CENTRE D'ETUDES
ET DE RECHERCHES
SUR LE DEVELOPPEMENT
INTERNATIONAL

Document de travail de la série

**Etudes et Documents**

E 2012.10

# The Effect of Development Aid Unpredictability and Migrants' Remittances on Fiscal Consolidation in Developing Countries

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*March 2012*

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**ABSTRACT**

We use panel data on seventy-four developing countries for the period 1980–2007 to examine the effects of aid unpredictability and migrants' remittances on fiscal consolidation in these countries. Two definitions of fiscal adjustment are considered and a conditional logit model is used to perform the analysis. Evidence is shown that except for the case of low-income countries, remittances increase the likelihood of fiscal consolidation, be the latter gradual or rapid. Surprisingly, we observe that aid unpredictability, except in SSA countries where the effect is strongly positive and significant, does not affect the adoption of fiscal consolidation measures in all the groups considered.

## 1. INTRODUCTION

The issue of fiscal consolidation has been greatly explored in the empirical literature. The latter encompasses two main strands: the impact of fiscal consolidation measures on macroeconomic variables such as growth, investment, savings, etc., and the determinants of fiscal consolidation.

Whereas the first strand of this empirical literature has been explored well in relation to both developed and developing countries, the second strand, apart from certain scarce studies (such as Larvigne, 2010), has focused mainly on developed countries.

In 2000, the international community committed itself to achieving eight Millennium Development Goals (MDGs) by 2015.[1] The achievement of these goals requires a substantial transfer of resources (including for e.g. aid flows and migrants' remittances) to developing countries.

On one side, the substantial literature on the effects of workers' remittances has highlighted the welfare-enhancing benefits of remittances for the recipients' households, as well as their macroeconomic effects: remittances are said for example to reduce poverty rates (Adams, 2005; Gupta et al., 2009) and minimize the consumption volatility of transfer recipients through their compensatory nature (see for example Chami et al., 2003; Chami et al., 2009; IMF, 2005; World Bank, 2006); remittances are also said to increase consumption, expand the revenue base and thus allow the government to carry more debt or incur greater expenditure (Chami et al., 2006). In addition, remittances are said to exert a linear and direct effect on economic growth (for e.g. Chami et al.,2009b), and their effects could be positive on economic growth  conditioned upon some factors such as the quality of governance and the financial development (see for e.g. Catrinescu et al. (2009)).

On the other side, the international community has adopted the concept of the 'predictability of aid' through the Paris declaration (2005) of aid effectiveness in which donors committed to providing 'better aid' for the purpose of MDGs' attainment.[2] As highlighted by Celasun and Walliser (2008), 'more predictable aid would improve recipient countries' ability to plan for aid flows and allow them to more effectively execute the activities financed with such aid. Low predictability, by contrast, is costly by requiring adjustments to government consumption and investment plans with potential harmful effects on the objective attached to the spending of aid resources.'

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[1] See the complete list of Millenium Development Goals on the United Nations Millenium Development Goals website at: http://www.un.org/milleniumgoals/

[2] Particularly by halving extreme poverty by 2015.

The development aid flows' unpredictability is associated with reductions in government spending and/or increases in taxes (see for example Gemmell and McGillivray, 1998). According to Lensink and Morrissey (2000), aid uncertainty may negatively affect the impact of aid on economic growth. Pallage and Robe (2003) underscore that the lack of predictability due to aid delivered late compared with the original plans could at the same time be a source of pro-cyclicality, with aid flows arriving when the economic downturn is over and reinforcing economic cycles rather than dampening them, imposing costs on economic management and reducing welfare.

Meanwhile, evidence shows that OECD donors do not honour their aid commitments (see for example Bulir and Hamman, 2001, 2003, 2005; Celasun and Walliser, 2008). In addition, external and domestic shocks affecting remitters in their host countries (usually developed countries) can lead to a sudden and important decline in the remittances sent. In such circumstances, the public finances in developing countries could be severely affected and prompt the interested countries to adopt fiscal consolidation measures.

The main purpose of this study is to investigate the effect of external resource transfers on the decision of governments in developing countries to adopt fiscal austerity measures. In particular, we explore how migrants' remittances and the unpredictability of development aid affect the inclination of these governments' recipients to adopt fiscal adjustment measures.

The remainder of this paper is organized as follows. The next section reviews the literature on the fiscal consolidation issue. The following section presents our definitions of 'the episodes of fiscal consolidation in developing countries'. Next we elaborate the hypotheses to be tested, then we present the model to be estimated as well as the econometric technique. Subsequently, we present the data, evaluate the estimations' results and finally conclude.


## 2. REVIEW OF THE LITERATURE

There is a huge amount of literature on the macroeconomic consequences of fiscal consolidation (effects on growth, interest rates, real exchange rates, current accounts, savings, consumption, etc.) in both advanced and developing countries. However, among the few studies devoted to the determinants of fiscal adjustment, those that focus on developing countries are scarce. We summarize here the literature on the determinants of fiscal consolidation with a special focus on developing countries.

Adams and Bevan (2003) study the variations in the persistence of episodes of fiscal stability and conclude that: the OECD and developing countries on one side and middle-income and low-income countries on the other side differ significantly in terms of fiscal stance and the determinants of fiscal stability; in contrast to the conventional structural characteristics of the economies, the level of income plays a major role in explaining the persistence of fiscal stability; the ability of countries to maintain a sustainable fiscal stance is negatively affected by a history of poor fiscal management, with this legacy deteriorating rapidly for middle-income and OECD countries and not for low-income countries; fiscal stability is underpinned by revenue reforms rather than expenditure cuts, particularly for low-income countries.

Gupta et al. (2004) show evidence that the duration of fiscal adjustment episodes in developing countries is driven by the size of fiscal adjustment, economic growth, the composition of expenditure and past performance in fiscal consolidation. In addition, the availability of external financing is found to reduce the probability of continuing fiscal consolidation.

Gupta et al. (2005) conclude from a study on twenty-five emerging market countries that the legacy of previous fiscal failures, the size of the fiscal deficit, the composition of spending and the level of total revenue are the main determinants of the probability of a fiscal adjustment ending; the persistence of fiscal adjustments is affected by the initial debt stock, the exchange rate developments, inflation and the unemployment rate.

Mierau et al. (2007) explore the political determinants of fiscal consolidation in a sample of twenty OECD countries over the period 1970–2003. They make a distinction between rapid (in reference to Von Hagen et al.'s (2001) definition of fiscal adjustment) and gradual adjustments (in reference to Heylen and Everaert's (2000) definition of fiscal consolidation). They find that both gradual and rapid fiscal adjustments are driven by the initial budgetary situation (captured by the structural budget deficit and the debt-to-GDP ratio) as well as broad policy reform. Regarding the economic state, only gradual adjustments are affected by inflation.

Thornton and Mati (2008) use two definitions of fiscal consolidation to investigate the influence of the exchange rate on the success of fiscal consolidation in twenty-three emerging market economies. Their empirical results suggest that exchange rate depreciation significantly raises the probability of a fiscal consolidation being successful in these countries, when controlling for debt, economic growth, the composition of the consolidation and the degree of democracy.

Larvigne (2010), in contrast to the previously quoted studies, examines not only the political and institutional determinants of fiscal adjustments (called 'adjustment status'), but also those of the adjustments' need. In other words, his study aims at determining the role of political and institutional factors that explain why countries become fiscally distressed, why some fiscally consolidate when required and why others are unable to adjust despite an evident need to do so. He finds evidence that budgetary institutions play a key role in fiscal adjustment situations in developed countries: fiscal rules help avoid situations of fiscal distress whereas fiscal performance management systems improve the odds of implementing adjustments. Regarding developing countries, it is mainly the institutional quality that matters for fiscal adjustment need and status: whereas strong scores of broad measures of institutional quality (e.g. rule of law indices) help avoid fiscal distress situations in certain countries, weaker scores in other countries induce the latter to implement large fiscal adjustments.

The next section explains how we identify episodes of fiscal consolidation in our sample of developing countries.

## 3. EPISODES OF FISCAL CONSOLIDATION IN DEVELOPING COUNTRIES

In this study, the fiscal consolidation variable used is a binary variable that identifies the years in which a fiscal adjustment occurs in a developing country. This variable takes the value of '1' if there is a fiscal adjustment in a particular year and '0' otherwise.

In the empirical literature of budget deficits, there is no consensus upon the criteria to be used to identify fiscal adjustment years. Adam and Bevan (2003) usefully distinguish two approaches in the existing work: the *level approach*, which ex ante defines a specific threshold and considers all countries that have a deficit smaller than this value to be consolidating, and the *gradient approach*, which evaluates the yearly change in the deficit and considers all countries whose deficit decreases by more than a certain threshold to be in a period of fiscal consolidation. Our study is in the vein of the second approach and we consider here two definitions of fiscal adjustment.

The first is proposed by Alesina and Ardagna (2010) and is also used for example in Alesina and Ardagna (1998), Alesina and Perotti (1995, 1997a, 1998) and Ardagna (2007): 'A period of fiscal adjustment is a year in which the cyclically adjusted primary balance improves by at least 1.5 percent of GDP.' This definition captures rapid, though large adjustments.

The second definition is from Heylen and Everaert (2000) and captures gradual fiscal adjustment: 'A period of fiscal adjustment is any period starting with an improvement in the budget balance by at least 0.25% points in the first year, a minimum duration of 2 years and a total improvement of the budget balance by at least 2% points.'

