Remittances, Countercyclicality, Openness and Government Size

Christian Hubert Ebeke *

1 Introduction

Several arguments are evoked to explain the positive impact of trade openness on government size. Firstly, external openness increases the risks of macroeconomic volatility in small open economies (Easterly et al., 2000; di Giovanni and Levchenko, 2009). Governments react to this by increasing the share of the public sector to insulate the economy against the external shocks (Rodrik, 1998). Secondly, external openness increases the government size through the 'voracity effect'. This effect happens when an increase in the commodity price that a country exports leads to a more than proportional increase in the government spending (Tornell and Lane, 1999). Collier and Gunning (1999) seek to explain this effect by two factors: firstly, asymmetrical effects on fiscal policy of errors of optimism and pessimisms in the case of specific shock do matter. Secondly, the free-riding behaviors observed among the different ministries for attracting the resources generated by the positive external shocks can play a role. Talvi and Vegh (2005) conclude that political pressures in open economies lower the efforts for tax revenue mobilization, increase the level of government spending and therefore, aggravate the fiscal deficit. Combes and Saadi-Sedik (2006) showed that the positive effect of trade openness on fiscal deficits is generally observed in the case of natural trade openness (openness only due to structural factors) rather than in the case of trade-oriented policies.

Dreher et al. (2008) using a broadly measure of economic globalization that combines several dimensions of external openness conclude that economic globalization doesn't influence government expenditures in a notable way. On the one hand, integration to the world economy can induce welfare-state retrenchment in order to put the budget on the sustainable path and to build credibility ('discipline effect'). On the other hand, this globalization-induced welfare state

* International Monetary Fund, 700 19th Street, N.W., Washington DC 20431, USA, and Centre d'Études et de Recherches sur le Développement International (Cerdi), France. E-mail: Cebeke@imf.org. I would like to thank Prof. Jean-Louis Combes, the Editor of Louvain Economic Review and two anonymous referees for their insightful comments and suggestions. The views expressed in this paper are those of the author and should not be attributed to the institutions with which he is affiliated.

retrenchment is potentially mitigated by citizens' preferences to be compensated for the risks of globalization ('compensation hypothesis').

Although the analysis of the relationship between globalization and fiscal policy has been intensively studied, it is worth noting that little is said about the potential effect of another dimension of economic globalization that takes a crucial importance nowadays. Migrants' remittances (the money sent back at home by international migrants) generated by large migration waves represent a large and stable source of external development finance received by developing countries (Ratha, 2005). According to the World Bank, remittances have exceeded 300 billion of US dollars in 2008 and they represent today more than the double of foreign aid. While many studies have examined the macroeconomic effects of remittances on the macroeconomic volatility (Bugamelli and Paternò, 2009; Chami et al., 2009b; Combes and Ebeke, 2010), on growth (Pradhan et al., 2008; Giuliano and Ruiz-Arranz, 2009; Catrinescu et al., 2009; Chami et al., 2009a) and competitiveness (Amuedo-Dorantes and Pozo, 2004; Acosta et al., 2009), few studies have investigated their effects on fiscal policy. Papers include analyses of the impacts of remittances on debt sustainability (Abdih et al., 2009) on fiscal revenue (Chami et al., 2008; Ebeke, 2010) and two papers focused on the effect of remittances on government spending. Kapur and Singer (2006) showed that remittance inflows tend to reduce government consumption in developing countries and pointed-out the validation of the substitution effect between the private insurance provided by remittances and the public insurance initially provided by government spending. Shabbaz et al. (2008) found the same result for the case of Pakistan.

This paper enters this new literature on the consequences of remittances on the fiscal policy in the receiving economies. The hypothesis that remittances modify the relationship between openness to trade and government size is tested. Indeed, if remittances are relatively countercyclical (as it has been recently shown by Frankel, 2009) or stable over time, they can provide a form of private insurance against various types of external shocks and hence increase the welfare-state retrenchment in developing countries. Government could therefore reduce their role of insurer of last resort when countries receive stabilizing remittance inflows.

The paper revisits the Rodrik's (1998) hypothesis that more open economies have large government size. The notion of openness is re-examined by not only focusing on the traditional upper items in the current account balance to define openness (exports and imports), but by adding another item in the analysis, precisely remittances. Rather than just computing another type of proxy for openness (for example by adding remittances in the numerator of exports and exports over GDP), this paper proposes a theoretical discussion and an econometric test to show the magnitude with which remittances modify the elasticity of government consumption with respect to trade openness.

The rest of the paper is organized as follows. Section 2 presents a theoretical model of the relationship between external risk, remittances and government spending. It appears that the equilibrium solution with remittances is characterized by a relatively lower level of government spending compared to a situation without remittances. In section 3, the countercyclicality of remittances is measured by computing panel-data coefficients of the cyclicality of remittances vis-à-vis the real GDP cycle. We use the local Gaussian weighted ordinarily least squares (hereafter LGWOLS) to compute time-varying coefficients of remittance cyclicality for each countries in the sample. The results highlight a surge in the remittance countercyclicality during the 1990s and a significant and robust contribution of trade openness to the countercyclicality of remittances. In section 4, the empirical test of the effect of remittances on the marginal impact of trade openness on government spending is proposed. Using a large sample of developing countries, and after factoring in the endogeneity of openness and remittances, the results indicate a decreasing marginal contribution of trade openness to government spending as the level of remittance inflows increases. In section 5, the predicted coefficients of remittance cyclicality derived from the LGWOLS method are used to test the hypothesis that countercyclical remittances help decrease the impact of trade openness on government size. Section 6 concludes on policy implications.

2 A Simple Theoretical Model of Remittances, External Risk and Government Size

The departure point for this theoretical analysis is Rodrik (1998). He showed how openness to trade increases the insurance role played by the governments through public spending. His model is amended here to include remittances.

2.1 The no-remittance case

We consider an economy which exports a fix quantity of good x and produces two other goods: a good supplied by the public sector and a similar good supplied by the private sector. The total labor endowment is normalized at 1 with λ the share of labor employed in the public sector and $1-\lambda$ the remaining share in the private sector. Denotes π the export price expressed in terms of quantity of imports. π is therefore the index of terms of trade and is a random variable with a mean π_m and a variance σ^2. The tradable good x is not consumed domestically and the foreign good is not produced at home. Hence, the trade balance is always at its equilibrium and the economy imports the quantity πx. These imports are the inputs for the private

sector in the production of the 'private good'. The production function in the private sector is supposed linear in the labor and is written as follows:

$$f = \pi x(1-\lambda) \tag{1}$$

The supply function in the public sector is given by $h(\lambda)$ with $h' > 0$ and $h'' < 0$. The Government determines the size of the public sector before the realization of π. Moreover, the goods produced by the public and the private sectors are substitute in the consumption [1] and the Government's problem consists of the maximization of the utility of a representative agent:

$$\max_{\lambda} V(\lambda) \equiv E\left[u\left(h(\lambda) + \pi x(1-\lambda)\right)\right] \tag{2}$$

with $u(\bullet)$, the utility function of the representative agent, $u'(\bullet) > 0$ and $u''(\bullet) < 0$.

