

# Aid and remittances: their stabilizing impact compared

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## Abstract

This paper presents a comparative analysis of the stabilizing effect of official development assistance (ODA) and migrant remittances. First, at the country level and for each kind of flows it assesses their stabilizing impact with regard to the fluctuation of exports, as distinct from their countercyclical character. Most often than the opposite, both kinds of flows appear stabilizing. Second, on a cross-country basis it appears that both aid and remittances dampen the growth volatility. While at the country level, remittances appear to dampen the instability of exports more often than aid does so, on a cross-country basis, aid more than remittances lowers growth volatility.

**Key words:** Aid, Remittances, Stabilizing effect

**JEL codes:** F24, F35, F43, O42

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## 1- INTRODUCTION

Although respective amounts of aid and remittances are often compared at the global or the country level, their respective impacts on growth and poverty reduction are hardly done. How each kind of these often large flows can promote growth and poverty reduction is indeed an important issue. A major effect of both kinds of flows is likely to result from the stabilizing impact they can have on receiving economies. The stabilizing impact of aid has already been underlined at the macro-economic level (Chauvet and Guillaumont 2009), while the compensatory role of remittances has essentially been evidenced at the micro level (e.g. Azam and Gubert 2005). Then, in order to investigate the respective contribution of aid and remittances on growth and poverty reduction, a first step is to compare how far they dampen the effects of exogeneous shocks on macroeconomic stability.

It can be done by two ways. One is to consider, country-by-country, whether aid and remittances dampen the impact of a specific and measurable exogenous source of instability, namely the instability of exports of goods and services. The other one is to examine on a cross country basis whether these two categories of flows, depending on their average level, contribute to lower the volatility of income, whatever its origin. The first one, that is both country specific and specific to a given source of instability, requires time series data on the various kinds of flows. The second one, focused on the impact of the average level of aid and remittances, refers to the instability that may result from various sources, but gives only an overall effect.

The paper is organized as follows. Section 2 briefly reviews what the literature says regarding the propensity of aid and remittances to compensate exogenous shocks. Sections 3 and 4 respectively examine the stabilizing effect of aid and remittances at the country and cross-section level. Finally, section 5 presents the main conclusions of the paper.

## 2- SOME LESSONS OF THE LITERATURE: FROM THE COUNTERCYCLICALITY TO STABILIZING IMPACT

Both for aid and for remittances a major issue debated has been whether these flows are pro or countercyclical. Such an issue has been addressed both on a theoretical ground and through

econometric testing. Anyway measuring countercyclicality may not be the most relevant way to assess the stabilizing or destabilizing impact of each flow.

### **2.1- Countercyclicality as depending on motivations**

The countercyclicality of remittances is supposed to mainly depend on the underlying motivations of these inflows. The same could hold for official assistance.

Migrants' behavior concerning remittances depends not only on their capacity to earn money and to save, but also on their motivations to send money back home. Three main motivations are considered in the literature on remittances: the “pure altruism”, the “pure egoism”, and the existence of an informal contract signed beforehand between the migrant and his family.

The main motivation for migrants to remit money is the “pure altruism”, that is to say the wish of migrants' workers to help relatives or friends left behind. Stark and Lucas (1985) modeled the “pure altruism” motivation from the model of altruism developed by Garry Becker. In this framework, remittances are a compensation for the income gap between the migrant and the rest of the family. Here, remittances are the concrete expression of the affection and the responsibility the migrant has toward his family stayed in the country of origin. Some testable hypothesis correspond to the model of “pure altruism”: the amount of money sent home has to be positively correlated with the income of the migrant or the employment rate in the host countries (Funkhouser 1995; Lianos 1997; Bougha-Hagbe 2004; Cartagena 2004; and Chamon 2005), per-migrant remittances have to be negatively and significantly related to the number of migrants (for Guyana see Agarwal and Horowitz 2002), and finally altruistic behavior implies a negative relationship between remittances from the sender and the preremittance standard of living of the recipient (Bougha-Hagbe 2004). Accordingly if altruism dominates, migrant workers are expected to remit more during down cycles economic activity at home.

However, remittances can also be motivated by self-interested reasons, like portfolio investment in origin countries. Since remittance returns are expected to be higher when the economic conjuncture improves at origin, investment-oriented remittances are supposed to increase when the economy becomes better.

Lucas and Stark (1985) was the first study having empirically tested the various underlying motivations to remit. They concluded that the actual motivation to remit money is located between the “pure altruism” and the “pure egoism”. The reason of remittances would be a “tempered altruism” or an “enlightened self-interest” coming from the existence of an implicit contract between the migrant and the households. The first stage of this contract consists for the migrant in repaying for financial support received from the household (see Poirine 1997; Cox et al. 1998; and Ilahi and Jafarey 1999 for empirical supports of this “loan repayment” hypothesis). Then, altruism can lead to risk-sharing arrangements, in which migrants insure the origin household against potential shortfalls in income (Chami and Fisher 1996). In developing countries where formal institutions for managing risks are imperfect or absent, and where a lot of people do not have access to financial markets, remittances can play an essential role by allowing households to diversify their income sources and therefore can be viewed as a self-insurance mechanism. Migration decision is so considered as a strategy to raise income and to obtain a self-insurance against income risks through the geographical dispersion of their members.

This possible role played by remittances led some economists, for whom the basic unit of analysis is not the migrant but the household and for whom remittances are endogenous to the migration process, to consider emigration as a strategy for households which have aversion to risk, to minimize the effect of the negative shocks they can face (Stark and Lehvari 1982; Schrieder and Knerr 2000; Azam and Gubert 2005). The co-insurance argument can be associated with an empirically testable hypothesis: the amounts of remittances received would

be more important for the households really confronted to risks or when risks are more important (Azam and Gubert 2005). As in the “pure altruism” approach, remittances are expected to smooth households' consumption and to contribute to the stabilization of receiving economies by compensating for the losses following macroeconomic shocks.

Several papers showed empirically that remittances tend to answer positively to shortfalls in the household income. Mishra (2005) showed that remittances sent to the Caribbean tend to increase after a negative shock of product, but with a delay. Kapur and McHale (2005) examined remittances' reaction in the years preceding and following an economic crisis. They found that remittances flows increase when a country suffers from a macroeconomic shock too. Moreover, Yang and Choi (2007) examined how remittances sent by Philippine migrants react to the shocks of income occurring in Philippines households. They found that for households among which one of the members is living abroad, remittances can compensate 60% of the domestic income losses. Finally, Quartey and Blankson (2006) examined to what extent remittances received by Ghanaian households can dampen the effect of macroeconomic shocks they face. They found that remittances constitute a significant tool to mitigate shocks effects in the case of poor households.