To identify the fiscal consolidation episodes, the common practice in the empirical literature is to use a measure of the structural fiscal balances in relation to GDP, i.e. to abstract the business cycle influences from the fiscal balances. However, regarding developing countries, these business cycles' influences remain weak because automatic fiscal stabilizers have a small size and are much less effective (see e.g. Balassone and Kumar (2007) for sub-Saharan African countries and Thornton and Mati (2008) for emerging market economies). This is why Thornton and Mati (2008) define fiscal consolidation episodes with respect to changes in the unadjusted primary balance and control for business cycle effects in their regression analysis. In this study, we follow that approach.

It is worth mentioning that although the two definitions of fiscal consolidation used here partly overlap, they are not identical. These definitions are applied to a sample of seventy-four developing countries spanning the period 1980–2007. The panel data thus obtained are unbalanced, with the shortest time period being T=7 years and the longest, T=27.

Appendix 1 displays the set of all the fiscal adjustment years identified. For the first definition of fiscal consolidation (that of Alesina and Ardagna, 2010), we identify a total of 457 years of fiscal adjustment over 1980–2007 (representing 27.76 per cent of the total number of observations), whereas the total is 547 years (representing 33.23 per cent of the total number of observations) for the second definition. We also identify 346 episodes for rapid and gradual adjustments occurring in exactly the same years. Among all the episodes, 111 occur with the first definition without occurring with the second definition and 201 occur with the second one without occurring with the first one.

## 4. HYPOTHESES TO BE TESTED

In this part, we present and discuss the different hypotheses to be tested.

### 4.1 Hypothesis 1: Effect of Remittances

Remittances, by allowing higher levels of consumption and borrowing, can induce governments to take advantage of the fiscal space afforded by them. Therefore, they may reduce the incentives of governments to maintain fiscal policy discipline (Chami et al., 2008). Accordingly, the higher the migrants' remittances, the higher the likelihood of the governments engaging in excessive deficits and thus adopting fiscal adjustment measures in order to signal to the financial markets (investors) or other lenders (such as international financial institutions and bilateral donors) that their public finances are on a sustainable path. On the other hand, Chami et al. (2008) stress that remittances, even if not taxed directly, may indirectly increase the government's revenue from consumption and trade-based taxation (because they contribute to higher consumption levels of domestic and imported goods). Furthermore, the tax structures in place in the remittance-receiving countries play an important role in the strength of this channel (see Gordon and Li, 2006). Therefore, we can also infer that migrants' remittances, by increasing the tax base for a given level of government spending, will be likely to reduce the likelihood of fiscal adjustment. We introduce this variable with one-year lagged values to avoid the bias induced by the simultaneity between the fiscal adjustment and the remittance variables.

### 4.2 Hypothesis 2: Effect of Unpredictability of Development Aid Inflows

The concepts of 'aid unpredictability' and 'aid volatility' are closely related and often used interchangeably in the empirical literature. In this paper, we make a distinction between them. Following Bulir and Hamann (2001, 2003, 2005) and Celasun and Walliser (2008), we define the predictability of aid flows as the situation in which recipients can be confident about the amount and timing of aid disbursements. Conversely, aid is said to be volatile if it moves up and down significantly between two time periods.

Low predictability may result in more volatile aid, and aid could simultaneously be volatile and predictable since volatile aid disbursements can in part mirror the lumpiness of the spending of large investment projects (Celasun and Walliser, 2008). Moreover, Gemmell and McGillivray (1998) stress that unpredicted shortfalls in aid inflows are followed by

reductions in government spending and/or increases in taxes. According to Foster (2003), the direct costs of a shortfall in aid depend on the link between aid finance and specific expenditures. If aid is paying for the local provision of goods and services, a shortfall will cause the government to have a tighter fiscal policy.

Overall, these developments allow us to expect aid flow unpredictability to be associated with fiscal adjustment in recipient countries.

### 4.3 Hypothesis 3: Effect of Development Aid Inflows

Irrespective of the effects of aid unpredictability, we also expect the development aid inflows to affect the likelihood of fiscal retrenchment in developing countries through their effects on government revenues. These effects can be either positive or negative, depending on whether the aid flows serve to increase the tax revenues and government spending or decrease them.

However, there is no consensus in the empirical literature regarding the aid effect on tax revenue. Aid inflows can increase the government revenue through the improvement of customs and tax administration in developing countries (see for example Chambas et al., 2008). Moreover, by improving the efficiency of public spending, aid could lead to an increase in public services supply and thus reinforce the tax civism (Chambas et al., 2008).

At the same time, when receiving aid flows, recipient governments of developing countries can compare the social costs of each category of resources. Thus, an important flow of aid could reduce the tax effort of governments (Kaldor, 1963). However, if the macroeconomic associated costs of a surge of aid inflows are high, then the tax effort is likely to increase (Chambas et al., 2008).

In addition, Azam et al. (1999) provide evidence that the low quality of institutions is likely to exacerbate the negative effect of aid flows on tax revenues. Chambas et al. (2008) also highlight that aid inflows can affect tax revenues negatively through the low quality of government spending.

Summing up, the effects of aid on government revenue in developing countries remain uncertain. Accordingly, these effects on the decision to adjust the government budget or not are ambiguous. To avoid simultaneous bias, we also introduce here this variable with a one-year lagged value into our model.

### 4.4 Hypothesis 4: Effect of the Real Exchange Rate

The purpose of fiscal retrenchment to eliminate a current account deficit may result in domestic problems such as unemployment and low growth. Thus, fiscal stabilization may need to be accompanied by policies that achieve real exchange rate depreciation.

The effect of the real exchange rate depreciation may be either positive or negative on the fiscal balance, and thus on the decision to consolidate the budget, depending on the structure of the budget. One can also expect fiscal stabilization measures to affect the real exchange rate, although the specific effects in terms of appreciation or depreciation are likely to reflect the underlying economic situations. More particularly, developing countries characterized by limited capital flows tend to monetize fiscal deficits to a much greater extent than industrial countries. Consequently, fiscal consolidation (expansion) is much more unambiguously likely to lead to exchange rate appreciation (depreciation), even in the short run.

To avoid reverse causality from the fiscal consolidation to the real exchange rate, we introduce the one-year lagged values of the variable 'real effective exchange rate' into the model.

### 4.5 Hypothesis 5: Effect of the Primary Budget Deficit and Debt

These two variables reflect the need to adjust since there is no reason to adjust in the absence of an adverse fiscal position. We expect, all other things being equal, that the higher the primary budget deficit or the debt accumulated, the higher the likelihood of fiscal adjustment.

### 4.6 Hypothesis 6: Effect of Inflation

Monetary easing, by increasing inflation, can induce budget deficits and thus increase the likelihood of fiscal adjustments, as a result of the inter-relationship exists between fiscal policies and monetary policies (Mélitz, 1997; Wyplosz, 1999). Furthermore, the policy mix between the two significantly affects the level of output, prices and interest rates in the economy. Mélitz (1997) and Wyplosz (1999) provide evidence that the fiscal policy tends to relax when the monetary policy tightens, for several reasons:

- a fiscal expansion will compensate for the contraction effect on output induced by monetary tightening;

- high interest rates induced by monetary policy tightening can make new public debt titles more attractive to private investors. Thus, obtaining private financing of public works becomes easier for the government.

In the same vein, Von Hagen et al. (2001) show that monetary policy easing in year t increases the likelihood of starting a fiscal consolidation in year t+1. Therefore, we introduce the variable 'inflation' with one-year lagged values into the model.

### 4.7 Hypothesis 7: Effect of the GDP Growth and the Economic Cycle

Following the empirical literature, we expect fiscal adjustment to take place under favourable economic conditions like high GDP growth. Once again, to avoid the simultaneity effect, we include the GDP growth variable with one-year lagged values.

The distance between the actual output and its potential level (output gap) is also an important determinant of timing fiscal adjustments. Indeed, the economic cycle may affect the budget on both the revenue side and the expenditure side. For example, during economic booms, public revenue increases as the tax revenue rises, firms will increase their profits, more employment will be created and unemployment subsidies charges will be reduced for the state. By contrast, in an economic downturn, exactly the opposite effects will transpire. This explains why adjustments tend to occur when the economy is in expansion, and rarely take place during recessions. Accordingly, we follow Von Hagen et al. (2001), who stress that a large output gap increases the likelihood of fiscal adjustments being started, but reduces the likelihood of the consolidation being long-lasting. However, as mentioned in the previous section, the empirical literature documents that the effect of the economic cycle on the budget deficit through automatic stabilizers is more important in developed countries than in developing ones.

Summing up, we expect the output gap to exert a positive effect on the two types of fiscal consolidation measures.

Note that we follow Larvigne (2010) in including the output gap in addition to the GDP growth (as we do not adjust the primary deficit for the economic cycle) in our model. This is justified by the fact that the GDP growth may have indirect effects on the prospects for fiscal consolidation (e.g. it may be easier to bear the political cost of adjustment when growth is strong; see Annett, 2002).

### 4.8 Hypothesis 8: Effect of IMF Programmes

IMF programmes may have some beneficial impacts on the attempts to make fiscal efforts (Larvigne, 2010). Indeed, the IMF stabilization programme, i.e. the IMF balance of payments assistance and conditionality, could have provided incentives to countries that are subject to them to undertake a fiscal consolidation episode. Thus, we expect a positive effect of IMF programmes on the decision to adjust the fiscal position in developing countries.