Following a second-order Taylor's approximation of $V(\lambda)$ around π_m, we obtain the following expression:

$$V(\lambda) = u\left(h(\lambda) + \pi_m x(1-\lambda)\right) + \frac{1}{2}u''\left(h(\lambda) + \pi_m x(1-\lambda)\right)(1-\lambda)^2 x^2 \sigma^2 \tag{3}$$

It appears that the expected utility of the representative agent decreases with openness and the variance of terms of trade. The first order condition with respect to λ leads to:

$$\left[u'(\bullet) + \frac{1}{2}x^2\sigma^2(1-\lambda)^2 u'''(\bullet)\right]\left(h'(\lambda) - \pi_m x\right) - \sigma^2 x^2 (1-\lambda) u''(\bullet) = 0 \tag{4}$$

When the agent is prudent $(u'''(\bullet) > 0)$, the term in the brackets is always positive and given that $h'(\lambda) > 0$, we conclude that the optimal size of the public sector rises with the risk associated with trade openness $x^2\sigma^2$. Indeed, if we consider two situations, one in which the external risk is null $(R = \sigma^2 x^2 = 0)$ and the other case in which the external risk is strictly positive $(\sigma^2 x^2 > 0)$, we get the following results:

Case 1: $R = 0$ and $h'(\lambda_1) = \pi_m x$

Case 2: $R > 0$ and $h'(\lambda_2) = \pi_m x + \dfrac{\sigma^2 x^2 (1-\lambda_2) u''(\bullet)}{u'(\bullet) + \dfrac{1}{2}\sigma^2 x^2 (1-\lambda_2)^2 u'''(\bullet)}$

Knowing that $\dfrac{\sigma^2 x^2 (1-\lambda_2) u''(\bullet)}{u'(\bullet) + \dfrac{1}{2}\sigma^2 x^2 (1-\lambda_2)^2 u'''(\bullet)} < 0$ since $u''(\bullet) < 0$, we get the following equality : $h'(\lambda_2) < h'(\lambda_1)$.

[1] Indeed, households can arbitrate between the public and the private sector for the choice of services such as security, school, energy, health care facilities… (see Abdih et al., 2008).

Given the concave nature of the function h, we can conclude that $\lambda_2 > \lambda_1$. In other terms, the size of the public sector is higher in the case of existing external risk than in the case without an external risk.

2.2 The remittance case

Suppose now that the representative agent can receive remittances from abroad $r(\pi)$ and that they move countercyclically. More precisely, suppose that remittance inflows are countercyclical vis-à-vis the terms of trade: $r'(\pi) < 0$ et $r''(\pi) > 0$.[2] The expected utility function is re-written as follows:

$$W(\lambda) \equiv E\left[u\left(h(\lambda) + \pi x(1-\lambda) + r(\pi)\right)\right] \tag{5}$$

Using a second order Taylor's approximation of $W(\lambda)$ around π_m, we obtain :

$$\begin{aligned} W(\lambda) = {} & u\left(h(\lambda) + \pi_m x(1-\lambda) + r(\pi_m)\right) \\ & + \frac{1}{2}\sigma^2\left(x(1-\lambda) + r'(\pi_m)\right)^2 u''\left(h(\lambda) + \pi_m x(1-\lambda) + r(\pi_m)\right) \end{aligned} \tag{6}$$

When the expression (6) is compared with (3), it can be observed that remittances dampen the impact of the external risk on the agent's utility.[3] The first-order condition with respect to λ gives:

$$\left[u'(\bullet) + \frac{1}{2}\sigma^2\left(x(1-\lambda) + r'(\pi_m)\right)^2 u'''(\bullet)\right]\left(h'(\lambda) - \pi_m x\right) - \sigma^2 x\left(x(1-\lambda) + r'(\pi_m)\right)u''(\bullet) = 0 \tag{7}$$

From the equation (7), the optimal size of the public sector in the case of existing external risk ($\sigma^2 x^2 > 0$) and remittance inflows, is determined by the following equality:

Case 3 : $R > 0$, $r > 0$, and $h'(\lambda_3) = \pi_m x + \dfrac{\sigma^2 x\left(x(1-\lambda_3) + r'(\pi_m)\right)u''(\bullet)}{u'(\bullet) + \frac{1}{2}\sigma^2\left(x(1-\lambda_3) + r'(\pi_m)\right)^2 u'''(\bullet)}$

Knowing that $r'(\pi_m) < 0$, we have : $h'(\lambda_3) > h'(\lambda_2)$.[4] What leads to $\lambda_3 < \lambda_2$.

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[2] Indeed, remittances are more likely to react to the consequences that the terms of trade can exert on the agent's income rather than to terms of trade shocks themselves. The idea that remittances react to terms of trade shocks is basically a simplification in the theoretical model which is coherent with the empirical analysis that will be performed in Section 3. More precisely, in section 3, coefficients of remittance cyclicality are derived from the LGWOLS method in which remittance cycle is regressed on real GDP cycle instrumented by the terms of trade shocks. This is therefore close to the assumption raised in this theoretical model.

[3] Remember that $r'(\pi) < 0$ et $r''(\pi) > 0$.

[4] This arises since $\dfrac{\sigma^2 x\left(x(1-\lambda) + r'(\pi_m)\right)}{u'(\bullet) + \frac{1}{2}\sigma^2\left(x(1-\lambda) + r'(\pi_m)\right)^2 u'''(\bullet)} < \dfrac{\sigma^2 x^2(1-\lambda)}{u'(\bullet) + \frac{1}{2}\sigma^2 x^2(1-\lambda)^2 u'''(\bullet)}$.

The following result holds: The size of the public sector is lower in a small open economy which receives countercyclical remittances compared to the zero-remittance case. The fiscal retrenchment due to remittances is given by $\lambda_3 - \lambda_2 < 0$.

This prediction has important policy implications insofar as it enters the dilemma that characterizes developing countries: integrating the global economy to take advantages of the gain of the globalization, providing social safety nets and insuring against the vagaries of globalization and at the same time, reducing the size of the public sector through fiscal consolidations. This 'impossible trinity' (fiscal consolidation, macroeconomic insurance through government spending and globalization) is broken-down if we consider the fact that households can receive remittance inflows from abroad. By providing a form of private insurance they can therefore reduce the role of insurer of last resort that the governments play in small open economies.

The next section tests empirically the countercyclicality of remittance inflows in a large sample of developing countries.

3 Time-varying Measure of Remittance Cyclicality

This section is devoted to the evaluation of the cyclicality of remittances and to assess the impact of external openness on the cyclicality of remittances. The hypothesis tested is that external openness is associated with more countercyclical remittances because the later compensate for the risks associated with the former.

3.1 The cyclicality of remittance in the literature

The empirical literature analyzing the cyclical properties of remittances consists of an evaluation of the cyclicality of remittances with respect to GDP cycle. The results are however mixed. For some authors, remittances react countercyclically to the real GDP cycle at home (see Sayan (2006) for the case of the low and lower middle income countries). Lueth and Ruiz-Arranz (2007) however conclude that remittances are aligned with the business cycle in Sri Lanka. Acosta et al. (2008) showed that the countercyclicality of remittances appears to increase with income, being highest among upper-middle income countries. This result is close to that of Giuliano and Ruiz-Arranz (2009) who concluded that remittances were more procyclical in countries with shallower financial systems. Neagu and Schiff (2009) addressed the question of the cyclicality of remittances and found that remittances are pro-cyclical in 65% of cases in the period 1980-2007 using 116 developing countries. Finally, Gupta et al. (2009) showed that remittance de-trended flows for Sub-Saharan Africa are positively correlated with GDP growth during the

period 1980-1995 but remittances appear countercyclical with respect to growth during the last decade.

3.2 How computing time-varying country-specific indicators of cyclicality?

All previous studies analyzing the cyclicality of remittances vis-à-vis the GDP have derived one single coefficient of the cyclicality of remittances for countries or for regions over the time whereas the cyclicality of remittances is not necessary an invariant phenomenon. The cyclicality of remittances might vary for example for one country if the synchronicity of business cycles of the receiving and the source country varies over the time. The cyclicality may also be different among stages of migration. Indeed, one could expect more countercyclical remittances at the beginning of the migration history and procyclical ones afterwards. This happens when remittances are primarily used for consumption purposes in the first stage and used for investment in the later stage.

Another difference between our study and the previous comes from the fact that we determine the cyclicality of remittances vis-à-vis the GDP with an instrumental variable strategy. Remittances may react to the business cycle in the receiving's country but also, remittances could affect the economic activity (GDP growth) as it has been shown in the literature (Pradhan et al. 2008; Catrinescu et al., 2009 ; Giuliano and Ruiz-Arranz, 2009). This reverse causality could induce a bias in the estimation of the cyclicality of remittances.

