peter Montiel

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Remittances and Institutions: Are Remittances a Curse?

Prepared by Yasser Abdih, Ralph Chami, Jihad Dagher, and Peter Montiel[1]

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Abstract

This paper addresses the complex and overlooked relationship between the receipt of workers' remittances and institutional quality in the recipient country. Using a simple model, we show how an increase in remittance inflows can lead to deterioration of institutional quality – specifically, to an increase in the share of funds diverted by the government for its own purposes. Empirical testing of this proposition is complicated by the likelihood of reverse causality. In a cross section of 111 countries we document a negative impact of the ratio of remittance inflows to GDP on domestic institutional quality, even after controlling for potential reverse causality. We find that a higher ratio of remittances to GDP is associated with lower indices of control of corruption, government effectiveness, and rule of law.

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Author's E-Mail Address: yabdih@imf.org; rchami@imf.org ; dagher@usc.edu; Peter.J.Montiel@williams.edu

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[1] Yasser Abdih is an economist in the IMF Institute. Ralph Chami is a division chief in the IMF Institute. Jihad Dagher was a summer intern at the IMF institute when this project was undertaken. Peter Montiel is a professor of economics at Williams College. The authors would like to thank Leslie Lipschitz, Tom Cosimano, Andrew Feltenstein, Connel Fullenkamp, and Mike Gapen, for valuable comments and suggestions. The authors also would like to thank Ms. Asmahan Bedri for her help in editing and formatting the paper

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I. INTRODUCTION

Inflows of workers' remittances have been growing rapidly in many developing countries at least since the early 1990s. With recent estimates putting remittances at $135 billion, they now rival and even exceed other types of balance of payments inflows that have traditionally received much more attention. Since 1998, these private income transfers—at least those flowing through official channels—have been second only to FDI flows, but several times larger than remaining private capital inflows and official aid [World Bank (2006), IMF (2005), and Chami et al. (2008, forthcoming)].

There is now a substantial literature that has documented the welfare-enhancing benefits of remittances for the recipients. For example, remittances are credited with reducing poverty, and their compensatory nature is responsible for minimizing consumption volatility of transfer recipients (See, for example, Chami, Fullenkamp, and Jahjah (2003), World Bank (2006), IMF (2005), among others). Researchers, however, have also recognized that these flows entail several development challenges, specifically in terms of their effect on growth [see, for example, Chami et al. (2003), World Bank (2006), and IMF (2005)], and Dutch disease effect [see for example, Montiel (2006), and Acosta, Lartey and Mandelman (2007), among others].

In contrast to the well documented impact of remittances on recipient households, the macroeconomic impact of these flows has received scant attention. Recently, however, Chami, Cosimano and Gapen (2006) show that remittances also affect fiscal policy in the recipient countries. For example, by increasing the revenue base, remittances reduce the marginal cost to the household of government distortionary policy. Conversely, for a given level of distortion, remittances allow the government to carry more debt or incur more expenditures. These flows, therefore, have similar budgetary implications and incentive effects on government behavior as do natural resources such as oil.

This latter effect of such windfalls on government behavior was highlighted recently by Sala-i-Martin and Subramanian (2003), who show that the natural resource curse can lead to lower long-term growth for countries with oil and minerals. According to them, these windfalls may increase corruption—by reducing the quality of institutions and governance in these countries—which adversely affects growth. The revenue from oil and minerals plays a buffer role between government and citizens: the former substitutes these windfalls for taxes to finance a larger and less efficient public sector, which reduces the incentive for the latter to monitor and hold the government accountable. As a result, rent-seeking and corruption increases, reducing the quantity and quality of investment and leading to lower growth. Sala-i-Martin and Subramanian go on to argue that by disbursing the revenue from these resources among the people, the adverse incentive effect on government behavior may be mitigated.

In this paper, we test whether remittance flows, by also acting as a buffer between government and the people, impact the quality of institutions in countries that receive these flows. To our knowledge, this is the first such exercise measuring the impact of remittance flows on government behavior. At first glance, one might ask why these private income transfers should impact government policy, especially given that these flows are not taxed and, as a result, not mediated by the recipient-country government. Instead, they are household-to-household non-market private income transfers, widely dispersed, and usually allocated in small amounts. So one might expect [as is argued in World Bank (2006)] that remittances may escape or avoid the adverse effects of oil windfalls on institutional quality.

We show, however, that the presence of these flows will nevertheless affect the incentives faced by the government, and may therefore have important impact on the quality of domestic governance. This effect arises because the presence of remittances expands the revenue base, and, as stated earlier, the government finds it less costly in this situation to appropriate resources for its own purposes. This is especially true when the household has access to nontaxable exogenous resources that they can use to finance the purchase of goods that are substitutes for public services. In other words, access to remittance income makes government corruption less costly for domestic households to bear, and consequently such corruption is likely to increase.

To motivate our empirical exercise, in Section 2, we construct a simple model showing how remittances can potentially adversely affect the quality of domestic institutions. In Section 3, we test this key prediction of the model using standard cross-country regressions and conduct several robustness checks. We are well aware that remittances could be endogenous to the presence of corruption, or more broadly to the quality of domestic economic institutions in general. It is very plausible that a higher level of corruption in a country could lead to higher emigration, which itself could lead to higher remittances. Therefore we need to isolate the causality from remittances to corruption from that operating in the reverse direction. We do this through the use of an instrumental variable for remittances. Our results point to the negative and robust impact of remittances on the quality of governance in countries that receive these flows. In Section 4 we conclude, however, that the prescription advocated for resolving the dilemma of the impact of revenue from oil and minerals on government behavior—that is by disbursing the revenue from such windfalls—does not transfer to the case of remittances, which are already disbursed in this manner. Instead, we offer alternative policy advice for countries that rely on these flows.

II. A Simple Model: Public Good Provision in The Presence of Non-Taxable Remittances

In this section, we develop a simple model that outlines a plausible channel through which the presence of non-taxable private income transfers to households, such as remittances, can affect the quality of governance. We use the term "government effectiveness" in this model to refer to the extent to which resources are devoted to increasing the welfare of a

representative agent, rather than diverted for other purposes such as the wellbeing of the public-sector decision-maker. Thus, the notion of effectiveness captured in our model most naturally addresses the issue of government corruption. The link between remittances and the level of corruption is present in our model under fairly standard assumptions. Households choose consumption to maximize their utility while an intrinsically non-benevolent government is interested in both its (financial) welfare as well as that of the household. We posit that the government cannot maintain political power if it does not care to some degree about the utility of the household.