### 4.9 Hypothesis 9: Effect of Institutional Quality and Democracy

*Effect of Institutional Quality*

The overall quality of institutions plays a key role in conducting fiscal policy: a high institution quality could foster a more efficient public sector and minimize corruption, translating into a better use of revenues and increased tax collection. Furthermore, Lane and Tornell (1999) explain that 'strong institutions can also guard against fiscal policy failing vested interests'. The indicator of institutional quality used in this paper is the 'rule of law'. The latter captures the institutions that manage public resources and provide a framework for the organization of private activity. This aggregate measure evaluates the system of laws, conventions and behaviour that support market economies, encourage investment and protect public goods (see for example Larvigne 2010). Therefore, good institutional quality is expected to reduce the probability of fiscal adjustment in developing countries.

*Democratic Accountability*

This variable captures the responsiveness of a government to its people. According to Larvigne (2010), the net effect of the quality of democratic institutions on fiscal consolidation is uncertain. He explains this uncertainty by the fact that whereas certain democracies can elect fiscal reformers, there could be instances in which open and consultative democratic regimes fail to form the consensus required for a prolonged fiscal adjustment. Similarly, the absence of opposition may facilitate the implementation of emergency fiscal measures.

## 5. MODEL SPECIFICATION AND ECONOMETRIC TECHNIQUE

In this section, we formulate the model that will be estimated empirically. As there is no theoretical model or unified framework that deals with the economic and political determinants of fiscal adjustments, we follow the strategy adopted by Mierau et al. (2007), who, instead of focusing on a particular theory, explore a wide range of explanatory variables.

However, as our principal variables of interest are 'aid unpredictability' and 'migrants' transfers', we focus mainly on those control variables that may affect either one of our interest variables, or both of them.

### 5.1 Description of the Model and the Econometric Technique

We probe the following structural model:

$$y_{it}^* = x_{it}^{'}\beta + \varepsilon_{it}, \qquad\qquad (1)$$

$y_{it} = 1$ if $y_{it}^* > 0$, and $y_{it} = 0$ if $y_{it}^* <= 0$

where i = 1,…n denotes the country index and t = 1,…, $T_i$ denotes the period (year) index; $y_{it}$ represents the adjustment status: $y_{it} = 1$ if in country i in year t the government decides to adopt fiscal consolidation measures; $y_{it} = 0$, otherwise. $x_{it}$ is the vector of the explanatory variables that are included in the model and $\varepsilon_{it}$ is an error term.

Drawing from the empirical literature, these variables include those of which the tested hypotheses were previously discussed: the output gap; a measure of aid unpredictability; migrants' transfers (remittances); net aid disbursements; the real effective exchange rate; the primary budget deficit; the public debt stock; inflation; the annual GDP growth; an index of rule of law; and an index of democratic accountability.

Several empirical studies (for example Larvigne, 2010) use the pooled logit or probit technique to estimate this kind of model. In this paper, we implement panel data techniques to perform our analysis. These techniques allow us to control for the presence of country-specific effects in order to avoid biased estimates.

That said, we turn now to the assumptions made regarding the error term. According to the econometric literature, we have two options:

- either a random-effects model: in this case, $\varepsilon_{it} = v_{it} + \mu_i$, where $v_{it}$ and $\mu_i$ are independent random variables; $v_{it} \to N(0, \sigma_v^2 = 1)$ and $\mu_i \to N(0, \sigma_\mu^2)$,

- or a model of fixed effects where $\varepsilon_{it} = v_{it} + \alpha_i * d_{it}$ and $d_{it}$ is a dummy variable that takes the value 1 for individual i in period t, and 0 otherwise.

The most decisive factor in the choice of one of these options is the relationship between $v_{it}$ and $\mu_i$: in the absence of a correlation between $v_{it}$ and $\mu_i$, we should opt for the random effects. However, if $v_{it}$ and $\mu_i$ are correlated, then the better option is the fixed effects model.

In this study, we choose to use the fixed-effects model for the following reasons: although all of the developing countries could not be selected in our sample for data unavailability reasons, each country in the sample has its own economic, political and institutional characteristics that are likely to be correlated with the explanatory variables of the model. Therefore, there is a high probability of $\mu_i$ being correlated with the covariates.

Since we opt for the model with fixed effects, the other issue is to choose between the unconditional fixed-effects estimator and the conditional fixed-effects estimator. Using the

traditional unconditional fixed-effects estimator can pose certain statistical problems. In fact, applying the least squares dummy variable estimator (as in a linear panel) to this model with a binary dependent variable leads to inconsistent estimation of $\beta$ in the logit model, unless $T \to \infty$. As $T_i$ is fixed in our model, the estimators of $\beta$ are not consistent: this is known as the 'incidental parameters problem', which is more severe in the cases in which $T_i$ is small.

Chamberlain (1980) provides evidence that it is not impossible to estimate the parameters of this discrete-choice model consistently and proposes conditional logit estimation. The idea of this approach consists of conditioning the likelihood function on a minimum sufficient statistic for $\alpha_i$ (the fixed effects). This helps avoid the incidental parameter problem. More particularly, Chamberlain (1980) argues that $S_i = \sum_{t=1}^{T_i} y_{it}$ is the suggested minimal sufficient statistic for a fixed-effects model, which in our case is the number of years of fiscal adjustments per country. Like the modelization of standard fixed effects, the conditional fixed-effects logit model focuses on the variation in the data observed within countries (Baltagi, 2005). It is worth noting that whereas sufficient statistics are available for the logit model, they are not available for the probit model; this is the main reason for our choice of the conditional logit model.

The econometric technique of consistent estimate, which eliminates the $\alpha_i$ from the estimation equation, is the conditional maximum likelihood estimator (MLE). The latter is based on a log density for the ith individual who conditions on $S_i = \sum_{t=1}^{T_i} y_{it}$, the total number of outcomes $y_{it}$ equal to 1 for a given individual over time. Hence, the conditional likelihood function can be written as follows:

$$L^c = \prod_{i=1}^{n} \frac{e^{\sum_{t=1}^{T_i} y_{it} x_{it}' \beta}}{\sum_{\sum_t d_{it} = S_i} e^{\sum_{i=1}^{T_i} d_{it} x_{it}' \beta}}$$

The maximization of this equation, now free of the incidental parameters $\alpha_i$, can be performed by the conventional methods.

### 5.2 The Temporal Dependence Issue

A concern when dealing with the binary time-series cross-section (BTSC) is modelling the temporal dependence (Beck et al., 1998), as ordinary logit or probit models may result in overly high inferences (too high t-statistics).

Beck et al. (1998) give evidence that panel logit data are identical to grouped duration data and suggest dealing with this problem by adding a series of dummy variables to the model. These dummies should capture the number of years since the previous occurrence of an 'event' (here, a fiscal adjustment). However, this solution has the drawback of leading to an important loss of degrees of freedom (due to the large number of dummy variables). Thus, Beck et al. (1998) propose as an alternative solution replacing the dummy variables with a smooth function based on cubic splines.

In this paper, we follow Beck et al.'s (1998) suggestion and include the smooth function based on cubic splines in our model. Moreover, we follow another suggestion of Beck et al. (1998) and add another variable that captures the number of fiscal adjustments in the past (see also Mierau et al. (2007), who adopt the same procedure). This latter addition is justified by the fact that standard logit models assume the adjustments to be independent from one another, an argument that is obviously not true (Mierau et al., 2007).

### 6. THE DATA

In this section, we discuss the measures of our principal variables of interest: the unpredictability of aid inflows and migrants' remittances. The explanatory variables quoted above are described in table 3.

### 6.1 Measuring the Unpredictability of Aid Inflows

Bulir and Hamann (2001, 2006) argue that aid commitments tend to be used in budgetary exercises in recipient countries, mainly as a result of pressures from donors. Bulir and Hamann (2001, 2003, 2006) find evidence that commitments systematically exceed disbursements and that aid cannot be predicted reliably on the basis of commitments: aid commitments are a poor predictor of aid receipts and incorporating the predicted aid inflows into fiscal planning can be costly. Furthermore, they observe that several episodes of spikes in commitments were not generally followed by increased disbursements.

Vargas Hill (2005), also conclude that aid is unpredictable for many countries of her sample of least developed countries (as well as volatile – though we are not dealing with this

issue here): commitments nearly always exceed actual disbursements and commitments are a poor indication of what the actual disbursements will be. Pallage and Robe (2001) document empirical regularities in the foreign aid flows to developing countries. Among other results, they observe that 'commitments for all sources are typically larger than disbursements'. The authors explain commitments always exceeding disbursements by the fact that disbursements are net of possible principal repayments, whereas gross commitments are not.

Celasun and Walliser (2008) also observe evidence that on average, many aid recipient countries receive aid disbursements that exceed their aid commitments. This finding contrasts with the general belief that donors rarely keep their aid promises and systematically disburse less than they commit. Especially, it contrasts with the results obtained by Bulir and Hamann (2001, 2006) and Pallage and Robe (2001). In this paper, we construct our measure of aid unpredictability by relying upon a forecasting equation.