The GDP cycle is instrumented by three variables which constitute plausible exclusion restrictions: the one-year lagged value of the GDP cycle, one-year lagged value of the domestic investment rate and contemporaneous terms of trade shocks (growth rate of the series). Several arguments can be evoked to justify the choice of these variables. Firstly, the lagged values of GDP cycle and investment rate would be correlated with the contemporaneous business cycle but not necessarily with remittances of the current period. Secondly, the terms of trade shocks have been highlighted as among the major determinants of GDP shocks in developing countries (Mendoza, 1997; Bleaney and Greenaway, 2001 et Aghion et al., 2009). It seems difficult to assess that terms of trade shocks will directly induce changes in the amount of remittances other than through the income channel.

Generally, one would like estimate the following model for each country i:

$$\Delta \log\left(y_{i,t}\right) = \mathbf{Z}'_{i,t}\,\theta_{i,t} + \theta_{2i,t}\Delta \log\left(r_{i,t-1}\right) + \theta_{3i,t} + \upsilon_{i,t} \tag{8}$$

$$\Delta \log\left(r_{i,t}\right) = a_{1i,t}\Delta \log\left(y_{i,t}\right) + a_{2i,t}\Delta \log\left(r_{i,t-1}\right) + a_{3i,t} + \varepsilon_{i,t} \tag{9}$$

where $\Delta\log(r)$ and $\Delta\log(y)$ are the growth rate of real remittances and real GDP, respectively.[5] $\mathbf{Z}$ represents the matrix of instruments for the real GDP growth rate (one-year lagged value of GDP growth rate, one-year lagged value of the gross domestic investment and the contemporaneous terms of trade growth rate). The model includes the lagged value of the remittance growth rate for at least two reasons. Firstly, by this way, we assume the existence of a stochastic trend in the remittance series and secondly, the lagged value of remittance growth rate controls for dynamic properties of the remittance growth rate.

υ and ε are the error terms. i refers to the country and t to the year.

$a_{1i,t}$ measures the cyclicality of remittances. Note that a positive $a_{1i,t}$ means that remittances increase when the economy is in expansion, i.e. remittances are procyclical and the opposite holds for countercyclical remittances. Equation (8) refers to the first-stage instrumentation equation of the real GDP growth rate whereas equation (9) represents the structural model of the cyclicality of remittances. In these equations, all the coefficients are both country-specific and time-varying. This is the value-added of this approach. But how can we compute time-varying country-specific parameters $a_{1i,t}$?

Several approaches can be used. One for example can use the ten-year centered window regressions to estimate the value of the parameter $a_{1i,t}$ at each year t and for each country i. This method suffers however from serious shortcomings. First, by definition, we lose the first five years and the last four years of data for each country. Second, because the method involves estimating a coefficient by discarding at each time period one old observation and taking into account a new one, the coefficient can vary substantially when the new observation is very different from the one it replaces. This implies that the series may be jagged and affected by noise and transitory changes (Aghion and Marinescu, 2008); moreover, a sudden jump in the series would not be coming from changes in the immediate neighborhood of date t, but from changes 5 years before and 4 years after.

To deal with the shortcomings of the 10-years rolling window method, one can use smoothing such that all observations are used for each year, but those observations closest to the reference year are given greater weight. The local Gaussian Weighted Ordinarily Least Squares (LGWOLS) is one way of achieving this. It consists of computing all the time-varying country-specific parameters in equations (8) and (9) coefficients by using all the observations available for each country i and then performing one regres-

[5] Remittances series in US dollars are divided by the US deflator to convert them into real terms. The remittance series comprise the sum of workers' remittances and compensations of employees drawn from the World Bank Tables. The two items are used because for many countries, the distinction between the two is difficult (Bugamelli and Paternò, 2009). The paper retains only countries with at least 10 consecutive annual data of remittances over the period of analysis (1970-2008). The real GDP data also come from the World Bank Tables.

sion for each date t, where the observations are weighted by a Gaussian centered at date t :

$$\Delta \log(y_{i,t}) = \mathbf{Z}'_{i,t}\,\theta_{i,t} + \theta_{2i,t} tr_t + \theta_{3i,t} + \upsilon_{i,t}$$

$$\Delta \log(r_{i,t}) = a_{1i,t}\Delta \log(y_{i,t}) + a_{2i,t} tr_t + a_{3i,t} + \varepsilon_{i,t}$$

$$\text{where } \varepsilon_{i\tau} \sim N\left(0, \sigma_\varepsilon^2 / w_t(\tau)\right),\ \upsilon_{i\tau} \sim N\left(0, \sigma_\upsilon^2 / w_t(\tau)\right) \text{ and } w_t(\tau) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left(-\frac{(\tau - t)^2}{2\sigma^2}\right) \quad (10)$$

In practice, we use $\sigma = 5$. The choice is made to obtain sufficient smoothing of the estimates. This value also has been preferred by Aghion and Marinescu (2008). The strength and the orthogonality of the instruments **Z** are evaluated according to tests of significance of the coefficients of the instruments in the first-stage and the Hansen over-identification test.

Given that the main hypothesis defended in this paper is that remittances through their countercyclical behavior dampen the positive effect of trade openness on the government size, the equation describing the cyclicality of remittances may therefore include the trade openness variable in interaction with the GDP growth rate. This can allow us to assess whether the cyclicality of remittances vis-à-vis the GDP growth varies according to the degree of trade openness in each country. However, this can complicate the empirical analysis insofar as the trade openness and the GDP growth rate in interaction with trade openness are potentially endogenous and must be instrumented. Finding time-varying exogenous determinants of trade openness is however difficult since exogenous determinants of trade are those associated with the geographical characteristics of countries such as the remoteness or cultural proximity with trading partners.

The approach retained here therefore proceeds in two steps. Firstly, the cyclicality of remittances is evaluated by estimating for each country the equation (10) and secondly, we will use these indicators of cyclicality to examine the impact of trade openness on the countercyclicality of remittances.

3.3 Results

a Evolution of the cyclicality of remittances

The results of the instrumentation of the real GDP growth are resumed in Figure 1. The figure reports the percentage of countries every year, for which the F-statistic in the first-stage regressions is significant (at least at 10%) as well as the percentage of cases with F-statistics above the rule of thumb of 10 (Staiger and Stock, 1997). It appears that the F-statistics associated with the instrumentation equations are significant in around 60% of cases. About half of these 60% correspond to F-statistics above the rule of thumb of 10.

Figure 1. *Testing the strength of the instruments: summary of first-stage results*