For simplicity, our model has only 2 goods. One is a private good that must be purchased by the household, and a good that could be provided by the government or purchased by the household. The source of funding for the latter, which we will refer to for simplicity as the "public service," does not affect the marginal utility derived from this good. That is, whether provided by the government or by the household, the good is of the same quality. The main idea behind this aspect of the model is that many of the services that are provided by the public sector can be also privately funded. For example, households can decide to buy education and health care services or even security services on their own if the public provision of these services is non-existent or is of poor quality.

Moreover, households in many developing countries that receive remittances use these private income transfers to purchase goods and services (from private suppliers) that are usually provided by the public sector [see, for example, Roth (1987)]. An example of this substitution between publicly and privately funded services—can be seen with the recent rise in the hometown associations (HTA), which became very common in particular in Latin America. These philanthropic organizations, comprised of emigrants from a particular country, generally provide financial assistance to their communities in that country, by pooling the transfers among them, and using them to finance projects back home. For example, HTAs are often involved in providing support to public infrastructure activities such as construction of roads, schools and health facilities. In many cases, however, their contributions dwarf that of the public works budget in their countries of origin [see for example, Mexican HTA, in Orozco and Lapointe (2003)].

In general, given the assumed uniformity of quality, households would prefer for the government to provide the public service as long as the increase in taxes due to this provision does not offset the benefit they derive from these goods. For simplicity we assume initially that the tax rate is independent of the provision of the public service by the government. Our objective is to show in this simple framework that an increase in these non-taxable private income transfers from abroad to households in the country of origin can impact the provision of public services.

A. The Representative Agent Problem

Households care about their consumption of the private good as well as the public service. They take the government provision of the latter to be exogenous, and choose their own consumption of the two types of goods, *c* and *g*, to maximize:

$$U(c, g, \bar{g}) = \alpha \log(c) + (1-\alpha) \log(g + \bar{g}) \quad (1)$$

Where *c* is the agent's consumption of the private good, and *g* is the agent's consumption of a good that is a perfect substitute for the public good, while $\bar{g}$ is the level of government provision of the public good. The agent's budget constraint is the following:

$$(1-t)y + R = c + g \quad (2)$$

Where *y* is the agent's income, *t* the tax rate, and *R* (which stands for remittances) represents the foreign non-taxable private income transfers received from family members abroad. The reason why we assume taxes are constant is mainly because they are not as volatile in general as government spending [see Poterba and Rotemberg (1990)]. However, this assumption is without loss of generality. This is because the government can achieve any objective by changing either the tax rate or government spending, or both. Therefore, if we let government spending be constant and assume that taxes are the main policy of the government then we will arrive at similar conclusions as we will derive shortly. The assumption that remittances are non-taxed accords with the general practice of avoiding taxing these flows by governments in the recipient countries [see, for example, World Bank (2006), among others].

Maximizing (1) subject to (2) gives:

$$g^* = (1-\alpha)[(1-t)y + R] - \alpha \bar{g} \quad (3)$$

Therefore, taking the level of government provision of the public good as given, private purchases of the public good are increasing in household disposable income (domestic and foreign) and decreasing in the government's provision of the good. This result is intuitive: When households prefer to keep relatively constant the share of a good in their consumption basket, a higher endowment in a certain good ($\bar{g}$) will decrease the demand for this good (g), everything else equal, and increase consumption of the other goods (c).

B. The Government's Problem

One central assumption in this model is that the government does not behave like a central planner. In particular, suppose that the government cares about maximizing a combination of

the representative agent's utility and its own utility, derived from resources that the government reserves for itself. In that case the government's problem consists of maximizing:

$$\Psi(\bar{g},U) = \beta \log(s) + (1-\beta)U(c,g,\bar{g}) \qquad (4)$$

where s stands for whatever the government keeps for its own consumption. The government chooses $\bar{g}$ to maximize (4) subject to the budget constraint:

$$ty = \bar{g} + s \qquad (5)$$

Thus, the government is essentially choosing how much of the resources that it collects to divert for its own purposes. As mentioned earlier, remittances are not taxed, and we do assume that the government does not change the tax rate. Later on we will consider what happens when this assumption is relaxed.

Corruption

Before looking at the effect of remittances on corruption we need to adopt a metric for the level of corruption in this simple framework. It is evident from the setup above that the government's intentions are sub-optimal from the point of view of the representative agent as long as the government's own pecuniary benefit has a nonzero weight β in the objective function that it maximizes. However, we care not about the government's intentions (as revealed by this weight) but rather about the ex-post amount of resources diverted from the public funds by the policy makers. This is motivated by the perspective that governments are inherently selfish, but that economic conditions as well as other institutional factors ultimately determine how much of a predator the government ends up being [see, for example, Ades and Di Tella (1999), and Cai and Treisman (2004)]. For these reasons, the endogenous variable s is at the center of our corruption measure. In particular, we will focus on the ratio of s to GDP (here proxied by y), s/y, as well as on the ratio of resource diversion to the provision of the public good (s/$\bar{g}$).

C. Stackelberg Game

Since the government knows the problem of the representative agent and therefore the reaction of private agents to its own spending decisions, the government will take this reaction into account in its optimization problem. However, since it is highly unlikely that private agents could cooperate so as to be able to play a Nash bargaining game with the government, it is most natural to assume that individual private agents take the government's provision of the public good as fixed and unaffected by their actions. For example, if all

agents decreased their private consumption of the public good they might be able to force the government to increase its own spending; however such an assumption would not be realistic. Therefore we assume that our model economy works as a Stackelberg game where the government moves first. Under this assumption, and replacing (3) and (2) in the objective function of the government yields the following:

$\Psi(\bar{g}) = \beta \log(ty - \bar{g}) + (1-\beta)\{\alpha \log[\alpha((1-t)y + R + \bar{g})] + (1-\alpha)\log[(1-\alpha)((1-t)y + R + \bar{g})]\}$, which simplifies to:

$$\Psi(\bar{g}) = \beta \log(ty - \bar{g}) + (1-\beta)\left[\alpha \log(\alpha) + (1-\alpha)\log(1-\alpha) + \log((1-t)y + R + \bar{g})\right] \qquad (6)$$

When $\Psi(\bar{g})$ is maximized with respect to $\bar{g}$ it yields:

$$\bar{g}^* = (t-\beta)y - \beta R \qquad (7)$$

Equation (7) simply says that the public provision of the public good is increasing in the tax base, *y*, but decreasing in the amount of (non-taxed) remittances.[2] The substitutability between private and public provision of the good *g*, however, implies that an increase in the tax base y does not fully translate into an increase in the provision of the public good $\bar{g}$. Instead, part of that increase in the revenue base, which includes remittances, $\beta(y+R)$, is diverted to the government's own consumption. Given this optimal level of spending on the public good, we can easily derive the optimal level of resources diverted to the government's own consumption:

$$s^* = \beta(y+R) \qquad (8)$$

Note that the amount diverted does not depend on the tax rate, but is increasing in the revenue base, that is, income and remittances. The "fiscal space" provided by the revenue base, and in particular, the remittances, increases the household's private consumption of both goods (c, g), which allows the government to free ride and reduce its contribution to the public good, thereby increasing its own consumption.