*The Measure of Unpredictability of Aid Inflows*

Our measure of aid inflows' unpredictability refers to Lensink and Morrissey (2000). The authors, in examining the impact of aid uncertainty on growth in a sample of seventy-six countries over the period 1970–1995, propose a measure of unanticipated or unexpected instability of aid inflows. Lensink and Morrissey (2000: 8) posit that 'governments (recipients of aid) have some forms of adaptative expectations. Aid commitments are generally known in advance, and one could expect a degree of continuity in donor-recipient relations. In addition, recipients exercise some control over the disbursement of aid funds. Thus, knowing past values of aid inflows, recipients should be able to anticipate some variability in aid. Accordingly, one of their measures of 'uncertainty' is captured by the use of the following forecasting equation:

$$A_t = \alpha_0 + \alpha_1 T + \alpha_2 A_{t-1} + \alpha_3 A_{t-2} + e_t \qquad (2)$$

where $A_t$ is the development aid as a percentage of GDP, T is a time trend and $e_t$ is an error term with standard properties. According to the authors themselves, this forecasting equation is estimated in order to determine the expected component of the variable under consideration. Typically, this forecasting equation is specified as a second-order autoregressive process, extended with a time trend.

More precisely, the uncertainty in aid inflows is measured by Lensink and Morrissey (2000) as the standard deviation of the residuals from the forecasting equation. In our study, we adopt an approach that differs slightly from that of Lensink and Morrissey (2000): instead of using the standard deviation of the residuals from the forecasting equation (which captures

the volatility of aid inflows), we use the residuals from it. Thus, residual terms computed for each country of our sample from the forecasting equation are considered as the unanticipated aid inflows or unpredictability of aid receipts.

### 6.2 Measuring the Remittances

Since our second interest variable is the migrants' remittances, its measure matters for our estimation results. The discussion here is based on Chami et al. (2008). Remittances are defined in the empirical literature (see for example Dilip Ratha, 2003) as 'unrequited, non-market personal transfers between households across countries'. When compiling statistics on the balance of payments, three components of remittances are taken into account: workers' remittances, employees' compensation and migrants' transfers (see Chami et al., 2008 for more details).

As highlighted by Chami et al. (2008), when studying the macroeconomic effects of remittances, the choice of the measurement of remittances is important. According to them, among these three categories of remittances, workers' remittances conform most closely to the notion that researchers and policymakers have in mind when discussing remittance flows. The authors criticize the common practice in the empirical literature of summing the three categories when compiling statistics on remittances and provide evidence that the data series on workers' remittances (the series in the World Bank Development Indicators (WBDI) that best reflect the behavioural aspects that are trying to be captured) should be used when conducting any econometric or statistical analysis and drawing conclusions regarding remittance behaviour.

Therefore, we follow Chami et al. (2008) and choose 'the workers' remittances' as our main remittance variable. We scale it by the gross domestic product. However, due to the lack of data on this variable for many countries, we also use 'the remittances'[3] that sum the three components described above. This allows us to compare the results and to draw our conclusions with regard to the effects of these variables on the inclination of governments to adjust the fiscal imbalances.

## 7.  EVALUATION OF THE RESULTS

In this section, we present and analyze the empirical results obtained from the estimations of our conditional logit model. This analysis will primarily focus on our variables of interest

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[3] Note that these two variables exhibit the same trend over our period of study.

(namely, the unpredictability of aid and the migrants' remittances), although we will also analyse the results obtained from the control variables.

The estimations are performed using our two measures of fiscal consolidation (FCAlesina and FCHeylen) on different types of samples: the full sample of developing countries and three sub-samples: low-income countries (LICs), sub-Saharan African countries (SSA) and Zone Franc countries. Note that the classification of these groups of countries is based on the World Bank's classification.

Before proceeding with the interpretation of our results, we find it useful to mention that as our model is a conditional logit one in which fixed or individual effects are not eliminated, it will not be possible for us to compute the marginal effects. This is why we opt for another way of intuitively interpreting these results: the use of an odds ratio analysis.

From equation (2), the probability of an occurrence of fiscal consolidation to the probability of a non-fiscal consolidation is given by $e^{x'\beta}$. The differentiation of this expression with respect to any of the regressors ($x_k$) leads us to obtain $e^{\beta_k}$. The meaning of this is: for any unitary change in $x_k$, the odds will change by a factor of $e^{\beta_k}$, holding all other variables constant.

In table 1, we report the estimation results when using as our dependent variable the definition of fiscal adjustment based on Alesina and Ardagna (2010) (that is, rapid fiscal adjustments – FCAlesina). In table 2, we display the estimation results when we use gradual fiscal adjustments as our dependent variable (the definition of fiscal consolidation based on Heylen and Everaert (2000) – FCHeylen).

In each of these tables, we present the outcomes obtained when using each of the two variables of migrants' remittances. Recall that following the suggestion of Beck et al. (1998), we introduce into our model a variable reflecting the number of prior adjustments and the variables capturing the duration dependence (three splines variables and a variable measuring the number of years (the time) since the last adjustment).

In table 1, the student test for the individual duration dependence variables and the joint F-test on these variables suggest the absence of significance at the 10 per cent level. Accordingly, we can infer that there is no duration dependence in the decision made by developing countries (as well as the full sample and the sub-samples) to adopt rapid fiscal adjustment measures. By contrast, the same tests in table 2 reveal the presence of significant duration dependence of the inclination of developing countries (the full sample and the sub-samples) to adopt gradual fiscal austerity measures.

In both the tables, the coefficient of the variable indicating the number of prior adjustments is negative and almost always highly significant. This suggests that the higher the number of previous adjustments (rapid/gradual), the lower the inclination of a government in developing countries to adopt rapid/gradual fiscal adjustment measures.

Let us turn now to the interpretation of our estimation results' coefficients.

Notice that in each of the two tables, the results obtained for our two remittances' variables (wrgdp and remitgdp) are to a large extent similar. For that reason, we will rely only on the results obtained for the variables 'wrgdp', that is, those of the workers' remittances, expressed as a percentage of GDP.

Consider first the full sample of developing countries. Our results from tables 1 and 2 suggest that workers' remittances increase the probability of both rapid and gradual fiscal adjustments in developing countries. This result confirms our hypotheses that more remittances, by allowing greater fiscal space in year t-1, lead governments to relax fiscal discipline and make unavoidable fiscal adjustment in year t. The unpredictability of aid inflows appears to exert no significant effect on the likelihood of both rapid and gradual fiscal adjustments. What about our sub-samples' results?

We find evidence of no significant impact of both migrants' remittances and aid unpredictability on the inclination of governments in LICs to adopt rapid fiscal adjustment measures. By contrast, the inclination of governments in low-income countries to adopt gradual fiscal consolidation measures is positively driven by both migrants' remittances and aid unpredictability: the higher the migrants' remittances in year t-1, the higher the likelihood of LICs adopting gradual fiscal retrenchment measures in year t. These results are not surprising because all of these countries are highly dependent on aid flows and remittances for their budgets.

Regarding SSA countries, both workers' remittances and aid unpredictability exert a strong positive impact on the probability of governments opting for rapid fiscal adjustments. These results are once again not surprising because, as mentioned above, almost all of these countries are highly dependent on aid flows and remittances for their budgets. The same results are obtained for the group of Zone Franc countries, except that for this group, the impact of the unpredictability of aid inflows on the decision of rapid fiscal adjustment is insignificant. Turning to gradual fiscal consolidation measures, we obtain for SSA and Zone Franc countries a positive and significant effect for the remittances variable, but no significant impact for the aid unpredictability variable.

Overall, the positive effect of migrants' remittances on the likelihood of fiscal adjustment raises the issue of the good management of government budgets in developing countries during the periods of increases of these transfers. While it has been shown that these transfers exert positive effects on economic growth and reduce poverty rates in developing countries, it should advisable for the governments of these countries to manage these resource inflows better during the periods of their increases in order to have a manoeuvre in bad times for implementing countercyclical fiscal policies when these resources are drying up.

Regarding aid unpredictability, we find that it is positively and significantly related to the decision (be it gradual or rapid) to adjust fiscal imbalances. This is in accord with our hypothesis.

What about the control variables now?

Whichever group of countries is considered (the group of developing countries, the LICs, the SSA and the Zone Franc countries' groups), the net aid disbursements appear to affect the occurrence of rapid fiscal adjustments negatively. The effect is statistically insignificant for the other groups of countries. In addition, the net aid disbursements (in per cent of GDP) exert a negative impact on the likelihood of gradual fiscal adjustments in all the groups, except for the Zone Franc countries, where the impact is statistically insignificant.

For all the groups of countries, an increase in the budget deficit induces a higher probability of both gradual and rapid fiscal adjustments. However, the effect of the other budgetary variable (namely the stock of public debt) appears to be mixed among the different groups of countries: whereas the public debt appears to exert no significant effect on rapid fiscal consolidation measures in the groups of developing countries and LICs, its effect is as expected positive and significant in Zone Franc countries but surprisingly negative in SSA countries. Conversely, for gradual fiscal adjustments, the stock of public debt does not significantly affect the decision to consolidate the budget in any of these groups of countries.

As expected, the economic cycle (output gap) does not affect the likelihood of fiscal consolidation (be it gradual or rapid) in any of our groups of countries. This confirms our hypothesis that fiscal variables (namely government spending and revenue) do not respond significantly to business cycles in developing countries.