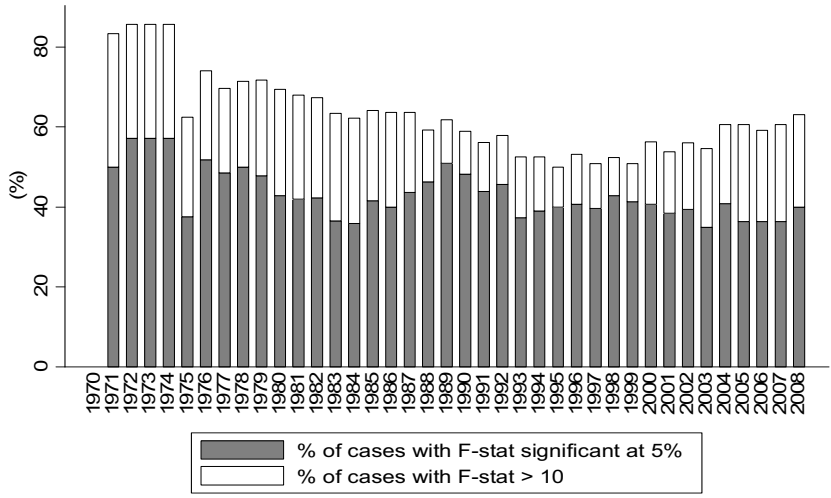
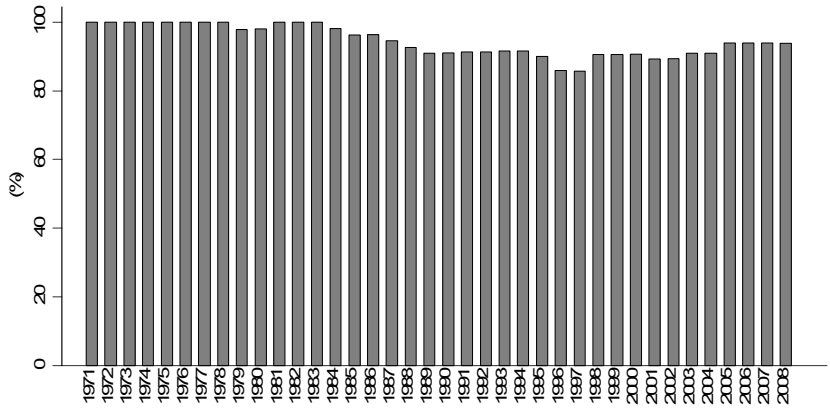


Figure 2 reports the percentage of cases with a Hansen test statistic exhibiting a p-value above 10% (the null hypothesis is the orthogonality of **Z**). The results indicate that the instruments retained for the real GDP growth rate are not significantly correlated with the error term in the second stage.

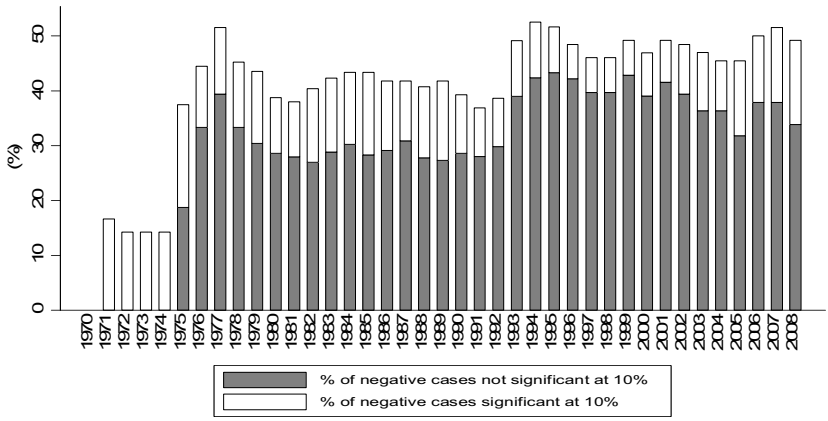
Figure 2. *Testing the orthogonality of the instruments: summary of first-stage results*



Given the relatively comfortable results associated with the diagnostic tests, we can now turn on the main results regarding the cyclicality of remittances. Figure 3 reports the percentage of cases for which remittances

appear countercyclical as well as the percentage of cases in which this negative coefficient is statistically significant. Two important results emerge. Firstly, the negative correlation of remittances vis-à-vis the GDP growth rate in the receiving countries has increased since the mid of 1990s and represent on average, around 50% of the countries. Our results highlight that remittances are more countercyclical than what has been found in previous papers. Secondly, the countercyclical behavior of remittances is statistically significant for about one-third of these 50% of cases. Whether this percentage of significant cases might seem relatively low, this doesn't necessarily invalidate the idea that remittances may dampen the effects of external risk on government size. Indeed, we can conclude that remittances are often acyclical in the majority of cases and acyclical remittances have potentially a stabilizing impact compared to procyclical remittances. Moreover, we will take into account further in the paper, the heterogeneity in the significance of the parameters of the cyclicality of remittances by using the bootstrap procedure.

Figure 3. *Evolution of the countercyclicality of remittances*



What seems important to underline is that the cyclicality of remittances is not a time-invariant phenomenon. This paper uncovers that the cyclical properties of remittances have changed over the time and the countercyclicality of remittances appears much stronger during the last two decades.

b Does trade openness increase the countercyclicality of remittances?

The panel data of the cyclicality of remittances are used to investigate whether remittances are more countercyclical as the degree of trade openness increases within countries. If external openness leads to some important risks that developing countries have to deal with, one might observe

that remittances are more countercyclical in more open economies. To test this hypothesis, an econometric model is specified with the cyclicality of remittances as a dependent variable and trade openness as an explanatory variable. The model would also control for some other factors that could shape the cyclicality of remittances. The following model is used:

$$\hat{a}_{1i,t} = \mathbf{X}'_{i,t}\,\beta + \theta\, op_{i,t} + u_i + \varepsilon_{i,t} \qquad (11)$$

with $\hat{a}_{1i,t}$, the variable measuring the cyclicality of remittances, op the trade openness variable (drawn from the Penn World Tables 6.3., PWT) and $\mathbf{X}$ the matrix of potential control variables. u_i represents the country fixed-effects and $\varepsilon_{i,t}$ is the error term. The initial level of GDP per capita (the lagged value of GDP per capita in log drawn from PWT 6.3.) is introduced to control for the level of economic development. The lagged value of financial development (M2 over GDP), the inflation rate, public investment, the release of economic informations by the public authorities (Williams, 2009) and the number of natural disaster events occurred in each country are also included. Excepting the release of information, natural disasters, GDP per capita and trade openness, all the others variables are drawn from the World Bank Tables.

Financial underdevelopment may be positively correlated with the countercyclicality of remittances if we hypothesize that remittances play an insurance role in a context of low level of financial development. However, as pointed-out by Giuliano and Ruiz-Arranz (2009), remittances could be more procyclical in less financially developed countries because they are sent to finance investments in a context of huge financial constraints. Regarding the inflation rate, one could expect that remittances will exhibit a strong countercyclicality in a context of high inflation if the migrants respond to the collapse of the purchasing power of their siblings. We also expect a procyclical behavior of remittances in countries that release more essential economic informations to the public. Indeed, these informations help migrants who want to invest in their countries of origin. We thus expect a positive correlation between the release of economic information and the procyclicality of remittances. The public investment ratio could be positively associated with remittances sent for financing private investment.[6] Finally, natural disasters measured as the number of disaster events would be associated with more countercyclical remittances given that altruistic migrants react strongly to natural disasters occurred in their countries of origin (Yang, 2008; Mohapatra et al., 2009, and David, 2010). Data on natural disasters are drawn from the Center for Research on the Epidemiology of Disasters (CRED) – Emergency Events Database (EM-DAT).

The equation (11) is estimated over the period 1970-2008. The hypothesis tested is that $\theta < 0$. In other terms, trade openness increases the

[6] Data on public investment are drawn from IMF World Economic Outlook database (2010).

countercyclicality of remittances. Descriptive statistics and the list of country in the sample are presented in appendix.

The results of the estimations are presented in Table 1. Whatever the control variables that are introduced, it appears a negative and statistically significant impact of trade openness on the cyclicality of remittances. In others terms, the coefficients of the cyclicality of remittances are more negative at high levels of trade openness. This result validates the hypothesis that remittances are more likely to play an insurance role in more open economies by insulating the private sector against the external risks. Regarding the other determinants of the cyclicality of remittances, the results uncover a significant association between natural disasters, inflation rate and the countercyclicality of remittances. In contrary, more public investment and financial development are associated with procyclical remittances.[7]

Altogether, this section has highlighted two important results: on average, remittances are countercyclical this countercyclicality increases as the level of trade openness rises. The next sub-section tests the hypothesis that the level of remittances really matters in the relationship between government size and trade openness and section 5 directly investigates the impact of countercyclical remittances on this relationship.