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[2] Since we know it is virtually always the case that government-spending increases with GDP we assume that $t > \beta$, in other words, that there is a threshold level of government self-interest $\bar{\beta}$ such that governments with levels of β beyond this threshold are easily ousted from power.

It is also clear that the government's proclivity to divert resources to its own consumption, measured by β leaves the household worse off in equilibrium: replacing (3) and (7) into (1) we have:

$$\frac{\partial U(c^*, g^*, \bar{g}^*)}{\partial \beta} = -\frac{\beta(1-\alpha)}{(1-\beta)} < 0 \qquad (9)$$

But what we are interested in is the ratio of resource diversion either to total government spending :

$$\frac{\bar{s}^*}{\bar{g}^*} = \frac{\beta y + \beta R}{(t-\beta)y - \beta R} = \frac{\beta(1+\frac{R}{y})}{(t-\beta)-\frac{R}{y}} \qquad (10)$$

or to total income,

$$\frac{\bar{s}^*}{y} = \beta(1+\frac{R}{y}) \qquad (11)$$

As one can easily see:

$$\partial(\frac{\bar{s}^*}{y})/\partial R = \frac{\beta}{y} > 0 \text{ and } \partial(\frac{\bar{s}^*}{\bar{g}^*})/\partial R = \frac{\beta t y}{[(t-\beta)y - \beta R]^2} > 0.$$

That is, both measures of corruption are increasing in the level of remittances. Note also that (10) and (11) indicate that corruption is potentially higher in countries where the ratio of remittances to GDP is high.

D. Discussion

We stress that our assumption regarding households' preferences is important for our results and therefore deserves further discussion. First, suppose that households cannot purchase any service privately that is a perfect substitute for the public service. In that case, the government's decisions will be unaffected by the level of remittances as long as these are not taxed. Indeed, when households cannot provide themselves with education or health services, for example, the interaction between the decisions of the government and the households

breaks down. Households use their disposable income for consumption of the private good and the trade-off that the government faces is independent of any non-taxable income. However, ruling out private provision of public services is not only an unrealistic assumption, but it also overlooks important dynamics that we think are crucial in understanding the effect of private flows on the government's behavior.

By contrast, the simplifying assumption that taxes are exogenous and constant does not affect our results. As can be seen from the objective function in (6), the government can maximize its utility by varying either the tax rate t or $\bar{g}$**.** Since taxes are usually less volatile than economic aggregates and since changes in tax rates are usually costly for the government, we assumed that t is constant while $\bar{g}$ is decided by the government in each period**.** However, suppose the government decides on t instead. Then the problem is equivalent, since it yields a relationship between the tax rate and spending on public services' that is identical to (7). That is, when remittances are high, the government increases taxes for the same level of government spending, and ex-post its own consumption increases.

Finally, we have treated remittances as an exogenous transfer, but it is also possible to add another stage to the game, where the altruistic emigrant/remitter decides on the optimal level of remittances, given the optimal behavior by the recipient household and the government. It can be easily demonstrated that in this case, remittances would depend positively on the remitter's income and degree of altruism, on the one hand, and negatively on the recipient's income and on the government's proclivity to divert resources for its own consumption, on the other. The latter suggests that emigrants would remit less in situations where remittances lead to higher corruption, which in turn lowers the welfare of the recipient households.

III. EVIDENCE

The model in section 2 suggested a channel through which remittances can increase the level of corruption in a country. We now turn to the data to see if the evidence supports our theory. We use a cross section on 111 countries, chosen on the basis of the availability of data on workers' remittances. Our remittance variable is measured as the average ratio of remittances to GDP between 1990 and 2000. It is enough for a country to have one observation on remittances during this period to be in our sample. A detailed description of the data and a listing of data sources is included in Appendix B.

A. OLS Results

To ensure that our results can be compared with those in the literature that studies the determinants of government quality, we use the framework of the seminal work by La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999) —henceforth PLSV— and add our own regressors. Our main regression model is therefore the following:

$$\text{Corruption control}_{2000} = \alpha + \beta_1 * \text{economic} + \beta_2 * \text{religion} + \beta_3 * \text{legal} + \gamma_1 * \text{remittances} \qquad (12)$$

Our endogenous variable is taken from the World Bank governance indicators. It is a measure of control of corruption (inversely related to the degree of corruption) in the year 2000. We regress this measure on average remittance receipts between 1990 and 2000 while controlling for economic, religion, and legal variables, as in PLSV. Note that β_i in (12) is a vector of coefficients on each set of regressors.

As a first step, we ignore all endogeneity issues stemming from the inclusion of a measure of remittances on the right hand side of the regression.

The OLS results are shown in Table 1, Appendix A. In Column (1) we simply regress the index of corruption control (denoted Corrup) on remittance flows. We find a negative and significant coefficient, as suggested by our model. In column (2) we add a measure of energy depletion in the country. Its coefficient turns out to be negative and statistically significant, consistent with the findings of many recent studies that oil-rich countries tend to have worse institutions on average (see Sala-i-Martin and Subramanian (2003) and Leite and Weidmann, (1999)). The coefficient of remittances remains negative and significant. Indeed, this coefficient remains negative in all the specifications we use in this paper. In columns (3) and (4) we add the regressors that La Porta et al. (1999) use in their regressions [Table 9 in Appendix B provides a description of all the regressors used in this paper]. We follow their approach by alternating the religion and the legal variables as regressors, since they are correlated.[3] In column (3) we add the legal variables. Among these, only the dummy for Scandinavian laws is positive and significant, which is similar to the result in La Porta et al. (1999). The coefficients on remittances and energy remain negative and significant in this specification as well as in column (4), where we replace the legal variables by variables that measure the prevalence of certain religions in these countries. Similar to La Porta et al. (1999), we find a negative and significant coefficient on both the variables "Muslim" and "Catholic" while the coefficient on "Other Denominations" is negative; however, unlike in Porta et. al., it is slightly insignificant. Note that the R-squared improves dramatically in columns (3) and (4) when we add the legal or religion variables.