When considering the group of all the developing countries, we observe evidence that the economic situation captured through the GDP growth and the inflation does not affect the likelihood of fiscal adjustment, be it gradual or rapid. Conversely, inflation affects positively and significantly (though at the 10 per cent level of significance) the likelihood of gradual fiscal adjustment measures in SSA countries, with no significant effect for the other groups.

For the GDP growth variable, we find no significant effect for any of the groups of countries. Regarding rapid fiscal adjustment decisions, it is only in LICs and Zone Franc countries that we obtain significant effects: inflation exerts a positive effect in LICs, and GDP growth exerts a positive effect in Zone Franc countries.

As expected, real exchange rate (REER) depreciation increases the probability of rapid fiscal consolidation in the groups of developing countries and SSA. However, the effect of this variable is not statistically significant for LICs and Zone Franc countries. Regarding the gradual fiscal consolidation, as expected theoretically, REER depreciation decreases the likelihood of its occurrence.

We observe evidence that IMF programs do not affect the probability of fiscal consolidation (be it gradual or rapid) in the groups of developing countries, LICs, SSA and Zone Franc countries.[4]

The decision of governments to consolidate the budget or not (irrespective of its rapid or gradual nature) does not depend on the responsiveness of governments to their people in developing countries and SSA countries. However, in LICs and Zone Franc countries, democratic accountability affects positively (though at the 10 per cent level of significance for the group of Zone Franc countries) the likelihood of both gradual and rapid fiscal adjustments. An explanation for these surprising positive effects is that the more responsive a government is to its people in these two groups of countries (the higher the score of democratic accountability), the higher will be its inclination to adopt fiscal retrenchment measures to put its public finances on a sustainable path if in the previous year it has adopted fiscal profligacy measures.

Recall that our measure of institutional quality tries to reflect the efficiency of the public sector in which strong institutions are likely to foster higher revenue for a given tax system and in which the power of rent-seeking vested interests that have a stake in impeding fiscal adjustment diminishes. Accordingly, if the rule of law is a good proxy for the institutional quality, our results suggest the absence of a significant effect of strong institutions on the probability of implementing gradual fiscal consolidation measures in all the groups of countries. Whilst, as expected, rapid fiscal adjustment measures are driven by lower quality of institutions in LICs and SSA, we find that in the groups of developing countries and SSA

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[4] Note that we observe slightly different results when we use 'remitgdp' as our remittances variable. However, as our main variable of interest is workers' remittances (that is, 'wrgdp'), we rely on it for the interpretation of the results.

countries, the quality of institutions does not play a significant role in explaining rapid fiscal adjustments.

## 8. CONCLUSION

This paper examines the impact of migrants' remittances and the unpredictability of aid flows on the inclination of governments in developing countries to adopt fiscal adjustment measures. The study is conducted over the period of 1980–2007 and on a sample of seventy-four developing countries as well as on three sub-samples: low-income countries, sub-Saharan African countries and Zone Franc countries.

After controlling for several variables in a conditional logit model, our results suggest that migrants' remittances increase the likelihood of fiscal consolidation, be the latter gradual or rapid. This result remains valid for the different sub-samples analysed in this paper, except for low-income countries, for which we observe no effect of remittances on the decision to consolidate the budget rapidly. This result suggests that despite the well-known positive macroeconomic effects of remittances, the rise of the latter appears to lead governments' recipients in developing countries to adopt fiscal profligacy measures and to consolidate their budgets further. Better management of the revenues derived from these private transfers during their booms could help avoid such situations and allow greater room for manoeuvre for governments' recipients to implement countercyclical measures during bad times.

Unexpectedly, we find that the unpredictability of aid inflows, except in SSA countries where the effect is strongly positive and significant, does not affect the adoption of fiscal consolidation measures in all the groups considered.

Celasun and Walliser (2008), to solve the persistence of aid predictability problems, suggest reconsidering the mechanisms of aid delivery to developing countries. One possible way, as discussed by Eifert and Gelb, is to lengthen the aid allocation periods and tie them to slower-moving country indicators rather than reconsidering fast-disturbing aid volumes annually within annual conditional frameworks. They particularly suggest committing annual budget aid disbursements over a long-term period as long as the indicator for the broad country framework, such as the Country Policy and Institutional Assessment (CPIA) of the World Bank, remains stable within a given range. An extension of this study could be to explore theoretically the different mechanisms through which developing countries (especially those of SSA) on one side could manage their remittances to avoid negative

effects on their budgets and thus their spending plans, and on the other for developed countries to reconsider their mechanisms of aid delivery to make it more predictable.

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## APPENDICES AND TABLES

*Appendix1: The Periods of Fiscal Adjustments in developing countries*

| Country | Rapid Adjustments | Gradual Adjustments |
|---|---|---|
| Albania | 94-95; 98-00; 03;05-06 | 94-95; 98-00; 02-07 |
| Algeria | 91 ; 95-96 ; 99-00 ; 03 ; 05-06 | 94-97 ; 99-00 ; 05-06 |
| Argentina | 86 ; 90-91; 96 ; 01 ; 03-04 | 90-91 ; 00-01 ; 03-05 |
| Armenia | 96 ; 98-99 ; 01-02 ; 07 | 98-99 ; 01-02 |
| Bangladesh | 89 | - |
| Belarus | 96-97 ; 01 ; 03-07 | 96-97 ; 01-07 |
| Bolivia | 85-86 ; 90 ; 04-06 | 85-86 ; 89-92 ; 94-95 ; 97-98 ; 04-06 |
| Botswana | 82-85 ; 88 ; 90 ; 95-96 ; 00 ; 06 | 82-85 ; 95-96 ; 05-06 |
| Brazil | 81 ; 83 ; 85 ; 87 ; 89-90 ; 92-94 ; 98 | 81-83 ; 89-90 ; 92-95 ; 98-02 |
| Burkina Faso | 84-85 ; 90-91 ; 96-97 ; 99 ; 03 ; 07 | 84-85 ; 90-91 ; 95-99 ; 06-07 |
| Cameroon | 81-84 ; 94-96 ; 00 ; 05-06 | 81-84 ; 94-96 ; 05-06 |
| Chile | 84 ; 95 ; 00 ; 04-07 | 00-01 ; 04-07 |
| China | 94-95 ; 97 ; 00 ; 06-07 | 94-95 ; 97-98 ; 00-07 |
| Colombia | 85 ; 01 ; 04-05 | 85-87 ; 99-02 ; 04-07 |
| Congo, Rep. | 85 ; 89-90 ; 93-94 ; 96 ; 99-01 ; 03-06 | 84-85 ; 88-90 ; 93-94 ; 99-01 ; 03-06 |
| Costa Rica | 83 ; 92 ; 99 ; 06-07 | 91-93 ; 97-99 ; 05-07 |
| Cote d'Ivoire | 81 ; 83-85 ; 90 ; 94 ; 04 | 81-85 ; 90-91 ; 03-04 |
| Dominican Republic | 85-86 ; 88 ; 92 ; 97 | 85-88 ; 00-01 |
| Ecuador | 82 ; 84-85 ; 89-90 ; 95 ; 99-00 ; 04 ; 06 | 84-85 ; 88-90 ; 99-00 ; 06-07 |
| Egypt, Arab Rep. | 81-83 ; 91-92 ; 05-06 | 81-83 ; 91-92 ; 04-06 |
| El Salvador | 92-93 ; 01 ; 03 ; 06 | 91-95 ; 99-03 ; 06-07 |
| Ethiopia | 84-85 ; 92 ; 95 ; 01 ; 04 ; 06 | 83-86 ; 91-92 ; 95-97 ; 04-06 |
| Gabon | 81-82 ; 89 ; 91 ; 94-95 ; 97 ; 99 ; 01 ; 05 | 81-82 ; 94-95 ; 05-06 |
| Gambia, The | 82 ; 84 ; 86 ; 94 ; 98 ; 02-04 | 85-86 ; 91-92 ; 02-04 |
| Ghana | 84 ; 86 ; 91 ; 93 ; 95 ; 02-03 ; 05 | 82-88 ; 02-03 |
| Guatemala | 91 ; 95 ; 98 ; 06 | 91-92 ; 95-96 |