4 Remittances, Openness and Government Size: Econometric Analysis

4.1 The econometric model

This section presents the econometric model specified to measure the impact of remittance inflows on the sensitivity of government consumption ratio to trade openness. The hypothesis tested is that the effect of openness on government consumption will be less positive at high levels of remittances. The following equation is estimated:

$$g_{i,\tau} = \rho g_{i,\tau-1} + \mathbf{X}'_{i,\tau}\beta + \theta_1 r_{i,\tau} + \theta_2 op_{i,\tau} + \theta_3 \left(op_{i,\tau} \times r_{i,\tau}\right) + \alpha_i + \eta_\tau + \varepsilon_{i,\tau} \quad (12)$$

where g represents the government consumption ratio, $\mathbf{X}$ is the matrix of control variables (GDP per capita, demographic dependency ratio, urbanization rate, inflation rate and population size). op is the indicator of trade openness and r the remittance variable. α_1 and η_τ are respectively the country fixed-effects and the period dummies. $\varepsilon_{i,\tau}$ is the error term. All the time-varying

[7] However, the low value taken by the coefficient of determination suggests that the results would be taken with some hindsight. This can be explained by at least two reasons. Firstly, there are some unobservable time-varying variables that can determine the cyclicality of remittances but for which we didn't control for. Secondly, we explain a variable which changes year by year with some explanatory variables which change slightly over the time (openness, financial development, income).

Table 1. *Trade openness and the procyclicality of remittances: OLS with country fixed-effects estimator*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trade openness	-2.347**	-2.900***	-2.702***	-2.886***	-2.780**	-2.256**	-1.980*	-2.226*
	(2.49)	(2.86)	(2.70)	(2.71)	(2.37)	(2.18)	(1.70)	(1.80)
Lagged GDP per capita	-0.650	0.098	-0.278	-0.518	1.793	1.104	1.808	1.600
	(0.54)	(0.07)	(0.21)	(0.36)	(1.09)	(0.80)	(1.11)	(0.90)
Inflation rate		-3.126***	-3.172***	-2.875***	-3.409***	-3.229***	-3.341***	-3.208***
		(2.83)	(2.96)	(2.63)	(3.01)	(2.93)	(3.09)	(2.99)
Lagged Financial development			0.545				1.799*	1.916*
			(0.76)				(1.84)	(1.96)
Release of information				2.638				-1.382
				(0.50)				(0.24)
Public investment					2.520***		2.621***	2.189***
					(3.78)		(4.08)	(3.31)
Natural disasters						-0.373***	-0.269**	-0.336**
						(2.91)	(1.97)	(2.33)
Intercept	17.367*	28.104**	28.513**	30.202**	10.700	18.752	1.108	4.526
	(1.86)	(2.35)	(2.45)	(2.41)	(0.75)	(1.52)	(0.08)	(0.30)
Observations	1839	1696	1683	1568	1453	1696	1440	1315
Countries	67	65	65	65	65	65	65	65
R^2	0.005	0.008	0.009	0.009	0.019	0.014	0.026	0.026

Note: *T*-statistics in parentheses. All the explanatory variables are expressed in their logarithmic form. For the inflation rate, we use the log of 100+the inflation rate. Financial development is the logarithm of M2 in percentage of GDP. Natural disasters record the number of natural disaster events in each country each year (CRED-EM-DAT). The models include country fixed-effects. The release of socio-economic information by Governments is drawn from Williams (2009). *** p<0.01, ** p<0.05, * p<0.1.

variables are expressed in their natural logarithmic form. The model includes the lagged value of government consumption to capture the inertia in the government spending ratio.

The hypothesis tested is that the marginal impact of trade openness on government consumption ($\theta_2 + \theta_3 r_{i,\tau}$) is less positive at high levels of remittances. More precisely, our claim is that $\theta_2 > 0$ and $\theta_3 < 0$. Because the two coefficients are expected to exhibit opposite signs, a threshold level of remittances arises:

$$\frac{\partial g_{i,\tau}}{\partial op_{i,\tau}} = \theta_2 + \theta_3 r_{i,\tau} = 0 \Rightarrow r^* = -\frac{\theta_2}{\theta_3}$$

r^* measures the minimum remittance ratio (expressed in log terms) required for a full absorption of the effect of trade openness.

4.2 The sample and the variables

The sample includes 66 developing countries observed over 8 non-overlapping consisting of 5-year intervals, over 1970-2008. The same sample of countries as the one used to compute the coefficients of cyclicality is retained here. Time-varying data are computed as 5-year averages.

Government consumption data are normalized by country GDP and were drawn from the Penn World Table 6.3.[8] We follow the World Bank in defining remittances as the sum of workers' remittances and employees' compensations. We use the sum of these two items because for many developing countries the statistical distinction between the two could be highly problematic (Bugamelli and Paternò, 2009). Two alternative measures are used: real remittances per capita and remittances normalized by country GDP. Trade openness is defined as the sum of exports and imports of goods and services over GDP. Data come from the Penn World Table 6.3. Data for all the remaining explanatory variables are drawn from the World Bank Tables.

4.3 Estimation method

The System-GMM estimator is used to estimate the parameters of equation (12). Two reasons justify this choice. Firstly, since the equation (12) is

[8] Government consumption ratio is used as the indicator of government size due to the lack of available data on the composition of government expenditures. Moreover, this variable has been used by Rodrik (1998) in his analysis of the effect of trade openness on government size. Due to the absence of effective systems of social security in developing countries, governments often use government consumption to mitigate negative shocks (for example by hiring more people in the administration or by increasing demand for furniture supplied by the private sector). These activities are captured in the government final consumption.

autoregressive and includes country-fixed effect, OLS estimator is biased and this bias is particularly important in the case of short time dimension as in our case (8 sub-periods). Secondly, the System-GMM estimator allows to correct the endogeneity of the explanatory variables. The equation in levels and the equation in first differences are combined in a system and estimated with an extended GMM estimator system which allows for the use of lagged differences and lagged levels of the explanatory variables as instruments (Blundell and Bond, 1998). The paper uses the Windmeijer's (2005) correction of standard errors for finite sample bias. Two specification tests check the validity of the instruments. The first is the standard Sargan/Hansen test of over-identifying restrictions. The second test examines the hypothesis that there is no second-order serial correlation in the first-differenced residuals. The number of lags of the explanatory variables used as instruments is usually limited to reduce the 'over-fitting' bias (Roodman, 2009).

4.4 Results

The results are reported in Table 2 and Table 3. The model is firstly estimated using remittances per capita (Table 2) and after with remittances over GDP (Table 3). In all these estimations, the diagnostic tests associated with the system-GMM estimator are conclusive.

In Table 2, the results suggest a positive and significant impact of trade openness on the government consumption ratio. Given that all the explanatory variables are expressed in logarithm terms, the parameters reported approximate the elasticities. In a situation of zero remittances, the impact of trade openness on the government consumption is represented by the coefficient of the additive term of openness and stands between 0.1 and 0.2. On the basis of the results obtained with the full set of control variables (column 6), a 10% increase in openness is associated with a 1% increase in the government consumption ratio over GDP.[9] When trade openness is interacted with remittances per capita, its impact on government spending is negative and statistically significant.

[9] This result is not highly different to what found by Rodrik (1998). He estimated an elasticity around 0.2.