Altruism vs egoism are motivations also largely referred to in the literature on the long term determinants of aid allocation. But they have not been really analyzed through the prism of countercyclicality. We could imagine that altruism would lead official aid to react positively and immediately to negative shocks occurring in developing countries. It seems to be more the case for natural disasters than for trade shocks. Moreover the importance of administrative procedures may slow down the reaction capacity of public aid, which could tend to become procyclical, without revealing search of self interest.

## **2.2- Countercyclicality always related to a reference flow**

Any study examining the countercyclicality of a specific flow should refer to another variable, and this variable should not depend on the variable the pro-cyclicality of which is considered.

As for remittances, since most studies are micro, the reference is in most of the cases the real GDP of home countries. Sayan (2004) showed that remittances sent from Turkish migrants tend to move procyclically with the real GDP of Turkey. In 2006, by using a similar approach he examined the cyclical properties of remittances received by 12 low-income and lower-middle income countries over the period 1976-2003. To assess whether more developed financial systems are associated with more or less procyclicality of remittances, Giuliano and Ruiz-Arranz (2005) focused on the cyclical behavior of remittances with respect to output. They finally found that remittances are more procyclical in countries with less developed financial systems what confirms their hypothesis of substitutability between remittances and the financial sector. By using co-integration techniques, Bouhga-Hagbe (2004) tested also the correlation between remittances and real GDP in Morocco and the negative correlation found provided evidence that altruistic motives can partly be behind remittances in Morocco. To compare the cyclical behavior of remittances and that of other flows of external funding at the global level, IMF (2005) also considered as a basis the cycles of output at home.

As an exception, Lueth and Ruiz-arranz (2007) examined the cyclical behavior of remittances to Sri Lanka over the period 1975-2004 with respect to GDP at home but also with respect to oil prices, exchange rate, differential interest rate and price level. They provide evidence of the procyclical character of remittances to Sri Lanka what leads them to the conclusion that remittances are mainly motivated by investment considerations. Furthermore, in a recent paper, Sayan and Tekin-Koru (2007) examined the poverty alleviation potential of remittances at a macroeconomic level by focusing on the co-movements between remittances cycles and that in consumption spending on foods and durable goods in Turkey. They showed

that remittances cycles and cycles in consumption spending have become synchronous since 1992, what reveals the potential of remittances to alleviate poverty.

As for official assistance, a lot of studies examined the cyclical character of public aid with respect to fiscal revenue. Several papers found that foreign aid tends to have a procyclical character. Using a database covering 72 countries over the period 1975-1997, Bulir and Hamman (2001) showed, for example, that aid flows are more volatile than domestic fiscal revenues and that they are pro-cyclical in the great majority of countries. In their study on the period 1969-1995, Pallage and Robe (2001) reached the same main conclusion.

However, it is more relevant to assess the pro or countercyclicality of a variable with regard to a flow that is unlikely to be influenced by aid or remittances. To overcome this problem, Chauvet and Guillaumont (2009) compared the cycle component of public aid with that of exports. They showed that even if official aid is volatile, it is not clearly as procyclical as often argued, and that it is not necessarily destabilizing.

### **2.3- Countercyclicality as different from stabilizing impact**

Even though some papers dealing with specific countries showed that remittances tend to be procyclical (for example Lueth and Ruiz-Arranz 2007 for Sri Lanka; Burguess and Haksar 2005 for the Philippines), the great majority of studies presented them as countercyclical, that is, they increase at times of distress in the receiving countries, working effectively as an informal stabilization fund. High increases of remittances have been for example observed after periods of economic crises in some specific countries such as in Mexico in 1995 and in Argentina in 2001, during conflicts like in Sierra Leone, or following important natural disasters (Clarke and Wallsten 2003). Then migrants remittances seem to follow an insurance logic between the migrant and his/her family stayed at home (whether it comes from altruistic motives or through an informal risk-sharing contract), what would confirm the idea that remittances can have a stabilizing effect on countries of origin. However, at the macroeconomic level the stabilizing effect of remittances, as that of external assistance (cf. Chauvet and Guillaumont, 2009), depends not only on their countercyclicality, but also on their relative volatility and on their average level compared to that of the reference flow (exports).

As for their volatility level, migrants' remittances seem to represent an external source of income which is less volatile than others. Basically, according to the economic theory, saving is a stable function of income and the evolution of investments depends on that of interest rates. Since remittances are a part of current flows which are a function of income, remittances are expected to be less volatile than other private capital flows. Furthermore, other private capital flows depend on decisions of foreign investors who are in search of a business climate favorable to their investments, whereas remittances are the fact of migrants who have kept a link with the members of their family stayed in the country of origin.

From a panel sample on the period 1970-2000, Buck and Kuckulenz (2004) confirmed empirically this theory. They found that remittances constitute in general a more stable foreign source of income for recipient countries than other capital flows (foreign public aid and other private capital flows). This result is confirmed for all the geographic regions except for Asia. For 107 of the 135 countries in the sample, remittances are less volatile than other private capita flows, for 70 countries remittances are less volatile than official public aid, and for 62 countries remittances' volatility is less important than that of all sources of foreign capitals.

Ratha (Global Development Finance 2003) found on the contrary that remittances have tended to answer positively to the economic situation in recipient countries (both in Philippines and in Turkey). Nevertheless, he noted that despite this volatility and procyclicality, remittances are less volatile than other capital flows in both cases. Migrant

remittances seem to react less violently than other private capital flows to the economic conjuncture in recipient countries.

By leaning on the literature, there seems to be no consensus concerning the correlation between remittances and business cycles of recipient countries (what probably comes from the different motivations driving these flows), but most studies conclude to the relative stability of these flows. More than examining only whether remittances respond positively or negatively to business cycles of different recipient countries, we want here to go further by examining first country by country the stabilizing character of remittances and comparing it with that of official aid (through the approach used in Chauvet and Guillaumont 2009). The next step will consist in assessing the joined stabilizing effect of remittances and aid. Finally, this paper compares through a cross-section approach, the effect of remittances and foreign aid on income instability.

### **3- COUNTRY-BY-COUNTRY ANALYSIS OF THE RESPECTIVE STABILIZING IMPACT**

#### **3.1 The data**

Our dataset covers the period 1980-2005. Remittances dataset is taken from IMF, and comprises the three following line items of the Balance of Payments Statistics: workers remittances, compensation of employees and migrant capital transfers. As a measure of foreign aid we use the usual Official Development Assistance (ODA) data published by the OECD. It comprises grants, the value of technical assistance and concessional loans. We use data for net ODA disbursements. All the three series consist of annual data and are expressed in absolute terms, in constant US dollars (2000=100) by deflating them using GDP deflator of the US. As aggregate exogenous reference flow we choose exports of goods and services because first it is the most likely aggregate to be affected by exogenous shocks and second because exports are less likely to be influenced by public aid or remittances than other aggregates like fiscal receipts or national income. Exports data comes from WDI 2006. To analyze the stabilizing effect of remittances and official aid country-by-country, we use annual data.