| | | |
|---|---|---|
| Guinea | 81-82 ; 87 ; 05 | 81-82 ; 04-05 |
| Guinea-Bissau | 81 ; 87 ; 90 ; 94 ; 96 ; 99 ; 03 ; 06 | 84-87 ; 93-94 ; 03-06 |
| Haiti | 95 ; 97-98 ; 04 | 97-99 ; 03-04 |
| Honduras | 95 | 94-95 |
| India | 93-94 ; 03 ; 05 | 91-94 ; 00-05 |
| Indonesia | 98 ; 05 | 93-98 ; 04-05 |
| Iran, Islamic Rep. | 81-82 ; 87 ; 89-90 ; 96 ; 99 ; 02 ; 05 | 81-82 ; 89-90 ; 95-96 ; 02-03 |
| Jamaica | 81 ; 84-85 ; 95 ; 99-00 ; 07 | 84-85 ; 99-00 |
| Jordan | 82-83 ; 85-86 ; 88-92 ; 95 ; 04-06 | 82-83 ; 85-86 ; 88-92 ; 04-07 |
| Kazakhstan | 97-98 ; 00 ; 03 ; 05 ; 07 | 97-00 ; 05-07 |
| Kenya | 88 ; 93 ; 04 ; 06 | 86-89 |
| Lebanon | 02-03 | 01-03 |
| Liberia | 83 ; 88 ; 02-04 ; 06-07 | 81-84 ; 02-04 ; 06-07 |
| Madagascar | 84 ; 86-87 ; 97 ; 99 ; 04 ; 06 | 86-87 ; 96-99 |
| Malawi | 84 ; 90 ; 98 ; 04-05 | 84-85 ; 89-90 ; 04-05 |
| Malaysia | 01 | 96-97 |
| Maldives | 81-82 ; 87 ; 94-95 ; 06-07 | 81-83 ; 87-89 ; 94-95 ; 01-03 ; 06-07 |
| Mali | 82 ; 86 ; 89-90 ; 92 ; 96 ; 99 | 86-87 ; 89-90 ; 96-97 ; 01-02 |
| Mexico | 81-83 | 81-83 |
| Moldova | 97-00 ; 03-04 ; 06 | 97-00 ; 03-06 |
| Mongolia | 93 ; 95 ; 97 ; 99-01 ; 06-07 | 99-03 ; 06-07 |
| Morocco | 88 ; 92 ; 96 ; 01 ; 06-07 | 87-89 ; 96-98 ; 06-07 |
| Mozambique | 95 ; 05 ; 07 | 95-96 |
| Namibia | 83-85 ; 87 ; 89 ; 91 ; 96-97 ; 02 ; 04 ; 06 | 83-87 ; 96-97 ; 04-06 |
| Nicaragua | 91 ; 94 ; 97-98 | 93-98 ; 03-05 |
| Niger | 84 ; 93 ; 95 ; 98 ; 01-02 ; 06 | 95-98 ; 01-02 ; 06-07 |
| Nigeria | 89-90 ; 92 ; 95 ; 99-01 ; 05 | 89-90 ; 99-01 |
| Pakistan | 89 ; 93 | 89-90 |
| Panama | 91-92 ; 99 ; 01 ; 03 ; 06 | 91-92 ; 06-07 |
| Papua New Guinea | 82-84 ; 86-87 ; 94-95 ; 97 ; 04 ; 06 | 82-84 ; 86-87 ; 93-95 |

| Paraguay | 95 ; 01 ; 03-04 | 97-99 ; 03-04 |
|---|---|---|
| Peru | 84 ; 88 ; 90-91 ; 93 ; 96 ; 06-07 | 84-85 ; 90-93 ; 95-96 ; 02-07 |
| Philippines | 94 | 91-94 |
| Senegal | 07 | 94-96 ; 00-02 ; 06-07 |
| South Africa | 95 ; 05 | 95-96 ; 04-07 |
| Sri Lanka | 83-84 ; 89 | 83-84 ; 89-90 ; 92-93 ; 01-03 |
| Sudan | 81 ; 83 ; 87 ; 92 ; 97-00 ; 04 | 97-00 |
| Tanzania | 87 ; 89-91 ; 93-96 ; 07 | 89-91 ; 93-96 |
| Thailand | 03 | - |
| Togo | 82-85 ; 88 ; 94-95 ; 97 ; 01 ; 03 ; 06-07 | 82-85 ; 94-97 ; 01-03 ; 06-07 |
| Tunisia | 82 ; 84 ; 93 | 82-82 ; 91-94 |
| Uganda | 82-83 ; 88 ; 91 ; 94 | 82-83 ; 91-94 |
| Uruguay | 92-93 ; 97 ; 04 ; 06 | 91-93 ; 96-98 |
| Venezuela, RB | 94 ; 96-97 ; 99 | 96-97 |
| Vietnam | 04 | 88-02 |
| Yemen, Rep. | 91 ; 95-97 ; 99-00 ; 04-06 | 95-97 ; 99-00 ; 03-06 |
| Zambia | 83 ; 85-86 ; 90 ; 93-95 ; 99-00 | 85-87 ; 93-95 ; 98-00 |
| Zimbabwe | 81-83 ; 89 ; 96-98 ; 03-04 | 81-83 ; 96-98 ; 03-04 |

*Table 1: The Impact of Aid Unpredictability and Migrants' Remittances on Fiscal Consolidation*
*The fiscal consolidation variable is 'FCAlesina'*

| | Model with 'wrgdp' | | | | Model with 'remitgdp' | | | |
|---|---|---|---|---|---|---|---|---|
| | Developing countries | LICs | SSA | Zone Franc | Developing countries | LICs | SSA | Zone Franc |
| Regressors | | | | | | | | |
| | | | | | | | | |
| Log(Remit$_{t-1}$)[a] | 0.358*** | 0.141 | 0.456*** | 1.149** | 0.410*** | -0.152 | 0.553*** | 0.752*** |
| | (0.104) | (0.246) | (0.166) | (0.477) | (0.0966) | (0.255) | (0.155) | (0.270) |
| Unpredictability | 0.0467 | 0.0633 | 0.0790** | 0.0557 | 0.0470** | 0.0513 | 0.0601** | 0.0438 |
| | (0.0292) | (0.0468) | (0.0366) | (0.0872) | (0.0239) | (0.0325) | (0.0284) | (0.0410) |
| Log(Net ODA)$_{t-1}$ | -0.637*** | -2.266** | -0.865** | -2.765*** | -0.484*** | -0.980* | -0.607** | -0.735* |
| | (0.187) | (0.984) | (0.369) | (0.921) | (0.140) | (0.580) | (0.271) | (0.429) |
| Primedef$_{t-1}$ | 0.134*** | 0.355*** | 0.252*** | 0.250*** | 0.119*** | 0.304*** | 0.175*** | 0.141*** |
| | (0.0227) | (0.0927) | (0.0495) | (0.0895) | (0.0171) | (0.0657) | (0.0305) | (0.0507) |
| Debt$_{t-1}$ | -0.00216 | -0.0156 | -0.0138** | 0.0600** | -0.00143 | -0.000875 | -0.00429 | 0.0149 |
| | (0.00309) | (0.0113) | (0.00614) | (0.0234) | (0.00269) | (0.00569) | (0.00431) | (0.0113) |
| Output gap | 4.63e-12 | 7.14e-11 | -2.24e-11 | -1.57e-10 | 5.01e-12 | 2.90e-10 | -1.56e-11 | -2.69e-10 |
| | (3.49e-12) | (2.84e-10) | (9.88e-11) | (5.13e-10) | (3.51e-12) | (2.37e-10) | (7.52e-11) | (3.45e-10) |
| Inflation$_{t-1}$ | 0.000482 | 0.0528* | 0.00823 | 0.0473 | 0.000484 | 0.00266 | 0.00464 | 0.0247* |
| | (0.000459) | (0.0283) | (0.0106) | (0.0322) | (0.000395) | (0.0153) | (0.00851) | (0.0150) |
| GDPGrowth$_{t-1}$ | -0.00259 | 0.0720 | 0.0450 | 0.213** | -0.00116 | 0.00623 | 0.0209 | 0.0482 |
| | (0.0241) | (0.0626) | (0.0398) | (0.0865) | (0.0197) | (0.0375) | (0.0304) | (0.0443) |
| Log(REER)$_{t-1}$ | -1.877*** | 3.849 | -2.973*** | -0.866 | -1.363*** | -1.588 | -2.173*** | -1.471 |
| | (0.488) | (2.511) | (0.864) | (2.655) | (0.391) | (1.126) | (0.637) | (1.569) |
| IMF | 0.315 | -0.127 | 0.614 | -1.573 | 0.353* | 0.395 | 0.696** | -0.230 |
| | (0.223) | (0.886) | (0.424) | (1.068) | (0.190) | (0.522) | (0.330) | (0.625) |
| Icrgdeac | 0.102 | 1.443** | 0.0475 | 0.925* | 0.101 | 0.352 | 0.240 | 0.467 |
| | (0.126) | (0.608) | (0.274) | (0.554) | (0.108) | (0.312) | (0.201) | (0.340) |
| Icrglaw | -0.159 | -2.411*** | 0.0257 | -2.985*** | -0.00892 | -0.424 | 0.0407 | -0.603 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (0.132) | (0.776) | (0.313) | (1.156) | (0.113) | (0.273) | (0.210) | (0.510) |
| NumberfcAlesina | -0.552*** | -0.845** | -0.586*** | -0.982** | -0.514*** | -0.612** | -0.726*** | -0.598** |
| | (0.114) | (0.399) | (0.188) | (0.436) | (0.0871) | (0.253) | (0.151) | (0.254) |
| VariablefcAlesina | -0.109* | -0.0431 | -0.328** | 0.696** | -0.0651 | 0.0287 | -0.189* | 0.252 |
| | (0.0560) | (0.154) | (0.153) | (0.354) | (0.0499) | (0.124) | (0.112) | (0.203) |
| Spline1 | -0.000947 | 0.00269 | -0.000249 | -0.0314 | -0.000852 | 0.00359 | -0.000901 | -0.0149 |
| | (0.000762) | (0.00283) | (0.00434) | (0.0306) | (0.000710) | (0.00237) | (0.00229) | (0.0117) |
| Spline2 | -0.00186 | 0.00363 | -0.0140 | -0.113 | -0.00276 | 0.00724 | -0.00968 | -0.0547* |
| | (0.00249) | (0.00743) | (0.0169) | (0.0819) | (0.00225) | (0.00693) | (0.00931) | (0.0297) |
| Spline3 | 0.00157 | -0.00633 | 0.00133 | 0.154 | 0.00229 | -0.00912 | 0.00315 | 0.0775 |
| | (0.00273) | (0.00823) | (0.0173) | (0.117) | (0.00248) | (0.00758) | (0.00971) | (0.0474) |
| Test on Spline1 | 1.54 (0.2139) | 0.90 (0.3421) | 0.00 (0.9542) | 1.05 (0.3046) | 1.44 (0.2304) | 2.29 (0.1300) | 0.15 (0.6938) | 1.61 (0.2042) |
| Test on Spline2 | 0.56 (0.4547) | 0.24 (0.6252) | 0.68 (0.4092) | 1.92 (0.1659) | 1.50 (0.2213) | 1.09 (0.2965) | 1.08 (0.2985) | 3.39 (0.0656) |
| Test on Spline3 | 0.33 (0.5651) | 0.59 (0.4420) | 0.01 (0.9387) | 1.73 (0.1883) | 0.85 (0.3554) | 1.45 (0.2292) | 0.11 (0.7455) | 2.67 (0.1024) |
| Test on variable | 3.79 (0.0516) | 0.08 (0.7796) | 4.62 (0.0316) | 3.85 (0.0496) | 1.70 (0.1920) | 0.05 (0.8176) | 2.88 (0.0896) | 1.54 (0.2151) |
| Joint F-test on 'duration dependence' variables | 4.93 (0.2944) | 1.68 (0.7951) | 6.42 (0.1702) | 6.50 (0.1649) | 3.97 (0.4100) | 3.01 (0.5568) | 3.76 (0.4389) | 5.09 (0.2782) |
| | | | | | | | | |
| LR | 102.52 (0.0000) | 54.50 (0.0000) | 76.59 (0.0000) | 69.35 (0.0000) | 127.92 (0.0000) | 53.35 (0.0000) | 87.07 (0.0000) | 52.85 (0.0000) |
| Log-likelihood | -323.73633 | -49.793559 | -105.94848 | -35.984811 | -449.35162 | -95.099675 | -175.37466 | -77.954037 |
| Countries–observations | 59-866 | 16-197 | 23-322 | 9-160 | 69-1162 | 17-286 | 26-471 | 10-216 |