Table 2. *Remittances per capita, Openness and Government consumption*

	(1)	(2)	(3)	(4)	(5)	(6)
Trade openness	0.135**	0.108*	0.116*	0.137**	0.116*	0.101*
	(2.16)	(1.81)	(1.84)	(2.12)	(1.67)	(1.71)
Trade openness*Remittances	-0.041**	-0.033**	-0.037**	-0.041**	-0.033*	-0.028*
	(2.38)	(2.12)	(2.08)	(2.41)	(1.91)	(1.93)
Remittances per capita	0.142**	0.107**	0.132*	0.141**	0.117*	0.103**
	(2.01)	(2.01)	(1.85)	(2.02)	(1.78)	(2.02)
Government consumption (t-1)	0.903***	0.832***	0.914***	0.907***	0.906***	0.805***
	(7.69)	(10.52)	(8.39)	(7.39)	(7.76)	(6.37)
Inflation	0.168***	0.133***	0.158***	0.167***	0.137***	0.097***
	(2.59)	(2.58)	(2.72)	(2.58)	(2.84)	(2.61)
GDP per capita		0.065				0.079
		(1.17)				(1.03)
Urbanization rate			-0.052*			-0.117*
			(1.89)			(1.90)
Population				-0.002		0.010
				(0.26)		(0.66)
Demographic dependency ratio					-0.166	0.275
					(1.19)	(1.20)
Intercept	-0.984**	-1.053	-0.716	-0.961*	-0.182	-1.683
	(2.03)	(1.64)	(1.42)	(1.83)	(0.30)	(1.15)
Observations	396	396	396	396	391	391
Countries	66	66	66	66	65	65
Joint significance prob.[a]	0.026	0.100	0.092	0.024	0.158	0.129
Joint significance prob.[b]	0.044	0.080	0.100	0.039	0.141	0.097
Remittances per capita [c]	$26 US	$26.5 US	$23 US	$28 US	$34 US	$38 US
Countries above the threshold	40	40	41	38	35	31
Percentage of countries above	61%	61%	62%	58%	54%	48%
AR(1):p-value	0.001	0.001	0.001	0.001	0.001	0.004
AR(2):p-value	0.774	0.774	0.780	0.760	0.855	0.771
Hansen OID test: prob.	0.762	0.661	0.690	0.736	0.302	0.441
Instruments	32	37	33	33	25	47

Note : All the variables are expressed in natural logarithm. Period dummies are included in all the specifications. Robust T-statistics in parentheses. Urbanization rate, population, dependency ratio and period dummies are taken as strictly exogenous. The remaining control variables are taken as predetermined and the matrix of instruments is collapsed and the maximum number of lags is fixed at 5. The estimation method is the two-step System-GMM method with the Windmeijer (2005) correction for finite sample bias. Data are computed as 5-year averages corresponding at 8 nonoverlapping subperiods.

[a] Joint significance probability of coefficients associated with remittances and remittances crossed with trade openness.

[b] Joint significance probability of coefficients associated with trade openness and remittances crossed with trade openness.

[c] Threshold level of remittance (expressed in per capita $US terms) at which the effect of trade openness on government consumption is equal to zero.

*** p<0.01, ** p<0.05, * p<0.1.

The other result that is reported in the Table 2 is a positive impact of the additive term of remittances on the government consumption ratio. This coefficient identifies the effect of remittances on government spending in a context of autarky (openness equals zero). In this specific case, remittances are not used as a compensation mechanism against external risks but finance investments on education or other forms of demand for public services which therefore increase government size.

The level of remittances per capita required to fully offset the effect of trade openness on government spending is evaluated between 20 and 40 $US per capita. About 50% of the sample is concerned (country-year observations). On the basis of the results obtained in column 6, some basics simulations can be performed. In a situation with zero remittance inflows, the impact of openness on government consumption can be obtained with the following calculation. The median value of government consumption and trade openness ratios are 16% and 59%, respectively. A country for which trade openness moves from its median value toward 80% (an increase of 35%) would observe an increase of the government consumption ratio by about 0.5 percentage point of GDP – (0.101×0.35×0.16) ×100 –, a shift in the government consumption ratio from 16 to 16.5%. However, if the same country receives a level of remittances per capita corresponding to the median value in the sample (12 $US) for which the logarithm is 2.5, this country will observe a variation of the government consumption of 0.17 percentage point of GDP– [(0.101×0.35) – (0.028×0.35×2.5)]×0.16×100 – a shift from 16% to 16.17%. The reduction of government size enabled by remittances in this example is about 0.33 percentage point of GDP.

To check the robustness of this result, the same model is estimated using the remittance-to-GDP ratio. Results are reported in Table 3 and are broadly consistent with the previous ones. As previously, the model includes several control variables to ensure that the results are driven by omitted variables. Trade openness again determines positively the government consumption and its effect is strongly dampened by remittance inflows. Results indicate that the threshold level of remittances required for a full absorption of the effects of trade openness on the government size stands around 4.5 and 8% of GDP. On the basis of the parameters estimated with the full set of control variables (column 6), the threshold of remittances stands at 6% and concerns 46% of the sample of country-year observations.

Table 3. *Remittances (%GDP), Trade openness and Government consumption*

	(1)	(2)	(3)	(4)	(5)	(6)
Trade openness	0.148**	0.188**	0.127*	0.220***	0.119*	0.137*
	(2.05)	(2.50)	(1.72)	(2.66)	(1.90)	(1.82)
Trade openness*Remittances	-0.094**	-0.093**	-0.086*	-0.101**	-0.089*	-0.079*
	(2.31)	(1.97)	(1.93)	(2.18)	(1.75)	(1.66)
Remittances (%GDP)	0.349**	0.336*	0.315	0.377*	0.343	0.299
	(1.97)	(1.66)	(1.63)	(1.90)	(1.60)	(1.48)
Government consumption (t-1)	0.925***	0.922***	0.929***	0.934***	0.927***	0.898***
	(9.08)	(7.73)	(10.16)	(10.38)	(9.47)	(8.69)
Inflation	0.139**	0.171**	0.128**	0.144**	0.121**	0.111*
	(2.36)	(2.50)	(2.02)	(2.22)	(2.17)	(1.71)
GDP per capita		-0.042*				-0.011
		(1.94)				(0.34)
Urbanization rate			-0.052**			-0.025
			(2.16)			(0.82)
Population				0.021*		0.007
				(1.77)		(0.46)
Demographic dependency ratio					0.079	-0.044
					(0.62)	(0.18)
Intercept	-1.028*	-0.980	-0.702	-1.728**	-1.128	-0.535
	(1.79)	(1.63)	(1.21)	(2.46)	(1.54)	(0.42)
Observations	395	395	395	395	390	390
Countries	66	66	66	66	65	65
Joint significance prob.[a]	0.011	0.031	0.020	0.017	0.100	0.143
Joint significance prob.[b]	0.038	0.029	0.100	0.020	0.118	0.117
Remittances (%GDP) [c]	5%	7.5%	4.5%	9%	4%	6%
Countries above the threshold	33	22	33	19	35	30
Percentage of countries above	50%	33%	50%	29%	54%	46%
AR(1):p-value	0.001	0.002	0.001	0.001	0.001	0.001
AR(2):p-value	0.694	0.671	0.709	0.599	0.794	0.779
Hansen OID test: prob.	0.801	0.468	0.767	0.895	0.683	0.634
Instruments	28	41	29	25	27	35

Note: All the variables are expressed in natural logarithm. Period dummies are included in all the specifications. Robust *T*-statistics in parentheses. Urbanization rate, population, dependency ratio and period dummies are taken as strictly exogenous. The remaining control variables are taken as predetermined and the matrix of instruments is collapsed and the maximum number of lags is fixed at 5. The estimation method is the two-step System-GMM method with the Windmeijer (2005) correction for finite sample bias. Data are computed as 5-year averages corresponding at 8 non-overlapping sub-periods.

[a] Joint significance probability of coefficients associated with remittances and remittances crossed with trade openness.

[b] Joint significance probability of coefficients associated with trade openness and remittances crossed with trade openness.

[c] Threshold level of remittance (expressed in %GDP) at which the effect of trade openness on government consumption is equal to zero.

*** p<0.01, ** p<0.05, * p<0.1.

Perhaps a better sense of the quantification of this result can be obtained from the following calculation. A country for which trade openness moves from the median value to 80% (a 35% increase) would observe a shift of the government consumption ratio of about 0.8 percentage point of GDP ((0.137×0.35×0.16)×100). However, if the same country receives the median value of the remittance ratio (2.4% of GDP) for which the logarithm stands at 0.9, the variation in percentage point of GDP of the government consumption ratio would only be around 0.4 ([(0.137×0.35) – (0.079×0.35×0.9)]×0.16×100). The reduction in the government consumption enabled by remittance inflows is 0.4 in this example, a value close to what was found in the case of the results with remittances per capita.