Note that a recipient country is excluded from our sample if: (i) it has no data available for one of our interest variables (exports, remittances or aid) and (ii) if the country was a net donor of aid in some years (e.g. Costa Rica, Gabon, Thailand, Mexico, Iran or Malaysia). For the remaining countries, we only consider the largest block of contiguous data-years during the period.

#### **3.2 The method**

As explained in Chauvet and Guillaumont (2009), the stabilizing character of a variable with regard to a given aggregate depends on:

- the relative trends levels of the variable and the aggregate of comparison
- the relative volatility of the variable with respect to the aggregate
- and on the pro or counter-cyclical of the variable with regard to the aggregate considered

Let us present successively the way to proceed for each of these three steps.

#### *The relative level of aid and remittances with regard to exports*

As noted above, to better interpret the relative volatility of aid and remittances with respect to exports, it is useful to have in mind their relative level. We thus have calculated the relative level of aid, remittances and exports as a percentage of recipients' GDP (see Appendix 1).

#### *Measurement of the cycles and of volatility*

To measure trend and cycles of the variables we want to compare, we first resort to an econometric estimate of their trend. Assuming that series can not be purely deterministic or purely stochastic, it is better to estimate an equation of the following form (including a stochastic element and a deterministic element):

$$x_t = \alpha_1 + \alpha_2 \text{time} + \alpha_3 x_{t-1} + \varepsilon_t$$

The predicted value,  $\hat{x}_t$ , is the trend component, while the residual,  $\varepsilon_t$ , is the cycle component. To measure instability of  $\varepsilon_t$  we take the average of the quadratic deviation relative to the mixed trend. The instability of  $\varepsilon_t$  is measured on the 6 previous year and the current one with regard to a rolling adjustment covering at least 12 previous years and the current year.

Another way of separating the cycle component and the trend component is to use an H-P filter (Hodrick-Prescott 1997). This technique consists in decomposing a series, which is the logarithm of the observed series  $x_t$ , in a cycle component,  $c_t$ , and in a trend component,  $t_t$ , by minimizing the following loss function:

$$\sum (x_t - x_t^g)^2 + \lambda \sum [(x_{t+1}^g - x_t^g) - (x_t^g - x_{t-1}^g)]^2$$

$\lambda$  corresponds to the smoothing parameter of  $x_t^g$ . Since we use annual data, we choose  $\lambda$  equals to 7 (see Pesaran and Pesaran 1997; Bulir and Hamman 2001). For robustness considerations, we also use an H-P filter to separate the cycle and the trend of the series studied.

We then compare the volatility of remittances and the volatility of official aid. As usual, the respective volatilities of aid, remittances and exports, are measured by the standard errors of their cycles.

However, to compare the real impact of the volatility of each variable, it is useful to take into account their average level. We so weight in a second stage the standard errors of their cycles by the share of each variable in recipients' GDP.

#### *Measurement of the countercyclicality*

To estimate the pro-cyclical or counter-cyclical character of each kind of aid, we examine the correlation between their own cycle (measured by the deviation to the trend) and the cycle of exports. A positive contemporaneous correlation means that aid or remittances receipts are procyclical with regard to exports, whereas a negative one indicates that aid or remittances flows are countercyclical with regard to exports.

However, since we consider that the procyclical or countercyclical character of aid (or remittances) is really relevant only when correlations are statistically significant, we identify those correlations which are significant.

#### *Measurement of the stabilizing character and of the stabilizing impact*

To measure the stabilizing character of a given variable Z with regard to another variable X, Chauvet and Guillaumont (2008) suggested building an index of stabilization. It consists in taking the difference between the volatility of X (the flow of comparison) and the aggregate flow (X+Z). Here X corresponds to exports and Z represents alternatively aid or remittances. This index is then here equal to:

$$\text{Stabilization index of Z} = \text{volatility of X} - \text{volatility of (X+ Z)}$$

If this difference is positive (negative), the variable Z has a stabilizing (destabilizing) character with respect to exports. It follows that remittances can have a stabilizing character even if there are some cases where they are procyclical.

From this stabilization index it is possible to measure the stabilizing impact of remittances and aid by weighting the index by the share of exports in recipients' GDP.

### **3.3- Which flow is the most important with regard to output?**

Figures presented in Appendix 1 confirm the stylized fact according to which remittances represent a more important part of GDP than foreign aid does. On the 82 countries composing

our whole sample, aid is more important than remittances in only 38 cases (46% of the cases). This share is higher in the African sample. Thus, there are 25 African countries on the 33 where foreign aid received represents a more important share of their GDP. In other words, on the 38 countries where aid is more important than remittances, 25 are located in Africa (68%).

### 3.4- Are remittances and public aid procyclical or countercyclical with regard to exports?

To assess the business cyclical properties of remittances and of foreign aid with regard to exports, we compute the correlations between the cyclical components of remittances, aid and exports, successively taking annual data and the average on two-years time periods. A positive correlation between same year data means that aid receipts are procyclical, whereas a negative correlation implies that aid flows are countercyclical.

By examining the cyclical character of official aid and of remittances inflows with regard to recipient exports, we observe that both remittances and aid tend to be slightly more procyclical than countercyclical, even if aid appears to be procyclical in a fewer percentage of cases than remittances. However, by only considering significant cases, the percentage of countercyclical cases increases for both kinds of flows (reaching 48% and 55% of the cases, for remittances and aid respectively). It can be noticed also that only 13% of the observations for remittances are significant (respectively 12% for public aid), what suggests that most of the time, remittances and aid are not significantly correlated with exports cycles and are so rather a-cyclical.

**Table 1.A: Coefficients of correlation between remittances/aid and exports cycles, whole sample (1980-2005)**

	80-84	85-89	90-94	95-99	00-05	Total	Total[ ]
<b>Rem</b>							
Average	0.06	0.02	0.01	0.06	-0.06	0.01	
No. of positive correlations	14 [6]	27 [3]	29 [6]	31 [3]	44 [6]	167 (56%)	[21] (52%)
No. of negative correlations	19 [2]	22[2]	24 [3]	22 [2]	27 [8]	129 (44%)	[20] (48%)
<b>Aid</b>							
Average	0.01	0.02	0.05	0.03	-0,03	0.02	
No. of positive correlations	31 [4]	28 [7]	37 [3]	40 [6]	40 [1]	176 (52%)	[21] (45%)
No. of negative correlations	24 [3]	33 [1]	28 [7]	38 [7]	40 [7]	163 (48%)	[25] (55%)
<b>Rem+Aid</b>							
Average	0.04	0.11	0.07	0.00	-0.07	0.03	
No. of positive correlations	24 [6]	27 [7]	36 [7]	40 [8]	42 [2]	169 (48%)	[30] (61%)
No. of negative correlations	22 [1]	26 [2]	22 [3]	33 [7]	35 [6]	138 (52%)	[19] (39%)

*Note: Number of cases significant at least 10% are given in brackets*

Concerning African countries, both remittances and aid appear procyclical in a higher percentage of cases.