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01.

a: Remit denotes either 'wrgdp' or 'remitgdp'.

*Table 2: The Impact of Aid Unpredictability and Migrants' Remittances on the Fiscal Consolidation*
The fiscal consolidation variable is 'FCHeylen'.

| | Model with 'wrgdp' | | | | Model with 'remitgdp' | | | |
|---|---|---|---|---|---|---|---|---|
| | Developing countries | LICs | SSA | Zone Franc | Developing countries | LICs | SSA | Zone Franc |
| Regressors | | | | | | | | |
| | | | | | | | | |
| Log(Remit$_{t-1}$)[a] | 0.345*** | 1.115** | 0.403** | 0.673** | 0.391*** | 0.109 | 0.467*** | 0.800*** |
| | (0.108) | (0.487) | (0.166) | (0.326) | (0.105) | (0.326) | (0.160) | (0.268) |
| Unpredictability | 0.00847 | 0.0375 | 0.0103 | -0.00326 | 0.00244 | 0.0535 | -0.00306 | -0.00578 |
| | (0.0283) | (0.0792) | (0.0451) | (0.0605) | (0.0246) | (0.0421) | (0.0371) | (0.0412) |
| Log(Net ODA)$_{t-1}$ | -0.761*** | -2.279** | -0.783* | -0.568 | -0.545*** | -2.082*** | -0.495* | 0.0542 |
| | (0.193) | (1.103) | (0.405) | (0.619) | (0.145) | (0.748) | (0.287) | (0.399) |
| Primedef$_{t-1}$ | 0.130*** | 0.394*** | 0.257*** | 0.281*** | 0.140*** | 0.431*** | 0.273*** | 0.280*** |
| | (0.0236) | (0.110) | (0.0509) | (0.0820) | (0.0193) | (0.0897) | (0.0404) | (0.0598) |
| Debt$_{t-1}$ | -0.000153 | -0.0164 | -0.0110 | -0.0114 | -0.000580 | 0.00131 | -0.00807 | -0.0173 |
| | (0.00318) | (0.0165) | (0.00679) | (0.0158) | (0.00279) | (0.00718) | (0.00514) | (0.0106) |
| Output gap | -2.50e-12 | 1.79e-10 | -9.74e-11 | 4.80e-10 | -2.00e-12 | 3.12e-10 | -3.89e-11 | 2.65e-10 |
| | (2.93e-12) | (3.91e-10) | (9.99e-11) | (3.20e-10) | (2.94e-12) | (2.77e-10) | (7.03e-11) | (2.32e-10) |
| Inflation$_{t-1}$ | -4.05e-05 | 0.0184 | 0.0236* | 0.0221 | -8.02e-05 | 0.00749 | 0.0226** | 0.0320** |
| | (0.000319) | (0.0296) | (0.0121) | (0.0188) | (0.000276) | (0.0194) | (0.00979) | (0.0158) |
| GDPGrowth$_{t-1}$ | -0.00228 | -0.0138 | 0.0324 | -0.00781 | 0.00835 | 0.0348 | 0.0508 | 0.0425 |
| | (0.0258) | (0.0780) | (0.0415) | (0.0704) | (0.0217) | (0.0566) | (0.0359) | (0.0581) |
| Log(REER)$_{t-1}$ | -1.230** | -7.341** | -2.038** | -4.675* | -1.006** | -6.671*** | -2.076*** | -4.485** |
| | (0.501) | (3.129) | (0.834) | (2.406) | (0.411) | (1.688) | (0.699) | (1.787) |
| IMF | 0.139 | -1.301 | 0.114 | 0.520 | 0.205 | -1.704** | -0.106 | -0.0968 |
| | (0.231) | (1.188) | (0.460) | (0.987) | (0.201) | (0.819) | (0.380) | (0.671) |
| Icrgdeac | 0.00397 | 2.271*** | -0.00408 | 0.791* | 0.0588 | 1.547*** | 0.108 | 0.562 |
| | (0.125) | (0.689) | (0.273) | (0.473) | (0.111) | (0.454) | (0.212) | (0.344) |
| Icrglaw | -0.122 | -0.716 | 0.0464 | -1.366 | 0.00537 | -0.695* | 0.0502 | -0.565 |
| | (0.135) | (0.745) | (0.354) | (1.115) | (0.116) | (0.376) | (0.238) | (0.661) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NumberfcAlesina | -1.012*** | -4.621*** | -1.282*** | -1.683*** | -1.028*** | -3.850*** | -1.556*** | -1.595*** |
| | (0.167) | (1.137) | (0.326) | (0.543) | (0.140) | (0.700) | (0.254) | (0.364) |
| VariablefcAlesina | -0.580*** | -0.826*** | -0.577*** | -0.543** | -0.591*** | -0.770*** | -0.669*** | -0.351** |
| | (0.0671) | (0.301) | (0.113) | (0.248) | (0.0546) | (0.180) | (0.0950) | (0.170) |
| Spline1 | -0.00524*** | -0.00411 | -0.00419*** | -0.0829*** | -0.00377*** | -0.00361 | -0.00499*** | -0.0384*** |
| | (0.00122) | (0.00607) | (0.00157) | (0.0292) | (0.000758) | (0.00269) | (0.00128) | (0.0145) |
| Spline2 | -0.0108*** | -0.0134 | -0.00967** | -0.0262 | -0.00554** | -0.0101 | -0.0108*** | 0.00204 |
| | (0.00356) | (0.0248) | (0.00489) | (0.0333) | (0.00234) | (0.00816) | (0.00395) | (0.0141) |
| Spline3 | 0.0108** | 0.0140 | 0.00939 | 0.218*** | 0.00357 | 0.00839 | 0.0101** | 0.0915*** |
| | (0.00462) | (0.0285) | (0.00623) | (0.0711) | (0.00303) | (0.0106) | (0.00505) | (0.0323) |
| Test on Spline1 | 18.43 (0.0000) | 0.46 (0.4985) | 7.12 (0.0076) | 8.04 (0.0046) | 24.75 (0.0000) | 1.79 (0.1808) | 15.22 (0.0001) | 7.06 (0.0079) |
| Test on Spline2 | 9.19 (0.0024) | 0.29 (0.5896) | 3.92 (0.0477) | 0.62 (0.4314) | 5.62 (0.0177) | 1.53 (0.2160) | 7.43 (0.0064) | 0.02 (0.8850) |
| Test on Spline3 | 5.42 (0.0199) | 0.24 (0.6243) | 2.27 (0.1317) | 9.39 (0.0022) | 1.39 (0.2388) | 0.62 (0.4299) | 4.02 (0.0449) | 8.03 (0.0046) |
| Test on variable | 74.75 (0.0000) | 7.51 (0.0061) | 26.24 (0.0000) | 4.80 (0.0284) | 117.24 (0.0000) | 18.23 (0.0000) | 49.64 (0.0000) | 4.29 (0.0383) |
| Joint F-test on 'duration dependence' variables | 79.58 (0.0000) | 12.39 (0.0147) | 28.52 (0.0000) | 13.94 (0.0075) | 124.31 (0.0000) | 22.60 (0.0002) | 51.66 (0.0000) | 16.89 (0.0020) |
| | | | | | | | | |
| LR | 188.59 (0.0000) | 80.10 (0.0000) | 93.91 (0.0000) | 78.18 (0.0000) | 273.70 (0.0000) | 125.37 (0.0000) | 156.08 (0.0000) | 93.49 (0.0000) |
| Log-likelihood | -306.67761 | -32.432862 | -97.20943 | -44.500524 | -410.01505 | -57.228772 | -143.28695 | -68.502251 |
| Countries–observations | 52-802 | 11-141 | 20-293 | 10-164 | 64-1102 | 14-245 | 24-453 | 10-216 |

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01.
a: Remit denotes either 'wrgdp' or 'remitgdp'.