As in PLSV, we add to both specifications real GDP per capita, whose coefficient we find to be positive and strongly significant. This captures the idea that richer countries tend to demand better institutions. We need to control for this measure of well-being so that the coefficients on the other exogenous variables will only reflect the direct impact of these factors on corruption. However, given the fact that GDP per capita can be endogenous to

[3] If both sets of variables are combined, the significance of the religious variables drops significantly, while the coefficient on remittances does not change significantly and its t-statistic is -1.64 (significant at the 10 percent level).

institutions, its inclusion as a regressor needs further discussion that we postpone to the next section.

One major concern with the results from OLS regressions, however, and in particular the one concerning the coefficient on remittances, is that remittances could be endogenous to the presence of corruption, or more broadly to the quality of domestic economic institutions in general. It is very plausible that a higher level of corruption in a country could lead to higher emigration, which itself could lead to higher remittances. Therefore we need to isolate the causality from remittances to corruption from that operating in the reverse direction. We do this through the use of an instrumental variable for remittances.

B. The Coastal Area as an Instrument for Remittances

To instrument properly for remittances we need a variable that is correlated with remittances but not correlated with our endogenous variable (corruption), except through remittances or any included regressor. In this sense, the coastal area of a country (defined as the ratio of the area within 100 KM from a sea or an ocean to the total area of the country) seems a potentially good instrument. The reason for the observed correlation between the coastal area and remittances is clearly through emigration. A higher coastal area is generally associated with a higher ratio of emigrants to the total population, which for obvious reasons leads to higher remittances on average. In a later section of the paper, we check for robustness and analyze the exclusion restriction in more detail; for now, we show and discuss the instrumental variable regressions.

Table 2 shows the first stage regression for both specifications (the legal variables and the religion variables respectively). We find that the impact of the coastal area on remittances is large and highly significant. The F statistic on the excluded instrument is equal to 7.59 in the first specification and 9.95 in the second, suggesting that our instruments do not suffer from significant weakness[4]. Columns (3) and (4) show the output from 2SLS second stage regressions. In the first specification we find a negative and significant coefficient at the 10% level, while in the second specification the significance level improves to 5%. The coefficient is very similar across both specifications. The Conditional Likelihood Ratio test proposed by Moreira (2003), which is robust to weak instruments, shows that the coefficient on instrumented remittances is significant at the 5% level[5].

One problem with our instrument is that it may be correlated with institutional quality through channels other than remittance flows. In that case, coastal area would be a poor

[4] Stager and Stock (1997) set a benchmark of F statistic =10. Our F statistic is close to 10; However we do not rule out their weakness and we perform the Conditional Likelihood Ratio test proposed by Moreira (2003).

[5] Both specifications are significant at the 1.5% level.

instrument, because the instrumented remittance variable would still be correlated with the disturbance term (unless these channels are explicitly accounted for in the regressions). Coastal area indeed tends to be correlated with variables that have been found to affect institutional quality through their effects on living standards, such as per capita real GDP itself and a variety of demographic variables that are highly correlated with per capita GDP. This is shown in Table 5 in Appendix A. While we did control for real GDP per capita, we did not control for the other demographic variables. This raises the question of whether instrumenting for remittance flows with coastal area while omitting these demographic variables from the regression may result in a biased estimate of the effects of remittance flows on institutional quality. It is worth noting, however, that if this is so, the coefficient on our instrumented remittance variable is likely to be biased in the direction *opposite* to that predicted by our model. This is because, aside from the remittance channel, our instrument is generally *positively* correlated with factors that are associated with better institutions[6]: for example, our instrument is positively correlated with real GDP per capita, with the level of urbanization, and with the degree of commercial openness (as measured by the ratio of trade to GDP). All of these factors tend to be associated with better institutional quality, so their exclusion from the regression would tend to bias the coefficient on remittances in a *positive* direction. At the same time, our instrument is *negatively* correlated with age-dependency ratios and infant mortality, factors that are themselves generally negatively correlated with institutional quality, again inducing a positive bias.

To address this potential bias we need to control for the effects of living standards on institutional quality. It is interesting to see that the coefficient on the instrumented remittance variable is negative and statistically significant as long as we control for either real GDP per capita itself or other variables that are correlated with it, such as dependency ratios, mortality rates and/or any combinations of such variables likely to affect institutional quality and to be affected by our instrument[7]. In columns (3) and (4) of Table 3, for example, we show the results from replacing per capita GDP by two demographic variables, dependence and urbanization. We can clearly see that these 2SLS regressions with the coastal area as instrument yield results similar to the ones in Table 2 columns (3) and (4).

But this procedure creates a second potential endogeneity problem. Like remittances themselves, measures of living standards such as per capita GDP are potentially endogenous with respect to institutional quality. Although we used the *initial* level of real GDP per capita in our estimation to mitigate this problem, since institutional quality is generally very

[6] One might argue that the coefficient on remittances can be capturing a negative impact going from emigration to institutions that is independent of remittances. However the theoretical literature on emigration predicts a positive impact on GDP and institutions, due to an increase in the level of schooling and other externalities from emigration.

[7] We do not show these variations here.

persistent the endogeneity of GDP might still be an issue. However, and as we show in Appendix C, as long as the correlation of our instrument with the error is due to its correlation with an included endogeneous variable (in this case per capita GDP) then the coefficient on remittances will be consistent. That is, we need to control for real GDP per capita if we think that excluding this variable will make our instrument correlated with the error. However, and to make sure that our results are robust, we also instrument for real per capita GDP by the distance to the equator as in Treisman (2000). Columns (1) and (2) in Table 3 show the results of 2SLS estimation where we instrument for both remittances and real per capita GDP by two instruments: the coastal area and distance to the equator. The coefficient on remittances remains negative and significant in these regressions.

Table 4 shows the result of the 2SLS regressions of Table 2 when we vary the endogenous regressors to look at other indicators of institutional quality. We only show the specification with the religion variables since the results obtained using the other specifications are very similar. It is interesting to see that remittances affect the three variables that are most related to corruption and government quality. We find a negative and significant coefficient on remittances (instrumented by the coastal area) in the regressions where the control of corruption, the quality of government, and the rule of law measures are the dependent variables. As for regulatory quality and voice and accountability, they seem unaffected by remittances. This in itself is interesting since these two variables are more likely to be determined by a country's constitution as well as by the preferences and the religious denomination of the median voter.