**Table 1.B: Coefficients of correlation between remittances/aid and exports cycles, sub-Saharan African sample (1980-2005)**

	80-84	85-89	90-94	95-99	00-05	Total	Total[ ]
<b>Rem</b>							
Average	0.12	0.03	-0.01	0.09	0.02		
No. of positive correlations	6 [3]	12 [1]	11 [0]	13 [1]	19 [4]	61 (58%)	[9] (50%)
No. of negative correlations	8 [0]	9 [1]	11 [5]	8 [0]	8 [3]	44 (42%)	[9] (50%)



Aid							
Average	0.007	0.08	0.12	-0.05	0.08	0.06	
No. of positive correlations	17 [3]	14 [4]	16 [6]	18 [4]	17 [1]	82 (57%)	[18] (62%)
No. of negative correlations	6 [1]	11 [0]	11 [3]	11 [5]	13 [2]	52 (43%)	[11] (38%)
Rem+Aid							
Average	0.19	0.21	-0.08	-0.04	0.04	0.08	
No. of positive correlations	10 [3]	13 [4]	15 [4]	17 [4]	19 [1]	74 (50.5%)	[16] (69%)
No. of negative correlations	9 [0]	8 [0]	9 [2]	11[3]	10 [2]	46 (49.5%)	[7] (31%)

Note: Number of cases significant at least 10% are given in brackets

In Appendix-4, we plot the data for a selection of countries.

### 3.5- Which flow is the most volatile?

Aid flows, remittances and exports receipts of each country can be more or less volatile, but a higher volatility of one of these three kinds of flows does not mean a higher potential impact on the stability of output. The potential impact indeed also depends on the share of each of these three kinds of flows in the GDP. For this reason, we have weighted their standard deviation by the share each variables represents in the output. The tables 2.A and 2.B report the average volatility and the average weighted volatility of each variable according to the period considered. According to periods, remittances are more or less volatile than aid on the whole sample. However, considering the African sample, remittances appear to be more volatile than aid for all the periods except 80-84. As for the weighted volatility, whatever is the period, remittances appear to be on average less volatile than aid, and aid seems to be less volatile than exports. This result holds whatever sample we consider.

The Appendix 3 shows results disaggregated by country. There are 20 cases where the weighted volatility of aid is higher than the weighted volatility of exports, and there are only 10 cases where the weighted volatility of remittances is higher than the volatility of exports. Graphics drawn in Appendix 4 compare for a couple of countries the cyclical trends of remittances, aid and exports. The look of curves testifies in general of the more important stability of remittances and aid with regard to exports (except for Egypt).

**Table 2.A: Volatility of remittances, aid and exports, whole sample**

		80-84	85-89	90-94	95-99	00-05
<b>Remittances</b>	Standard deviation (%)	18.72	26.0	37.33	28.69	26.69
	Weighted s.d. (% of GDP)	0.73	0.95	1.14	1.50	1.14
<b>Foreign Aid</b>	Standard deviation (%)	27.6	23.2	29.7	26.0	29.5
	Weighted s.d. (% of GDP)	2.93	2.11	2.51	2.34	2.50
<b>Rem+Aid</b>	Standard deviation (%)	15.8	17.5	17.3	17.1	20.0
	Weighted s.d. (% of GDP)	2.1	2.3	2.0	2.3	2.5
<b>Exports</b>	Standard deviation (%)	13.0	13.1	10.5	10.4	8.7
	Weighted s.d. (% of GDP)	3.76	4.07	3.27	3.17	3.01

**Table 2.B: Volatility of remittances, aid and exports, sub-Saharan African sample**

		80-84	85-89	90-94	95-99	00-05
<b>Remittances</b>	Standard deviation (%)	21.3	28.5	53.8	34.5	29.1
	Weighted s.d. (% of GDP)	0.67	0.86	0.95	1.51	1.46
<b>Foreign Aid</b>	Standard deviation (%)	23.7	19.8	20.3	19.5	25.0
	Weighted s.d. (% of GDP)	2.83	2.56	2.46	2.70	2.65
<b>Rem+Aid</b>	Standard deviation (%)	16.6	16.8	14.8	16.8	19.9
	Weighted s.d. (% of GDP)	1.9	2.7	2.5	3.2	3.0
<b>Exports</b>	Standard deviation (%)	15.3	14.0	11.0	10.1	9.7
	Weighted s.d. (% of GDP)	4.13	4.23	3.26	3.09	3.43

### 3.6- Do the stabilizing effect of remittances and aid reinforce each other?

Concerning public aid, we have 339 observations corresponding to 163 countercyclical versus 176 procyclical cases. Among the 163 cases of countercyclical aid, 133 cases (81.5%) appear to have a stabilizing indicator impact. On the other hand, procyclical aid is in 90 cases of the

176 (51%) associated too with a positive stabilizing indicator. Aid is actually stabilizing in almost 66% of all the cases.

As for remittances, we have 296 observations corresponding to 129 countercyclical versus 167 procyclical cases. Among the 129 cases of countercyclical remittances, 108 (84%) appear to be associated with a positive stabilizing indicator. There are also 109 cases where remittances are both procyclical and stabilizing. From a more general point of view, remittances seem to be stabilizing in 75% of all the cases.

As a conclusion, remittances appear to be stabilizing in more cases than official aid. We find also that the sum of remittances and foreign aid is stabilizing in 70% of the cases.

**Table 3.A: Stabilizing character of remittances and aid with regard to exports, whole sample (1980-2005)**

		80-84	85-89	90-94	95-99	00-05	Total	Total[ ]
<i>Remittances</i>								
<b>Destabilizing</b>	pro	13	8	15	13	19	58 (34%)	
	counter	1	3	4	4	9	21 (16%)	
	<b>total</b>	<b>4[0]</b>	<b>12[0]</b>	<b>19[1]</b>	<b>17[1]</b>	<b>28[3]</b>	<b>79 (25%)</b>	<b>[5]</b> <b>(12%)</b>
<b>Stabilizing</b>	pro	17	21	15	27	29	109 (66%)	
	counter	25	20	20	23	20	108 (84%)	
	<b>total</b>	<b>42[9]</b>	<b>41[5]</b>	<b>35[6]</b>	<b>50[6]</b>	<b>49[7]</b>	<b>217 (75%)</b>	<b>[34]</b> <b>(88%)</b>
<i>Aid</i>								
<b>Destabilizing</b>	pro	14	12	19	20	21	86 (49%)	
	counter	2	4	4	9	11	30 (18%)	
	<b>total</b>	<b>16 [1]</b>	<b>17[3]</b>	<b>25[1]</b>	<b>31[3]</b>	<b>33[4]</b>	<b>116 (34%)</b>	<b>[12]</b> <b>(22%)</b>
<b>Stabilizing</b>	pro	17	16	18	20	19	90 (51%)	
	counter	22	29	24	29	29	133 (82%)	
	<b>total</b>	<b>44[5]</b>	<b>46[7]</b>	<b>47[12]</b>	<b>51[14]</b>	<b>48[5]</b>	<b>223 (66%)</b>	<b>[43]</b> <b>(78%)</b>
<i>Rem+aid</i>								
<b>Destabilizing</b>	pro	6	9	17	12	19	63 (38%)	
	counter	2	3	2	8	12	27 (19%)	