*Table 3: Variables - Definitions and sources*

| Variable | Definition | Source | Comments |
|---|---|---|---|
| Wrgdp | Workers' remittances, receipts (% of GDP). | World Bank Development Indicators – WBDI (2010). | Workers' remittances record current transfers by migrants who are employed in, and considered a resident of, the countries that host them. |
| Remitgdp | Total Remittances, receipts (in percentage of GDP). | World Bank Development Indicators (2010). See the website: http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/0,,contentMDK:21122856~menuPK:5963309~pagePK:64165401~piPK:64165026~theSitePK:476883,00.html | Remittances here include the workers 'remittances, the employee compensation and the migrants' transfers. |
| Unpredictability | Unpredictability of development aid inflows. | Author's calculation based on Overseas Development Assistance (ODA) variables. | For the computation of this variable, we use the forecasting equation described in section 6.1. ODA data stem from the OECD Development statistics. |
| FCAlesina | Episodes of large (rapid) tight Fiscal Policy. | Author's Calculation using data from World Bank Development Indicators – WBDI (2010), Government Development Finance (GDF) – 2010 and Alesina and Ardagna (2010)'s definition of "fiscal consolidation episode". | For this variable, we use the definition of "fiscal consolidation episode" of Alesina and Ardagna (2010). These calculations are based on total government revenue (excluding grants), expenditure, interests payments on government's debt and GDP data. The total government revenue and government's spending stem from CERDI's database. The interest payments on external debt stem from the Government Development Finance (GDF) – 2010. The source of the GDP is the WDI 2010. |
| FCHeylen | Episodes of gradual tight Fiscal Policy. | Author's Calculation using data from World Bank Development Indicators – WBDI (2010), Government Development Finance (GDF) – 2010 and Heylen and Everaert (2000)'s definition of "fiscal consolidation episode". | For this variable, we use the definition of "fiscal consolidation episode" of Heylen and Everaert (2000). These calculations are based on total government revenue (excluding grants), expenditure, interests payments on government's debt and GDP data. The total government revenue and government's spending stem from CERDI's database. The interest payments on external debt stem from the Government Development Finance (GDF) – |

| | | | 2010. The source of the GDP is the WDI 2010. |
|---|---|---|---|
| Outputgap | Output Gap | Author's Calculation using data from World Bank Development Indicators – WBDI (2010). | The Output Gap is calculated as the difference between the actual output and the potential output. The actual output is the Gross Domestic Product (GDP), PPP, (constant 2005 international $) of WDI 2010 and the potential output is computed by the use of the Hodrick Prescott Filter (with lambda = 100). |
| inflation | Inflation (annual %) | Author's calculation using Inflation, consumer prices (annual %) from WBDI (2010) and Inflation, GDP deflator (annual %) also from WBDI (2010). | This variable is the inflation (Consumer prices, %) where we replace the missing data by those of the Inflation (Deflator GDP, %). |
| GDP Growth | Growth of GDP (annual %) | WBDI 2010 | We use the GDP (based on PPP 2005 Constant 2005 International $) to compute the GDP growth rate (annual %). |
| REER | Real Effective Exchange Rate. | Database of CERDI (Centre d'Etudes et de Recherches sur le Developpement International) - France | This is the Real Effective Exchange Rate, base 2005 = 100 computed by CERDI.: it is the ratio of prices in the country to prices in the main import partners adjusted for variations in nominal effective exchange rate. An increase means an appreciation. |
| debt | Gross Public Debt in % of GDP. | Historical Public Debt Database of IMF | The IMF's database weblink on Gross Public debt is: http://www.imf.org/external/ns/cs.aspx?id=262. |
| Icrglaw | The Institutional Quality | ICRG (International Country Risk Guide) | Variable varying from 1 to 6. The institutional quality increases with the figures. |
| Icrgdeac | The democratic accountability | ICRG (International Country Risk Guide) | Variable varying from 1 to 6. The democratic accountability increases with the figures. |
| IMF | IMF Programmes | Database of CERDI and IMF's annual reports, various years. | Dummy Variable that takes the value "1" (the value "0", otherwise) if the country is under agreement with the IMF in the previous fiscal year. IMF programs considered here are non-crisis programs: Standby Credit Facility (SCF), Extended Credit Facility (ECF), Structural Adjustment Facility (SAF), Enhanced Structural |

| | | | Adjustment Facility (ESAF) and Poverty Reduction and Growth Facility (PRGF). See Brun et al. (2011). |
|---|---|---|---|
| Net ODA | ODA Total, Net disbursements - in % of GDP | Author's calculation using data from OECD.Stat DAC dataset and the WDI 2010. | We use the Total Net disbursements of ODA in US current Dollars (source: OECD.Stat DAC dataset) that we divide by the GDP in US current Dollars (source: WDI 2010). |
| Primdef | Primary Deficit in % of GDP | Author's calculation using several sources of data: CERDI's Database for Government Revenues (in % of GDP) and government expenditures (in % of GDP) and the GDF (2010) for interest payments on government debt (in % of GDP). | The Primary deficit is computed for each country as follows: Primary Deficit = Expenditures (in % of GDP) minus total revenue, excluding grants (in % of GDP) minus Interest payments on government debt (in % of GDP). |
| NumberfcAlesina | Number of prior adjustments using "FCAlesina" | Calculation of the Author by focusing on the variable "FCAlesina" | For instance, if there is a continuous adjustment over 4 consecutive years, it is considered as 1 adjustment. |
| Numberfcheylen | Number of prior adjustments using "FCHeylen" | Calculation of the Author by focusing on the variable "FCHeylen". | For instance, if there is a continuous adjustment over 4 consecutive years, it is considered as 1 adjustment. |
| VariablefcAlesina | Time since previous Adjustment for "FCAlesina" | Author's calculation | Variable constructed by the author at the same time as the Splines variables used in our study. |
| VariablefcHeylen | Time since previous Adjustment for "FCHeylen" | Author's calculation | Variable constructed by the author at the same time as the Splines variables used in our study. |

*Table 4: Descriptive Statistics*

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| | | | | | |
| remitgdp | 1705 | 3.534375 | 5.416706 | .0000289 | 64.04824 |
| wrgdp | 1491 | 3.022739 | 4.837604 | 0 | 31.03261 |
| Unpredictability1 | 1828 | -.0271751 | 4.322327 | -59.34135 | 49.37504 |
| Log(Net ODA) | 1928 | .7891535 | 1.887966 | -7.589356 | 4.685136 |
| primdef | 1672 | -4.698798 | 11.94965 | -55.37574 | 43.52265 |
| debt | 1811 | 75.65384 | 77.08825 | 0 | 2092.922 |
| Outputgap | 1984 | 1.76e+08 | 1.75e+10 | -1.80e+11 | 4.82e+11 |
| inflation | 1997 | 79.52322 | 756.8552 | -100 | 24411.03 |
| GDP Growth | 1909 | 3.566364 | 6.286189 | -51.03086 | 106.2798 |
| REER | 1935 | 224.744 | 3775.504 | 29.74355 | 166045.4 |
| IMF | 2100 | .2785714 | .4484029 | 0 | 1 |
| Icrgdeac | 1600 | 3.207665 | 1.236312 | .1111111 | 6 |
| Icrglaw | 1600 | 2.911625 | 1.151641 | 0 | 6 |
| NumberfcAlesina | 1659 | 2.097046 | 1.800579 | 0 | 10 |
| VariablefcAlesina | 1659 | 2.795057 | 3.790369 | 0 | 26 |
| NumberfcHeylen | 1658 | 1.11339 | 1.04419 | 0 | 5 |
| VariablefcHeylen | 1659 | 3.217601 | 4.334648 | 0 | 26 |

*Appendix2: Classification of Countries According to Income (World Bank's Classification)*

**Low-Income Countries (LICs)** : Bangladesh; Burkina Faso; Ethiopia; Gambia, The; Guinea; Guinea-Bissau; Haiti; Kenya; Liberia; Madagascar; Malawi; Mali; Mozambique; Niger; Tanzania; Togo; Uganda; Zimbabwe.

**Sub-saharan Africa (SSA)**: Botswana; Burkina Faso; Cameroon; Congo Rep; Cote d'Ivoire; Ethiopia; Gabon; Gambia, The; Ghana; Guinea; Guinea-Bissau; Kenya; Liberia; Madagascar; Malawi; Mali; Mozambique; Namibia; Niger; Nigeria; Senegal; South Africa; Sudan; Tanzania; Togo; Uganda; Zambia; Zimbabwe.

**Zone Franc Countries**: Burkina Faso; Cameroon; Congo, Rep; Cote d'Ivoire; Gabon; Guinea-Bissau; Mali; Niger; Senegal; Togo.