C. Robustness

In this subsection we try to evaluate the robustness of our results by looking at some of the potential problems with our instrumental variable estimation. For an instrumental variable to be appropriate it must satisfy two conditions: relevance and exogeneity. The first can be verified empirically by looking at the correlation between the instrument and the endogenous regressor. In our case we showed that this correlation is strong and that in that respect our instrument is not particularly weak. As for the exogeneity condition, it deserves further discussion. A clear advantage of our instrument is that it is a geographical variable and therefore we know for a fact that it cannot be endogenous to institutions. This however does not guarantee exogeneity in the sense that our instrument can still be correlated with the error in the second stage regression. We mentioned earlier that the other channels that might exist between our instrument and the dependent variable will if neglected bias the coefficient in the opposite direction and therefore decrease the significance of our estimate. In the following we look at the possible omitted variables in our regression and try to control for them:

Openness: Our instrument is positively correlated (although slightly) with the ratio of trade to GDP in our data. This is expected since a higher exposure to the waters is indeed very

beneficial for trade. However, including the ratio of trade to GDP on the right hand side does not affect our results as shown in the first column of Table 6. The coefficient on "trade to GDP" is positive but not significant.

Demographics: As shown in Table 5, our instrument is positively correlated with a measure of urbanization. This is also mentioned in Gallup, Sachs and Mellinger (1999). The instrument is also negatively correlated with the dependency ratio as well as with infant mortality. As shown in column 2 of Table 6, controlling for these factors does not affect our results materially, as the coefficient on instrumented remittances remains negative and significant.

Continents: Another concern that one might have is that our instrument can be correlated with the area dummies. In fact, African countries have on average less shoreline than countries in other continents. Therefore one might suspect that our coefficient might be reflecting the difference in institutions across continents that is not explained by our regressors. However, we can show that this is not the case by introducing dummies for the different continents. As shown in the third column of Table 6, controlling for these dummies yields a coefficient with similar magnitude and significance level to the earlier results.

Migration: Since our endogeneous regressor (Ratio of remittances to GDP) is certainly correlated with a measure of the stock of migrants to the total original population at home, one might be concerned that our coefficient might be reflecting the negative impact of immigration in general and not that of remittances on institutions. Due to the lack of good data on the stock of emigrants in each country, we cannot resolve this problem empirically by controlling for this factor. However, the literature on emigration sees benefits from emigration to the home country. This is especially the case in the recent literature[8] such as Mountford (1997), Beine et al. (2003),[9] and others. The possibility of immigration increases the expected return on education. This induces additional investment in education which has positive effects on productivity and growth. This suggests that skilled labor emigration may on average have a positive effect on institutions, since the possibility of immigration raises the human capital in a country.

Using another instrument: To ensure that our results are robust we instrument for remittances with another variable. We construct a measure of the distance between any country x and the nearest country that is a large source of remittances v. This is because one would expect that on average the closer the country is to a source of remittances the higher remittances should

[8] Even the older literature on migration such as Grubel and Scott (1966) acknowledges that the short-term loss to the original country might be well offset in the long run due to spillovers and network effects.

[9] Beine et al. (2003) found a positive and highly significant effect of migration prospects on gross human capital formation.

be. Note that this relationship is expected to hold mainly for the developing countries but not for the developed countries.

We know that the United States, followed by Western Europe and the Arab Gulf, are the largest sources of remittances in the world. Therefore for each country x this variable will take the value of the log of the distance between country x and country v. Therefore for Latin American countries this variable will be the log of the distance between these countries and the US. The same is done for the Caribbean countries. As for Africa, we take the simple average of the distances from France and from Saudi Arabia. For Asia we use the distance to Saudi Arabia. Taking the distance of the European countries to France will, for obvious reasons, lead to a weak instrument as the distance is relatively small and received remittances to GDP in these countries are quite low. We can circumvent this problem in three different ways: we can take the distance of the European countries to the United States instead, we can add a dummy for Europe as an additional instrument[10], or we can exclude these countries from our sample. The three methods yield similar results. In Table 7, we show the results from the first and second stage of the 2SLS regressions when we use the distance measure as an instrument and we exclude the European countries from our sample. Column (3) shows a negative and significant coefficient on remittances. Furthermore the coefficient is comparable in magnitude to the one obtained from using the coastal area. Column (4) shows a negative yet non-significant coefficient when we use the religion variables as regressors. In Table 8, we show that when we use the United States as the main remitter for the European countries we obtain similar results. Note that our instrument is correlated with the distance to the equator for obvious reasons. In fact the correlation in our sample is around -0.56. This is the reason why we control for the distance to the equator in our regressions.

IV. CONCLUSIONS

We conclude that despite their nature as household-to-household private income transfers, remittance inflows may have adverse effects on domestic institutional quality – specifically, on the quality of domestic governance – that are similar to those of large resource flows. In our analytical model, this effect arises because when households receive remittances, the government finds it less costly to free ride on the households and their emigrant relatives and divert resources for its own purposes. In other words, because access to remittance income makes government corruption less costly for domestic households to bear, the government engages in more corruption. Remittances, by acting as a buffer between the government and its citizens, give rise to a moral hazard problem; these flows allow households to purchase the public good rather than rely solely on the government to provide that good, which reduces the household's incentive to hold the government accountable. The government can

[10] This option might not be appropriate since this dummy might affect directly institutions even after controlling for GDP and other religious and legal variables.

then free ride and appropriate more resources for its own purposes, rather than channel these resources to the provision of public services.

Our empirical results are strongly supportive of this proposition. Using standard specifications, and addressing issues of endogeneity and robustness, we consistently find a negative and statistically significant partial effect of remittance inflows on institutional quality.

One implication is that, while remittance inflows remain welfare-enhancing for the representative remittance-receiving household, the increase in household welfare is reduced by corruption, and the net increase in household welfare is lower the larger the government's temptation to steal (i.e., the larger the value of β in the government's objective function). This suggests that IFI support for measures to facilitate remittance flows should be conditioned on government accountability. Otherwise the gains from such measures may accrue to parties other than those for whom they are intended.

Another implication concerns the relationship between remittances and economic growth. There is a fairly recent and growing empirical literature that attempts to measure the impact of remittances on economic growth. Overall, this literature fails to find a robust positive effect of worker remittances on growth. One possible reason for such a finding, among others, is the presence of several possible mechanisms through which remittances may affect growth, some of which identify a positive effect while others a negative one.

On the positive side, remittances may increase investment, facilitate human capital formation, enhance total factor productivity (TFP), and may have a favorable effect on the financial system, all of which potentially contribute positively to economic growth [see IMF (2005), World Bank (2006)]. However, remittances may also hamper economic growth through a Dutch Disease effect [see for example, Acosta et al. (2007), and Montiel (2006)], and by reducing labor supply and increasing investment risk [Chami et al. (2003)].