	<b>total</b>	<b>8[0]</b>	<b>11[2]</b>	<b>19[1]</b>	<b>20[4]</b>	<b>31[6]</b>	<b>90 (30%)</b>	<b>[13]</b>
								<b>(20%)</b>
<b>Stabilizing</b>	pro	18	18	19	27	23	105 (62%)	
	counter	20	23	20	25	23	111 (81%)	
	<b>total</b>	<b>38[12]</b>	<b>41[8]</b>	<b>39[12]</b>	<b>52[12]</b>	<b>46[10]</b>	<b>216 (70%)</b>	<b>[54]</b>
								<b>(84%)</b>

Note: Number of cases significant at least 10% are given in brackets

As for the sub-Saharan African countries, remittances are also stabilizing in more cases than public aid, and both flows appear to be stabilizing in almost the same percentage of cases as in the whole sample.

**Table 3.B: Stabilizing character of remittances and aid with regard to exports, sub-Saharan African sample (1980-2005)**

		80-84	85-89	90-94	95-99	00-05	Total	Total[ ]
<i>Remittances</i>								
<b>Destabilizing</b>	pro	0	4	6	4	8	22 (36%)	
	counter	0	1	2	0	2	5 (11%)	
	<b>total</b>	<b>0[0]</b>	<b>5[0]</b>	<b>8[0]</b>	<b>4[0]</b>	<b>10[1]</b>	<b>27 (26%)</b>	<b>[1] (10%)</b>
<b>Stabilizing</b>	pro	6	8	5	9	11	39 (64%)	
	counter	8	8	9	8	6	39 (89%)	
	<b>total</b>	<b>14[5]</b>	<b>16[1]</b>	<b>14[1]</b>	<b>17[2]</b>	<b>17[1]</b>	<b>78 (74%)</b>	<b>[10] (90%)</b>
<i>Aid</i>								
<b>Destabilizing</b>	pro	6	7	7	9	8	37 (45%)	
	counter	0	1	1	3	4	9 (17%)	
	<b>total</b>	<b>6[0]</b>	<b>8[2]</b>	<b>8[0]</b>	<b>12[3]</b>	<b>12[3]</b>	<b>46 (34%)</b>	<b>[8] (24%)</b>
<b>Stabilizing</b>	pro	11	7	9	9	9	45 (55%)	
	counter	6	10	10	8	9	43 (83%)	
	<b>total</b>	<b>17[3]</b>	<b>17[7]</b>	<b>19[4]</b>	<b>17[8]</b>	<b>18[3]</b>	<b>88 (66%)</b>	<b>[25] (76%)</b>
<i>Rem+aid</i>								
<b>Destabilizing</b>	pro	2	5	6	7	11	31 (42%)	
	counter	1	2	1	2	3	9 (80.5%)	
	<b>total</b>	<b>3[0]</b>	<b>7[1]</b>	<b>7[0]</b>	<b>9[2]</b>	<b>14[2]</b>	<b>40 (34%)</b>	<b>[5] (20%)</b>
<b>Stabilizing</b>	pro	8	8	9	10	8	43 (58%)	
	counter	8	6	7	9	7	37 (19.5%)	
	<b>total</b>	<b>16[5]</b>	<b>14[4]</b>	<b>16[3]</b>	<b>19[6]</b>	<b>15[2]</b>	<b>80 (66%)</b>	<b>[20] (80%)</b>

These findings are strengthened by the two tables below which indicate that for both samples, the stabilizing impact of remittances is on average higher than the stabilizing impact of aid.

**Table 3.C: Stabilizing impact of remittances and aid with regard to exports, whole sample (1980-2005)**

	Averaged stabilizing impact					
	80-84	85-89	90-94	95-99	00-05	80-05
Remittances	0.77	0.48	0.30	0.56	0.2	0.44
Foreign aid	0.35	0.61	0.57	0.24	-0.24	0.28
Remittances+foreign aid	1.09	0.81	0.58	0.74	-0.01	0.58

**Table 3.D: Stabilizing impact of remittances and aid with regard to exports,**

**sub-Saharan African sample (1980-2005)**

	Averaged stabilizing impact					
	80-84	85-89	90-94	95-99	00-05	80-05
Remittances	1.01	0.37	0.25	0.66	0.18	0.47
Foreign aid	0.66	0.77	0.64	0.21	-0.59	-0.30
Remittances+foreign aid	1.13	0.50	0.28	0.77	-0.43	0.39

**3.7- Summary of results**

Empirical findings of this country-by-country analysis first suggest that for most of the countries in our whole sample, private transfers represent a bigger percentage of GDP than Official Development Assistance (ODA). However, this does not hold when we only consider the African sample.

Furthermore, neither remittances nor aid act countercyclically in a significant way. According to countries and period, remittances and aid are rather procyclical or acyclical.

However, by comparing weighted standard deviations of each flow, we observe that in a majority of countries aid and remittances are more stable over time than exports. Moreover, remittances appear to be on average less volatile than aid which is on average less volatile than exports, whatever sample is considered.

Finally, stabilization indexes with regard to exports indicate that both aid and remittances demonstrate a stabilizing character in a majority of countries. Nevertheless, remittances more often than aid have an average stabilizing character and they have a higher stabilizing impact than aid.<sup>1</sup>

**Table 4- Stabilizing or destabilizing impact of aid and remittances with regard to exports when they are procyclical or countercyclical**

Aid	
<p><b>1- Procyclical aid and S&gt;0 (45obs.)</b>                      Aid/X= 0.61                      Vol Aid/Vol X= 1.35                      Correlation coef.= 0.51                      Stabilization index= 3.33</p>	<p><b>2- Countercyclical aid and S&lt;0 (37 obs.)</b>                      Aid/X=0.51                      Vol Aid/Vol X= 3.68                      Correlation coef.= 0.54                      Stabilization index= -2.33</p>
<p><b>3- Countercyclical aid and S &gt;0 (43 obs.)</b>                      Aid/X=0.65                      Vol Aid/Vol X= 1.88                      Correlation coef.= -0.48                      Stabilization index= 4.42</p>	<p><b>4- Countercyclical aid and S &lt;0 (9 obs.)</b>                      Aid/X=0.41                      Vol Aid/Vol X= 3.73                      Correlation coef.= -0.43                      Stabilization index= -4.05</p>