5 Remittance Cyclicality, Openness and Government Size

This section extends the previous one by investigating directly whether countercyclical remittances reduce the positive impact of trade openness on government consumption. The time-varying coefficients measuring the cyclicality of remittances are used and the following equation is specified:

$$g_{i,\tau} = \rho g_{i,\tau-1} + \mathbf{X}'_{i,\tau}\beta + \theta_4 \hat{a}_{1i,\tau} + \theta_5 op_{i,\tau} + \theta_6 \left(op_{i,\tau} \times \hat{a}_{1i,\tau}\right) + \alpha_i + \eta_\tau + \varepsilon_{i,\tau} \quad (13)$$

The hypothesis tested is that $\theta_6 > 0$ so that the effect of trade openness on the government consumption is less positive in the case countercyclical remittances ($\hat{a}_{1i,\tau} < 0$). It is worth noting now that the additive term of trade openness doesn't identify the effect of openness on government consumption in a situation without remittances but clearly an effect in the case of acyclical remittances ($\hat{a}_{1i,\tau} = 0$). θ_5 is therefore not necessarily supposed positive given that even acyclical remittances can be stabilizing.

The results of the estimation of the equation (13) are presented in Table 4. As expected, the interaction of trade openness with the indicator of the cyclicality of remittances exhibits a positive and significant coefficient. This result suggests that countercyclical remittances (a negative value of $\hat{a}_{1i,\tau}$) significantly reduce the elasticity of government consumption with respect to trade openness. The opposite holds for procyclical remittances.

Table 4. *Remittance cyclicality, Openness and Government Consumption*

	(1)	(2)	(3)	(4)	(5)
Trade openness	-0.026	-0.023	-0.025	-0.029	0.019
	(0.62)	(0.55)	(0.50)	(0.66)	(0.28)
Trade openness*Remittance cyclicality	0.003**	0.003**	0.003**	0.004**	0.004***
	(2.08)	(2.00)	(2.03)	(2.25)	(2.61)
Remittance cyclicality	-0.013**	-0.012**	-0.014*	-0.016**	-0.019**
	(2.06)	(2.03)	(1.94)	(2.23)	(2.57)
Government consumption (t-1)	0.634***	0.642***	0.621***	0.591***	0.465***
	(4.56)	(5.28)	(3.93)	(3.83)	(3.59)
Inflation	-0.016	-0.003	-0.024	-0.017	-0.028
	(0.31)	(0.06)	(0.49)	(0.30)	(0.51)
GDP per capita	-0.018	0.034	-0.015	-0.017	0.057
	(0.74)	(1.48)	(0.60)	(0.49)	(1.24)
Urbanization rate		-0.109***			-0.095*
		(2.67)			(1.79)
Population			0.013		0.057
			(0.54)		(1.24)
Demographic dependency ratio				0.066	0.374
				(0.55)	(1.21)
Intercept	1.351***	1.231***	1.275**	1.236	-0.528
	(2.77)	(2.78)	(2.15)	(1.48)	(0.28)
Observations	384	384	384	380	380
Countries	66	66	66	65	65
Joint significance prob.[a]	0.113	0.127	0.104	0.079	0.033
Joint significance prob.[b]	0.114	0.135	0.126	0.079	0.010
AR(1):p-value	0.018	0.012	0.024	0.028	0.042
AR(2):p-value	1.000	0.993	0.985	0.900	0.996
Hansen OID test: prob.	0.362	0.563	0.335	0.219	0.644
Instruments	20	21	25	21	27

Note: All the variables are expressed in natural logarithm. Period dummies are included in all the specifications. Robust *T*-statistics in parentheses. Urbanization rate, population, dependency ratio and period dummies are taken as strictly exogenous. The remaining control variables are taken as predetermined and the matrix of instruments is collapsed and the maximum number of lags is fixed at 5. The estimation method is the two-step System-GMM method with the Windmeijer (2005) correction for finite sample bias. Data are computed as 5-year averages corresponding at 8 non-overlapping sub-periods.

[a] Joint significance probability of coefficients associated with remittance cyclicality and remittance cyclicality crossed with trade openness.

[b] Joint significance probability of coefficients associated with trade openness and remittance cyclicality crossed with trade openness.

*** p<0.01, ** p<0.05, * p<0.1.

Since the coefficients measuring the cyclicality of remittances have been 'generated' previously from an econometric model, using them as an explanatory variable in equation (13) can bias the results. To take into account the bias due to generated regressors, the model (13) is estimated anew and the standard-errors of the coefficients associated with the cyclicality of remittances are corrected using a bootstrap procedure with 100 replications. The procedure is applied to the model including the full set of control variables. Result show that the significance of the parameters is not altered by this correction (Table 5).

Table 5. *Bootstrapped standard-errors*

Variable	Coefficient observed (column 5, Table 6)	Bias	Bootstrapped standard-error
Remittance cyclicality	-0.019*	0.0167	0.0111
Openness*Remittance cyclicality	0.0045*	-0.0038	0.0027

Note: The bootstrap procedure uses 100 replications
* $p<0.1$.

6 Concluding Remarks

This paper showed robustly that remittance inflows dampen the positive effect of trade openness on government spending in developing countries. Moreover, this effect is likely to be observed in the case of countercyclical remittance inflows. Starting from a simple theoretical model, then on the basis of econometric investigations factoring in the endogeneity of remittances, the results indicate that when remittances exceed 6% of GDP, they fully absorb the positive effect of trade openness on government consumption.

Because this result is theoretically justified by assuming countercyclical remittance inflows, the paper proposes an empirical evaluation of the countercyclicality of remittances by computing time-varying country-specific indicators of remittance cyclicality for each country and at each year using Local Gaussian Weighted Ordinarily Least Squares estimations. The results indicate a surge in the countercyclicality of remittances during the mid of 1990s. It also appears that trade openness increases the inflow of more countercyclical remittances, supporting the idea of an insurance role played in small open economies. The econometric analyses also do not reject the hypothesis that countercyclical remittances induce a fiscal retrenchment in more open economies.

This paper showed how the relationship between globalization and fiscal policy differs among countries with differences in their balance of payment characteristics. Remittance inflows reduce the role of insurer of last resort often played by governments in developing countries.

References

Abdih, Y., Chami, R., Gapen, M. T. and Mati, A. (2009) Fiscal sustainability in remittance-dependent economies, IMF Working Papers 09/190, International Monetary Fund.

Abdih, Y., Dagher, J., Chami, R. and Montiel, P. (2008) Remittances and institutions: Are remittances a curse?, IMF Working Papers 08/29, International Monetary Fund.

Acosta, Pablo, Cesar Calderón, Pablo Fajnzylber, and J. Humberto López. (2008). Do Remittances Lower Poverty Levels in Latin America? in P. Fajnzylber and J. Humberto López (eds.): Remittances and Development: Lessons from Latin America. The World Bank, Washington D.C.

Acosta, P. A., Baerg, N. R. and Mandelman, F. S. (2009) Financial development, remittances, and real exchange rate appreciation, Economic Review, pp. 1-12.

Aghion, P., Bacchetta, P., Ranciere, R. and Rogoff, K. (2009) Exchange rate volatility and productivity growth: the role of financial development, Journal of Monetary Economics, 56, 494-513.

Aghion, P. and Marinescu, I. (2008) Cyclical budgetary policy and economic growth: What do we learn from OECD panel data?, NBER Macroeconomics annual.

Amuedo-Dorantes, C. and Pozo, S. (2004) Workers' remittances and the real exchange rate: a paradox of gifts, World Development, 32, 1407-1417.