This paper identifies a new channel through which remittances can affect economic growth. It is a fairly established empirical finding that better institutional quality enhances economic growth [See Hall and Jones (1999), and Acemoglu et al. (2001)]. Therefore, by worsening the quality of institutions in the recipient country, remittances can adversely affect growth. This channel has been missing from the empirical literature. Our results suggest that future empirical work on the relationship between remittances and growth needs to account for it.

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APPENDIX A

Table 1.

	(1) Corrup	(2) Corrup	(3) Corrup	(4) Corrup
Remit	**-0.0335***	**-0.0411****	**-0.0223***	**-0.0278****
	(-1.95)	**(-2.14)**	**(-1.69)**	**(-2.06)**
Energy_av		-0.0260**	-0.0332***	-0.0357***
		(-2.12)	(-3.55)	(-3.80)
Rgdp_av			0.388***	0.442***
			(7.58)	(8.87)
Legal_UK			0.129	
			(0.54)	
Legal_FR			-0.143	
			(-0.64)	
Legal_GE			0.293	
			(0.82)	
Legal_SC			1.076**	
			(2.42)	
Ethnic			-0.00599	-0.00399
			(-0.02)	(-0.02)
Catho				-0.00895***
				(-2.86)
Muslim				-0.00667**
				(-2.10)
Other_NP				-0.00513
				(-1.45)
Constant	-0.0211	0.0940	-2.754***	-2.489***
	(-0.22)	(0.88)	(-6.48)	(-4.47)
R2	0.0345	0.0753	0.694	0.683

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

OLS regressions

Table 1 shows the output from OLS regressions. The dependent variable is a measure of control of corruption (inversely related to the degree of corruption) taken from the World Bank governance indicators in year 2000. Remit, Energy_av and Rgdp_av are 1990-2000 averages (see definitions in Table 9).

Table 2.

	(1) Remit	(2) Remit	(3) Corrup	(4) Corrup
Coast	3.368**	3.615***		
	(2.08)	(2.77)		
Rgdp_90	-1.138***	-1.026***	0.343***	0.378***
	(-3.37)	(-3.27)	(4.02)	(5.20)
Legal_UK	-0.670		0.310	
	(-0.26)		(0.94)	
Legal_FR	0.0926		-0.0506	
	(0.04)		(-0.14)	
Legal_GE	-1.081		0.0996	
	(-0.42)		(0.23)	
Legal_SC	-0.907		0.874***	
	(-0.41)		(2.70)	
Energy_av	0.0546	0.0472	-0.0349**	-0.0368**
	(1.48)	(1.04)	(-2.42)	(-2.14)
Ethnic	-5.444***	-5.611***	-0.663	-0.638
	(-2.67)	(-2.90)	(-1.11)	(-1.29)
Catho		0.00907		-0.0111***
		(0.68)		(-3.29)
Muslim		0.0312		-0.00677
		(1.41)		(-1.54)
Other_NP		0.00229		-0.00681*
		(0.12)		(-1.85)
Remit			**-0.129***	**-0.120****
			(-1.81)	**(-2.02)**
Constant	11.32***	9.126***	-2.004**	-1.426*
	(2.96)	(2.76)	(-2.35)	(-1.85)
R2	0.274	0.312	0.591	0.621

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

2SLS regressions

The first two columns show the results from the first stage regression for both specifications. The third and fourth columns show the results from the second stage for both specifications. Note that Rgdp_90 is the real per capital GDP in 1990.

Table 3.

	(1) Corrup	(2) Corrup	(3) Corrup	(4) Corrup
Remit	**-0.161****	**-0.227***	**-0.103****	**-0.106****
	(-2.29)	**(-1.84)**	**(-2.06)**	**(-2.07)**
Rgdp_90	0.540***	0.621***		
	(4.74)	(3.50)		
Ethnic	-0.405	-0.376	-0.459	-0.560
	(-0.75)	(-0.49)	(-1.19)	(-1.48)
Catho	-0.00763		-0.0156***	
	(-1.39)		(-3.60)	
Muslim	-0.000408		-0.0157***	
	(-0.06)		(-3.45)	
Other_NP	-0.00167		-0.0154***	
	(-0.27)		(-3.06)	
Energy_av	-0.0396***	-0.0418**	-0.0298**	-0.0286**
	(-2.63)	(-2.06)	(-2.27)	(-2.18)
Legal_UK		0.297		0.430
		(0.61)		(1.43)
Legal_FR		-0.163		0.115
		(-0.35)		(0.40)
Legal_GE		-0.953		0.598
		(-1.06)		(1.42)
Legal_SC		-0.238		1.603***
		(-0.23)		(3.11)
Dependence			-2.442***	-1.934***
			(-3.64)	(-2.94)
Urban			0.00301	0.00598
			(0.60)	(1.20)
Constant	-3.010**	-3.712***	3.467***	1.328**
	(-2.48)	(-2.64)	(4.42)	(1.99)
R2	0.447	0.0255	0.630	0.634

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

2SLS regressions (variations)

Columns (1) & (2) show the 2SLS regressions where the coastal area and distance to the equator are used as instruments to real per capita GDP and remittances.

Columns (3) & (4) show the 2SLS regressions where dependence and urbanization are on the right hand side, and the coastal area used as an instrument for remittances.

Table 4.

	(1) Control of Corruption	(2) Government. Effectiveness	(3) Rule of Law	(4) Regulatory Burden	(5) Accountability
Remit	**-0.120****	**-0.119****	**-0.102****	**-0.0185**	**0.0179**
	(-2.20)	**(-2.14)**	**(-2.03)**	**(-0.44)**	**(0.35)**
Ethnic	-0.638	-0.611	-0.547	-0.313	0.0117
	(-1.43)	(-1.35)	(-1.33)	(-0.90)	(0.03)
Catho	-0.0111***	-0.00344	-0.00606	0.00179	-0.00550
	(-2.58)	(-0.79)	(-1.49)	(0.52)	(-1.38)
Muslim	-0.00677	0.00148	-0.000479	-0.0000600	-0.0135***
	(-1.43)	(0.31)	(-0.11)	(-0.02)	(-3.07)
Other_NP	-0.00681	-0.000610	0.000380	0.00177	-0.00272
	(-1.43)	(-0.13)	(0.08)	(0.45)	(-0.61)
Energy_av	-0.0368***	-0.0289**	-0.0305***	-0.0202**	-0.0220*
	(-2.96)	(-2.28)	(-2.62)	(-2.07)	(-1.90)
Rgdp_90	0.378***	0.407***	0.446***	0.279***	0.310***
	(5.21)	(5.52)	(6.53)	(4.88)	(4.60)
Constant	-1.426*	-2.295***	-2.606***	-1.807***	-1.600**
	(-1.74)	(-2.75)	(-3.37)	(-2.79)	(-2.10)
R2	0.621	0.587	0.643	0.564	0.613

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01
2SLS regressions where the IV is the coastal area- showing the regressions for different institutional measures. Complete definitions of these measures are found in Table 10, Appendix B.