<sup>1</sup> Another way to summarize is to regress the stabilizing impact on the average aid (or remittances) level, controlling for the level of export instability. The results obtained for the African sample are the following:

$$Volatility(Aid + X)_i = 0.57VolatilityX_i^{***} + 0.19\left(\frac{Aid}{Y}\right)^{**} - 0.005\left(\frac{Aid}{Y}\right)^{2**} \quad \text{threshold at } Aid/Y > 19\%$$

$$Volatility(Rem + X)_i = 0.75VolatilityX_i^{***} + 0.16\left(\frac{Rem}{Y}\right)^{**} - 0.005\left(\frac{Rem}{Y}\right)^{2***} \quad \text{threshold at } Rem/Y > 14.5\%$$

### Remittances

1- Procyclical rem and S>0 (39 obs.)	2- Procyclical rem and S<0 (22 obs.)
R/X= 6.42	R/X= 3.35
Vol R/Vol X= 2.16	Vol R/Vol X= 7.86
Correlation coef.= 0.52	Correlation coef.= 0.51
Stabilization index= 1.37	Stabilization index= -0.61
3- Countercyclical rem and S >0 (39 obs.)	4- Countercyclical rem and S <0 (5 obs.)
R/X= 5.21	R/X= 4.56
Vol R/Vol X= 2.33	Vol R/Vol X= 8.96
Correlation coef.= -0.41	Correlation coef.= -0.39
Stabilization index= 2.12	Stabilization index= -0.47

## 4- CROSS SECTION ANALYSIS

### 4.1- The dampening effect of aid en remittances on growth volatility

After having examined the stabilizing character and the stabilizing effect of remittances and aid through a country-by -country approach, we examine in this section whether these two kinds of inflows have on average a significant effect on the stability of income in recipients by estimating the following equation:

$$\text{Vol. } Y_{it} = \alpha_1 X_{it} + \alpha_2 Z_{it} + \varepsilon_{it}$$

where  $Y_{it}$  represents the logarithm of real income per capita of country  $i$  ( $i=1..N$ ) in period  $t$  ( $t=1..T$ ),  $X$  is recipient exports as a percentage of GDP and  $Z$  corresponds to our interest variable in percentage of GDP (alternatively aid, remittances and the sum of aid and remittances).

In this part, income volatility is still measured by taking the average of the quadratic deviation relative to the mixed trend and for a robustness check we present also the results obtained by using the H.P measure in Appendix 6.

Since there may be a problem of endogeneity<sup>2</sup> and to control for specific countries effect, we use the system GMM method proposed by Arellano and Bover (1995) and Blundell and Bond (1998). This method consists in instrumenting first-differenced equations by lagged level variables and equations in level by the lagged difference of endogenous variables. We also include in our model some external instruments for aid and remittances. As instruments for aid, we use a set of variables capturing historical relationships between recipient countries and donor countries. Following Tavares (2003), we use more precisely the total aid budget of the five main donors from OCDE weighted by variables of cultural distance (whether they speak the same language or have the same religion) and by the geographical distance between receiving and donor countries. As external instruments for remittances, we use the ratio of remittances to GDP of all recipient countries except the country considered (Chami et al., 2008), and the distance between the sending country  $i$  and the main destination countries  $j$  weighted by the income gap between the two countries (the dataset is built from Spatafora, 2005).

**Table 4.A: Income volatility estimation 5-year averages, 1980-2005, whole sample**

	System-GMM		
	Volatility from rolling adjustment		
Volatility of $Y_{t-1}$	0.655***	0.602***	0.627***

<sup>2</sup> The endogeneity could come from reverse causality between the interest variable and the dependent variable, from some omitted variables affecting both the interest variable and the dependent variable, or from measurement errors.

	(4.99)	(3.84)	(3.95)
Initial $\mathcal{Y}$ (log)	-0.227 (-0.89)	-0.255 (-0.67)	-0.191 (-0.88)
X/GDP	-0.014 (-0.85)	-0.048* (-1.67)	-0.087 (-1.40)
Volatility of X $\times$ (X/GDP)	0.0027** (1.97)	0.0034*** (2.70)	0.0090** (2.01)
Rem/GDP	-0.050* (-1.92)		
Aid/GDP		-0.051*** (-2.32)	
(Rem+Aid)/GDP			-0.041** (-2.08)
Constant	-0.709 (-0.35)	3.360 (0.84)	3.025 (1.18)
Time dummies	yes	yes	yes
Observations	270	280	270
Countries	78	80	78
Hansen p-value	0.42	0.39	0.47
AR(2) p-value	0.46	0.48	0.59

Note: Robust t-statistics in parentheses; \*significant at 10%, \*\*significant at 5%, \*\*\*significant at 1%

Estimations results first reveal that migrant remittances, aid and the sum of the two flows exert a negative and statistically significant influence on income volatility in receiving countries. This finding holds by considering only sub-Saharan African countries (Table 4.B). However, while at the country level, remittances appear to dampen the instability of exports more often than aid does so, on a cross-country basis, aid seems to have a slightly more important stabilizing effect, especially in the case of sub-Saharan African countries. These findings are corroborated when we use the Hodrick-Prescott filter to measure volatility (see robustness checks in Appendix 7).

**Table 4.B: Income volatility estimation 5-year averages, 1980-2005, sub-Saharan African panel**

	System-GMM		
	Volatility from rolling adjustment		
Volatility of $\mathcal{Y}_{t-1}$	0.465*** (3.46)	0.422*** (3.35)	0.379*** (3.72)
Initial $\mathcal{Y}$ (log)	-0.755 (-1.56)	-0.293 (-0.45)	-0.914** (-2.42)
X/GDP	-0.055 (-1.08)	-0.024 (-0.35)	-0.068 (-0.89)
Volatility of X $\times$ (X/GDP)	0.005** (2.01)	0.001 (1.20)	0.004** (1.68)
Rem/GDP	-0.057** (2.03)		
Aid/GDP		-0.069** (2.02)	
(Rem+Aid)/GDP			-0.045** (-2.12)
Constant	6.487* (1.83)	4.496 (0.73)	9.023*** (2.37)
Time dummies	yes	yes	yes
Observations	108	113	108

Countries	29	30	29
Hansen p-value	0.34	0.68	0.50
AR(2) p-value	0.60	0.52	0.57

*Note: Robust t-statistics in parentheses; \*significant at 10%, \*\*significant at 5%, \*\*\*significant at 1%*

### **5-CONCLUDING REMARKS**

This paper examines the respective stabilizing effect of remittances and aid, both at the country level and on a cross-country basis. At the country level, our results indicate that most often than the opposite, both kinds of flows appear stabilizing, and remittances appear to dampen the instability of exports more often than aid does so. This finding holds for the sub-Saharan African sample too and is robust, albeit slightly less clear, to the use of an H-P filter to measure cycles.