Bleaney, M. and Greenaway, D. (2001) The impact of terms of trade and real exchange rate volatility on investment and growth in sub-Saharan Africa, Journal of development Economics, 65, 491-500.

Blundell, R. and Bond, S. (1998) Initial conditions and moment restrictions in dynamic panel data models, Journal of econometrics, 87, 115-143.

Bugamelli, M. and Paternò, F. (2009) Output growth volatility and remittances, Economica.

Catrinescu, N., Leon-Ledesma, M., Piracha, M. and Quillin, B. (2009) Remittances, Institutions, and Economic Growth, World Development, 37, 81-92.

Chami, R., Fullenkamp, C., Barajas, A., Montiel, P. and Gapen, M. T. (2009a) Do workers' remittances promote economic growth?, IMF Working Papers 09/153, International Monetary Fund.

Chami, R., Hakura, D. and Montiel, P. (2009b) Remittances: An automatic output stabilizer?, IMF Working Paper No. 09/91.

Collier, P. and Gunning, J. (1999) Trade shocks in developing countries, Oxford University Press.

Combes, J. L. and Ebeke, C. (2010) Remittances and household consumption instability in developing countries, World Development, forthcoming.

Combes, J. L. and Saadi-Sedik, T. (2006) How does trade openness influence budget deficits in developing countries?, The Journal of Development Studies, 42, 1401-1416.

David, A. (2010) How do international financial flows to developing countries respond to natural disasters?, IMF Working Papers 10/166, International Monetary Fund.

di Giovanni, J. and Levchenko, A. (2009) Trade openness and volatility, The Review of Economics and Statistics, 91, 558-585.

Dreher, A., Sturm, J. and Ursprung, H. (2008) The impact of globalization on the composition of government expenditures: Evidence from panel data, Public Choice, 134, 263-292.

Easterly, W., Islam, R. and Stiglitz, J. (2000) Explaining growth volatility, in Annual World Bank Conference on Development Economics 2000.

Ebeke, C. (2010) Remittances, value added tax and tax revenue in developing countries, CERDI Etudes et Documents, 2010:30.

Frankel, J. A. (2009) Are bilateral remittances countercyclical?, NBER Working Papers 15419, National Bureau of Economic Research, Inc.

Giuliano, P. and Ruiz-Arranz, M. (2009) Remittances, financial development, and growth, Journal of Development Economics, 90, 144-152.

Gupta, S., Pattillo, C. A. and Wagh, S. (2009) Effect of remittances on poverty and financial development in Sub-Saharan Africa, World Development, 37, 104-115.

Kapur, D. and Singer, D. (2006) Remittances and government spending, and the global Economy, in Annual Meeting, San Diego, CA.

Lueth, E. and Ruiz-Arranz, M. (2007) Are workers' remittances a hedge against macroeconomic shocks? The case of Sri Lanka, IMF Working Papers 07/22, International Monetary Fund.

Mendoza, E. (1997) Terms-of-trade uncertainty and economic growth, Journal of Development Economics, 54, 323-356.

Mohapatra, S., Joseph, G. and Ratha, D. (2009) Remittances and natural disasters: ex-post response and contribution to ex-ante preparedness, Policy Research Working Paper Series 4972, The World Bank.

Neagu, I. C. and Schiff, M. (2009) Remittance stability, cyclicality and stabilizing impact in developing countries, Policy Research Working Paper Series 5077, The World Bank.

Pradhan, G., Upadhyay, M. and Upadhyaya, K. (2008) Remittances and economic growth in developing countries, The European Journal of Development Research, 20, 497-506.

Ratha, D. (2005) Workers' remittances: an important and stable source of external development finance, Remittances: Development Impact and Future Prospects, p. 19.

Rodrik, D. (1998) Why do more open economies have bigger governments?, Journal of Political Economy, 106, 997-1032.

Roodman, D. (2009) A Note on the Theme of Too Many Instruments, Oxford Bulletin of Economics and Statistics, 71, 135-158.

Sayan, S. (2006) Business cycles and workers' remittances: How do migrant workers respond to cyclical movements of GDP at home?, IMF Working Papers 06/52, International Monetary Fund.

Shahbaz, M., Rehman, J. and Hussain, W. (2008) Does Foreign Remittances Reduce Government Spending? Long and Short Run Phenomenon, International Research Journal of Finance and Economics, 14.

Staiger, D. and Stock, J. (1997) Instrumental variables regression with weak instruments, Econometrica: Journal of the Econometric Society, 65, 557-586.

Talvi, E. and Vegh, C. (2005) Tax base variability and procyclical fiscal policy in developing countries, Journal of Development Economics, 78, 156-190.

Tornell, A. and Lane, P. (1999) The voracity effect, American Economic Review, 89, 22-46.

Williams, A. (2009) On the release of information by governments: Causes and consequences, Journal of Development Economics, 89, 124-138.

Windmeijer, F. (2005) A finite sample correction for the variance of linear efficient two-step GMM estimators, Journal of econometrics, 126, 25-51.

Yang, D. (2008) Coping with disaster: The impact of hurricanes on international financial flows, 1970-2002, Advances in Economic Analysis & Policy, 8, 1903-1903.

APPENDIX
Descriptive statistics and list of countries in the sample

Table A1. *Descriptive statistics*

Variables	Obs	Mean	Std-dev.	Minimum	Maximum
			Annual data		
Cyclicality of remittances	1910	2.62	13.94	-26.49	124.76
Terms of trade growth rate	1755	-0.01	0.13	-0.98	1.42
Lagged Gross domestic investment ratio	2350	20.83	7.65	-23.76	70.81
Remittance growth rate	1943	0.08	0.42	-3.24	3.89
GDP growth rate	2434	0.04	0.05	-0.70	0.33
Release of information by Governments	2405	0.58	0.13	0.08	0.86
Public investment ratio	1759	1.69	0.89	-5.33	4.55
Inflation rate	2306	4.76	0.32	4.48	10.11
Trade openness	2546	4.06	0.60	2.17	5.47
Financial development (M2 (% GDP))	2466	3.32	0.61	-0.09	9.31
			5-year averages		
Trade openness	536	4.07	0.59	2.37	5.36
Remittances per capita [a]	449	2.17	2.02	-2.91	6.35
Remittances (% GDP) [a]	442	1.05	0.88	0	4.40
Cyclicality of remittances	420	2.53	13.58	-26.30	108.05
Government consumption	536	2.79	0.49	0.76	4.11
Inflation [a]	484	4.76	0.27	4.57	7.73
Urban	544	3.53	0.60	1.26	4.53
Population	536	9.16	1.75	4.03	14.09
Dependency ratio	536	3.79	0.12	3.37	3.97
GDP per capita	536	8.04	0.81	6.40	9.86

Note : All the variables are expressed in their logarithmic form except the release of information index, natural disasters, remittance and GDP growth rates and the cyclicality of remittances.
[a] series expressed as the logarithm of 1+the original values of the series to deal with zeroes and negative values.

Table A2. *List of countries (67)*

Algeria	Dominican Republic	Lesotho	Philippines
Argentina	Ecuador	Madagascar	Rwanda
Bangladesh	Egypt	Malawi	Senegal
Benin	El Salvador	Malaysia	Seychelles
Bolivia	Ethiopia	Mali	South Africa
Botswana	Fiji	Mauritania	Sri Lanka
Brazil	Gabon	Mauritius	Sudan
Burkina Faso	Gambia	Mexico	Swaziland
Cameroon	Ghana	Morocco	Tanzania
Cape Verde	Guatemala	Mozambique	Thailand
Chile	Guinea	Namibia	Togo
China	Haiti	Nicaragua	Tunisia
Colombia	Honduras	Niger	Turkey
Comoros	India	Pakistan	Uganda
Congo, Rep.	Indonesia	Panama	Venezuela
Costa Rica	Jordan	Paraguay	Zimbabwe
Cote d'Ivoire	Kenya	Peru	