Table 5.
Correlation Matrix

	lc100km (Coast)	Rgdp_90	Trade_GDP	Dependence	Urban	Inf_mort
lc100km (Coast)	1.0000					
Rgdp_90	**0.3544**	1.0000				
Trade_GDP	0.1487	0.1482	1.0000			
Dependence	**-0.3405**	-0.7493	-0.2331	1.0000		
Urban	0.2867	0.7853	0.1639	-0.6631	1.0000	
Inf_mort	**-0.3348**	-0.8533	-0.2785	0.8511	-0.6504	1.0000

Table 6.

	(1) Corrup	(2) Corrup	(3) Corrup
Remit	-0.130**	-0.125***	-0.112**
	(-2.19)	(-2.78)	(-2.35)
Ethnic	-0.659	-0.522	-0.491*
	(-1.43)	(-1.33)	(-1.67)
Catho	-0.0102**	-0.00801**	-0.0101***
	(-2.26)	(-1.98)	(-2.98)
Muslim	-0.00560	-0.00452	-0.00969***
	(-1.10)	(-1.02)	(-2.69)
Other_NP	-0.00588	-0.00604	-0.00593
	(-1.18)	(-1.29)	(-1.49)
Energy_av	-0.0369***	-0.0239**	-0.0303***
	(-2.90)	(-2.02)	(-3.04)
Rgdp_90	0.369***	0.167	0.207***
	(4.88)	(1.27)	(2.66)
Trade_GDP	0.00237		
	(1.05)		
Dependence		-0.0695	
		(-0.09)	
Urban		-0.00538	
		(-0.98)	
Inf_mort		-0.520**	
		(-2.56)	
Constant	-1.581*	2.250	0.0542
	(-1.91)	(1.47)	(0.06)
Region Dummy	NO	NO	YES
R2	0.604	0.711	0.765

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

2SLS regressions,

This table shows the output from the second stage of 2SLS regressions with coastal area as an instrument for remittances. We perform a robustness check by controlling for trade to GDP (column 1), demographics (column 2), and regional dummies (column 3).

Table 7.

	First Stage		Second Stage	
	(1) Remit	(2) Remit	(3) Corrup	(4) Corrup
distance	**-3.223****	**-2.935****		
	(-2.54)	**(-2.40)**		
Rgdp_90	-0.713	-0.514	0.295***	0.346***
	(-1.33)	(-0.90)	(3.33)	(4.45)
Legal_UK	3.656		0.673*	
	(1.55)		(1.79)	
Legal_FR	4.034*		0.303	
	(1.73)		(0.80)	
Legal_GE	2.612		-0.132	
	(0.70)		(-0.27)	
Energy_av	-0.00565	-0.0338	-0.0215**	-0.0243***
	(-0.08)	(-0.45)	(-2.05)	(-2.69)
Ethnic	-4.959**	-5.167**	-0.594	-0.275
	(-2.19)	(-2.25)	(-1.30)	(-0.69)
Distance_EQ	2.688	-3.431	1.506*	0.502
	(0.52)	(-0.67)	(1.88)	(0.89)
Catho		-0.0150		-0.0101*
		(-0.30)		(-1.73)
Muslim		0.00263		-0.00708
		(0.05)		(-1.22)
Other_NP		-0.0162		-0.00532
		(-0.31)		(-0.84)
Remit			**-0.110****	**-0.0582**
			(-1.97)	**(-1.17)**
Constant	30.59***	32.93***	-2.502***	-1.812*
	(2.88)	(2.85)	(-3.31)	(-1.95)
R2	0.296	0.272	0.391	0.558

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

2SLS regressions where the instrument is the distance to the closest remitter. **Europe is excluded from the sample**. The F-test on the excluded instrument is 6.45 in the first regression and 5.75 in the second. Using the legal variables as regressions the second stage lead negative and significant coefficient (column 3) on remittances. Our distance instrument is clearly correlated with the distance to the equator (correlation coefficient = -0.56) .This is why we control for this variable in the 2SLS.

Table 8.

	First Stage		Second Stage	
	(1) Remit	(2) Remit	(3) Corrup	(4) Corrup
distanceB	**-3.266*** **	**-2.512*** **		
	(-3.34)	**(-2.70)**		
Rgdp_90	-0.714	-0.427	0.313***	0.341***
	(-1.53)	(-0.85)	(3.81)	(3.84)
Legal_UK	3.509*		0.618**	
	(1.68)		(2.03)	
Legal_FR	4.027*		0.275	
	(1.95)		(0.92)	
Legal_GE	3.206		0.360	
	(1.14)		(0.94)	
Legal_SC	2.350		0.787*	
	(0.73)		(1.74)	
Energy_av	-0.0063	-0.0344	-0.0221**	-0.0264**
	(-0.09)	(-0.50)	(-2.23)	(-2.51)
Ethnic	-4.829**	-4.902**	-0.400	-0.349
	(-2.44)	(-2.47)	(-1.02)	(-0.76)
Distance_EQ	2.557	-2.030	1.538***	1.160**
	(0.68)	(-0.58)	(2.70)	(2.18)
Catho		-0.00265		-0.00840**
		(-0.10)		(-2.04)
Muslim		0.0127		-0.00607
		(-0.45)		(-1.35)
Other_NP		-0.00493		-0.00601
		(-0.16)		(-1.32)
Remit			**-0.0975** **	**-0.106***
			(-2.23)	**(-1.87)**
Constant	30.95***	27.66***	-2.711***	-1.788*
	(4.47)	(3.53)	(-3.97)	(-1.91)
R2	0.329	0.302	0.710	0.677

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

2SLS regressions where the instrument is the distance (distanceB) to the closest remitter. We use the United States as the closest source of remittances to Europe. The F-test on the excluded instrument is 11.1 in the first regression and 7.3 in the second. The coefficient on Remit will become slightly larger (in absolute value) and more significant when we include the distance to the equator as a regressor. Results not shown here.