On a cross-country basis, both aid and remittances appear to significantly dampen the growth volatility. However, while at the country level remittances appear to dampen the instability of exports more often than aid does so, on a cross-country basis, aid seems to lower growth volatility more than aid, especially for African countries. One explanation behind could be the more important part of aid in African recipients' GDP compared to the relative level of remittances.

A major policy implication of our findings is that both aid and remittances should be viewed as complementary.

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#### Appendix 1- Relative importance of remittances and official aid in recipients (Mean fraction of recipients' GDP, 1980-2005)

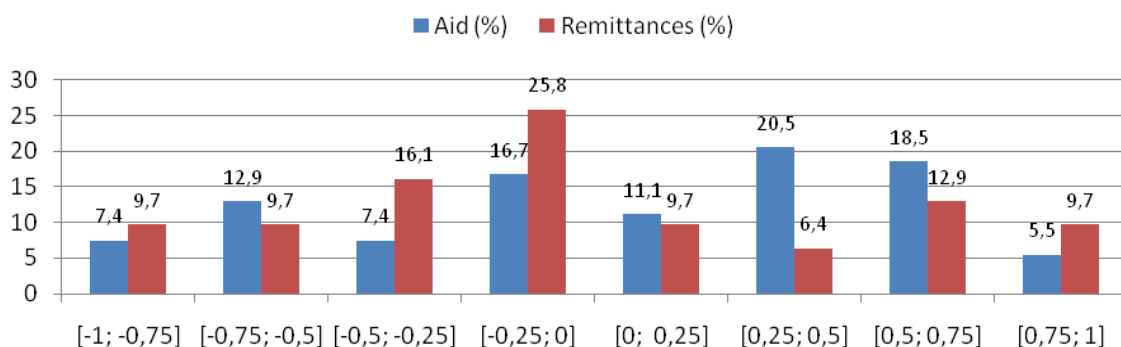
Countries	% of GDP			Countries	% of GDP		
	Remittances	Aid	Exports		Remittances	Aid	Exports
Albania	16.0	2.64	16.2	Lebanon	21.6	1.80	14.2

Algeria	1.61	0.18	28.2	<b>Lesotho</b>	<b>53.7</b>	<b>3.89</b>	<b>25.5</b>
Argentina	0.06	0.03	11.6	Macedonia,	2.63	1.47	38.9
Armenia	9.89	2.56	29.6	<b>Madagascar</b>	<b>0.28</b>	<b>3.81</b>	<b>19.0</b>
Azerbaijan	1.96	0.76	44.8	<b>Malawi</b>	<b>0.05</b>	<b>7.97</b>	<b>24.8</b>
Bangladesh	3.58	1.32	9.2	<b>Mali</b>	<b>3.76</b>	<b>6.83</b>	<b>20.6</b>
Belize	4.5	4.11	53.8	<b>Mauritania</b>	<b>0.5</b>	<b>6.69</b>	<b>40.5</b>
<b>Benin</b>	<b>4.16</b>	<b>4.56</b>	<b>15.9</b>	Moldova	14.6	1.68	46.8
Bolivia	0.69	3.48	22.7	Mongolia	5.44	01.8	46.3
<b>Botswana</b>	<b>2.27</b>	<b>2.03</b>	<b>54.7</b>	Morocco	6.97	1.06	26.5
<b>Burkina Faso</b>	<b>4.59</b>	<b>4.83</b>	<b>9.7</b>	<b>Mozambique</b>	<b>1.87</b>	<b>9.11</b>	<b>14.2</b>
Cambodia	2.04	2.06	32.8	<b>Namibia</b>	<b>0.37</b>	<b>1.29</b>	<b>53.6</b>
<b>Cameroon</b>	<b>0.17</b>	<b>1.93</b>	<b>23.3</b>	Nicaragua	5.80	3.91	20.9
<b>Cape Verde</b>	<b>16.0</b>	<b>8.60</b>	<b>19.5</b>	<b>Nigeria</b>	<b>1.63</b>	<b>0.39</b>	<b>35.7</b>
Colombia	1.37	0.09	16.9	Oman	0.39	1.03	51.0
<b>Comoros</b>	<b>4.11</b>	<b>6.13</b>	<b>15.7</b>	Pakistan	4.82	0.76	14.5
<b>Congo, Rep.</b>	<b>0.26</b>	<b>6.0</b>	<b>61.8</b>	Panama	1.28	0.48	80.5
<b>Cote d'Ivoire</b>	<b>0.73</b>	<b>2.46</b>	<b>39.0</b>	Paraguay	2.14	0.48	34.3
Croatia	3.15	0.20	47.8	Peru	1.11	0.42	16.1
<b>Djibouti</b>	<b>2.99</b>	<b>19.5</b>	<b>41.0</b>	Philippines	6.01	0.37	35.7
Dominica	5.47	7.05	47.5	<b>Rwanda</b>	<b>0.36</b>	<b>5.79</b>	<b>8.4</b>
Ecuador	2.27	0.54	27.1	Samoa	21.3	5.76	32.3
Egypt	7.7	1.59	22.0	Sao Tome & P	2.10	18.7	26.3
El Salvador	8.94	1.70	22.9	<b>Senegal</b>	<b>3.86</b>	<b>5.48</b>	<b>28.7</b>
<b>Ethiopia</b>	<b>0.32</b>	<b>2.23</b>	<b>9.0</b>	<b>Seychelles</b>	<b>0.96</b>	<b>2.81</b>	<b>67.6</b>
<b>Gambia, The</b>	<b>4.84</b>	<b>5.27</b>	<b>48.6</b>	<b>South Africa</b>	<b>0.13</b>	<b>0.12</b>	<b>26.7</b>
Georgia	7.77	4.6	32.4	Sri Lanka	6.08	1.51	31.8
<b>Ghana</b>	<b>0.31</b>	<b>10.7</b>	<b>23.7</b>	St Vincent	1.2	3.28	56.6
Guatemala	2.50	0.63	17.2	<b>Sudan</b>	<b>3.27</b>	<b>2.63</b>	<b>11.8</b>
<b>Guinea</b>	<b>0.64</b>	<b>2.54</b>	<b>24.2</b>	Surinam	5.79	7.52	46.75
<b>Guinea-B.</b>	<b>3.11</b>	<b>11.2</b>	<b>16.3</b>	<b>Swaziland</b>	<b>8.26</b>	<b>1.65</b>	<b>76.4</b>
Guyana	4.65	4.03	83.4	Syrian Arab R.	2.73	2.12	25.6
Honduras	4.38	2.74	35.4	<b>Tanzania</b>	<b>0.11</b>	<b>7.39</b>	<b>16.0</b>
India	1.81	0.16	9.9	<b>Togo</b>	<b>2.53</b>	<b>2.63</b>	<b>36.9</b>
Indonesia	0.36	0.38	29.3	Tonga	9.94	12.51	29.18
Jordan	19.6	5.85	45.9	Tunisia	4.15	0.75	41.2
Kazakhstan	0.49	0.20	45.3	Turkey	2.08	0.19	18.9
<b>Kenya</b>	<b>1.98</b>	<b>2.91</b>	<b>26.2</b>	<b>Uganda</b>	<b>5.30</b>	<b>3.28</b>	<b>11.1</b>
Kyrgyz Rep.	2.53	2.98	36.4	Vanuatu	6.20	13.76	37.88
Lebanon	21.6	1.80	14.2	Venezuela, RB	0.01	0.03	28.0
Lao PDR	0.82	3.49	19.9	<b>Zimbabwe</b>	<b>0.13</b>	<b>1.51</b>	<b>28.1</b>