APPENDIX B

Table 9: List of Regressors

Variable	Description	Source
Remit	Remittances/GDP, average 1990-2000.	World Bank Dev. Indicators
Coast	Ratio of coastal area (area within 100km of sea/ocean) to total area	Harvard, CID
Ethnic	Measure the degree of ethnic fractionalization. Higher values for higher fractionalization.	Andrei Shleifer's website. [11]
Catho	Catholic as % of population in 1980	Andrei Shleifer's website.
Muslim	Muslims as % of population 1980	Andrei Shleifer's website.
Other_NP	Non-catholic or Muslim or protestant as a % of population 1980	Andrei Shleifer's website.
Energy_av	Energy Depletion average 1990-2000.[12]	World Bank Dev. Indicators[13]
Rgdp_av	Real GDP per capita, average 1990-2000	World Bank Dev. indicators
Rgdp_90	Real GDP per capita in 1990	World Bank Dev. indicators
Distance_EQ	Distance to the equator	Andrei Shleifer's website.
Legal_UK	Dummy that takes 1 if legal origin is British	Andrei Shleifer's website.
Legal_FR	Dummy that takes 1 if legal origin is British French	Andrei Shleifer's website.
Legal_GE	Dummy that takes 1 if legal origin is British French	Andrei Shleifer's website.
Legal_SO	Dummy that takes 1 if legal origin is British Socialist	Andrei Shleifer's website.
Legal_SC	Dummy that takes 1 if legal origin is British Scandinavian	Andrei Shleifer's website.
Dependence	Dependency Ratio [14]	World Bank Dev. indicators
Urban	Urbanization[15]	World Bank Dev. indicators
Inf_mort	Infant Mortality [16]	World Bank Dev. indicators
Trade_GDP_	Trade to GDP, average 1990-2000	World Bank Dev. indicators

[11] http://www.economics.harvard.edu/faculty/shleifer/data.html

[12] Energy depletion = market value of energy extracted.

[13] We use the indicators from the World Bank Development indicators 2000.

[14] The dependency ratio is equal to the number of individuals aged below 15 or above 64 divided by the number of individuals aged 15 to 64, expressed as a percentage.

[15] Urbanization: % of population living in urban areas.

[16] Infant mortality is the death of infants in the first year of life.

Table 10: The Governance Indicators

Indicator	Description
Control of Corruption	Measures the exercise of public power for private gain, including both petty and grand corruption and state capture. The higher is the index the lower is corruption.
Government effectiveness	Measures the competence of the bureaucracy and the quality of public service delivery.
Voice and accountability	Measures political, civil and human rights.
Regulatory Burden	Measures the incidence of market-unfriendly policies.
Rule of Law	Measures the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence.

APPENDIX C

A. On the presence of a possibly endogeneous variable in the regression

In the regressions in Tables 2-4, we have included real GDP per capita in year 1990 as a regressor on the right hand side. Indeed, since the quality of institutions is quite persistent, even the beginning period real GDP might be correlated with the error in these regressions. That is, there might be a variable that we are omitting that has an effect on both real GDP per capita and institutions (for example a measure of Social Capital). In what follows, we show that as long as the coefficient on per capita real GDP is of no interest to us, the presence of this variable in the regression is necessary and under certain plausible assumptions will not bias the coefficient on remittances. To simplify the analysis we carry the discussion with an OLS regression example, since the main argument will be similar in a 2SLS context. Let the regression model be :

$$y = \beta_0 + x_1\beta_1 + x_2\beta_2 + u$$

where x_1, which can be thought of as real per capita GDP, is possibly correlated with the error, $E(x_1 u) \neq 0$. We know that:

$$\hat{\beta}_2 = \beta_2 + (x'_2 M_{x_1} x_2)^{-1}(x'_2 M_{x_1} u)$$

where $M_{x_1} = I - x_1(x'_1 x_1)^{-1}x_1^{'}$. Therefore, the estimated coefficient will converge in probability to :

$$\hat{\beta}_2 \xrightarrow{P} \beta_2 + E(x_2(x_2 - L(x_2 / x_1)))^{-1} E(x_2(u - L(u / x_1)))$$

where $L(x_2 / x_1)$ is the linear projection of x_2 over x_1. Therefore, our estimate of β_2 is consistent when: $E(x_2(u - L(u / x_1))) = 0$. That is, what is required for the consistency for this estimator is for x_2 not to be correlated with the projection of the residual on x_1; in other words, x_2 must be uncorrelated with the part of the error that is orthogonal to x_1. From this we draw two main conclusions for our 2SLS regression:

1. Since our instrument is correlated with real GDP per capita, then if this latter is not included in the regression our instrument will surely be correlated with the error and the coefficient of remittances will be biased. This is because real GDP per capita is correlated with institutions. Furthermore, we expect the coefficient of x_2 (remittances) to be biased upward since when x_1 (Real GDP per capita) is dropped from the above equation, the coefficient on x_2 (remittances) will converge to :

$$\hat{\beta}_2 \xrightarrow{p} \beta_2 + E(x'_2 x_2)^{-1} E(x_2 u)$$

But since we omitted a variable that is now included in the error and that is positively correlated with x_2, therefore one would expect that our coefficient – when real GDP is not included – to be biased upward.

2. The second implication of the results above is that as long as our instrument in the 2SLS is not correlated with the part of the error that is orthogonal to our included regressors our coefficient will not be biased. This is true even if some of our included regressors are correlated with the error term. Furthermore, to insure the unbiasedness of the coefficient on the instrumented variable, one should add any regressor that captures any correlation of the instrument with the error term.

B. Note on the impact of measurement error

It is clear when comparing the results from Table 1 (OLS regressions) to the ones in Table 2 (2SLS regressions) that the coefficient on remittances become significantly higher in absolute value in the 2SLS regressions. However, this is not very surprising for many reasons among which is the clear possibility of measurement error. Let *b* be the coefficient obtained by the OLS regression, and let remittances be such that,

Observed Remittances = True Remittances + u

Let β be the true coefficient on remittances. Suppose that the bias is only due to measurement error then we can estimate the size of this error, since we know that:

$$\frac{b}{\beta} = 1 - \frac{\text{var}(u)}{\text{var}(x)}$$

Since $\frac{b}{\beta} \approx 0.22$ in our case (compare for example the results in column 4 from Table 1 and Table 2), this implies that $\frac{\text{var}(u)}{\text{var}(x)} = 0.78$, which suggests a significant degree of measurement error. However, this is in line with some of the earlier studies that instrumented for remittances. For example, Aggarwal et al. (2006) find that $\frac{\text{var}(u)}{\text{var}(x)} = 0.85$ which implies even larger measurement error. They argue that this is not surprising since the existing estimates of the size of informal remittances range between 20 and 200% of formal remittances.