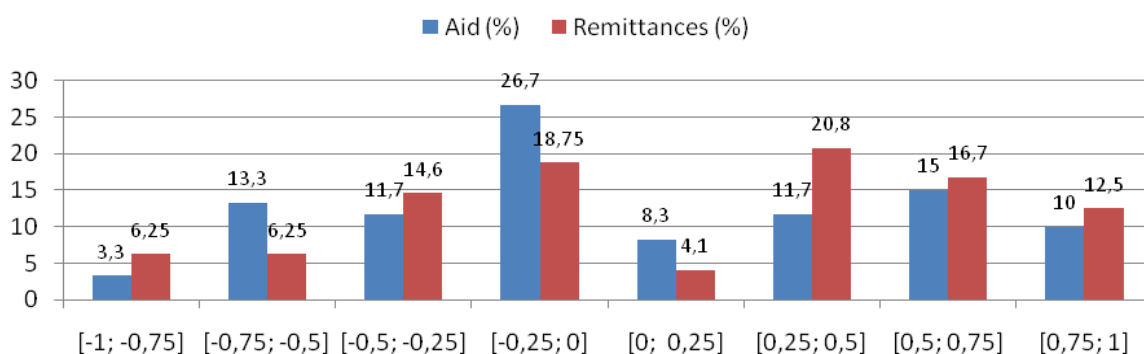
	All countries (82)	Sub-Saharan African countries (33)
Average ratio Rem/GDP	5.06	4.71
Average ratio Aid/GDP	8.10	12.78
Number of countries where Aid/GDP>Rem/GDP	38 (46%)	25 (76%)
Number of countries where Rem/GDP>Aid/GDP	44(54%)	8 (24%)

Appendix 2- Contemporaneous correlations between aid or remittances and recipient exports

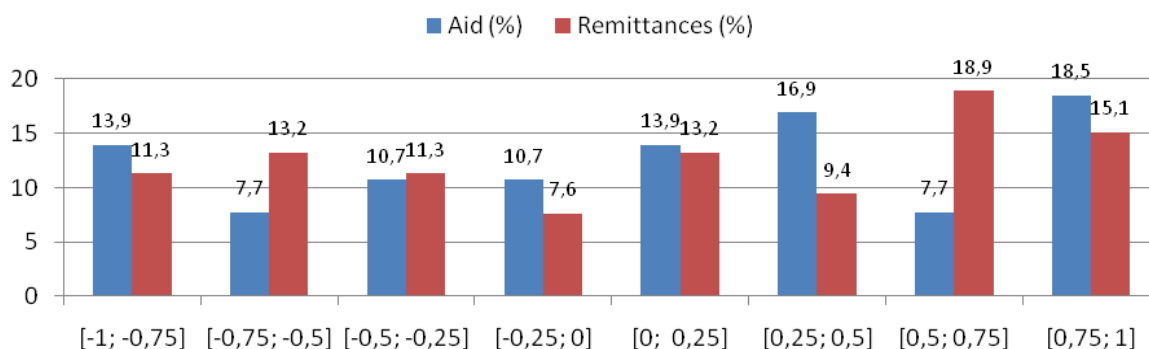
## 1980-1984



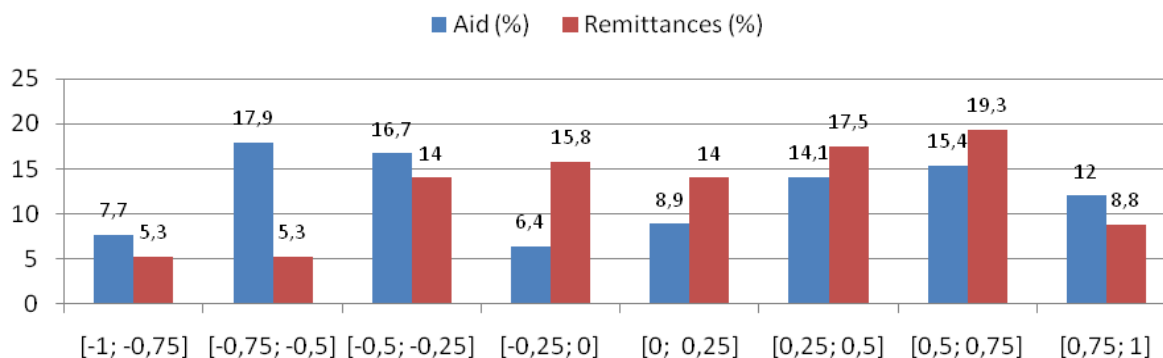
## 1985-1989



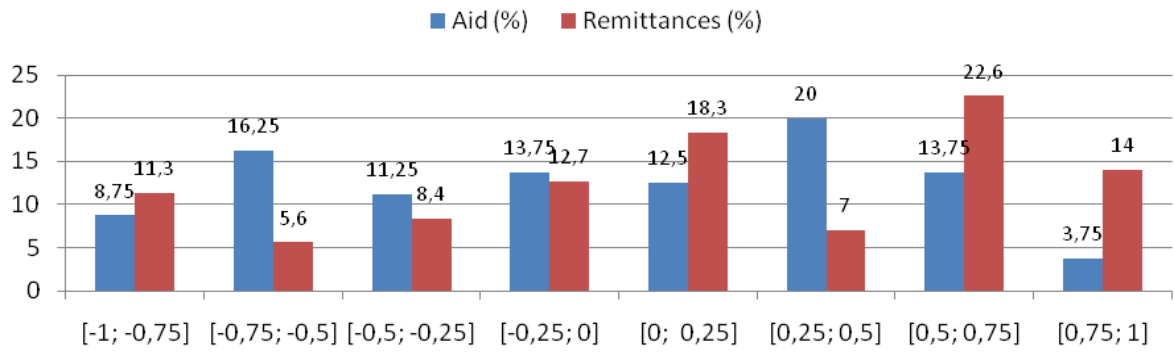
## 1990-1994



## 1995-1999



# 2000-2005



Appendix 3a- Average volatility of foreign aid, remittances and exports, non sub-Saharan African recipients (1980-2005)

Countries	<i>Standard deviation (%)</i>			Countries	<i>Weighted standard deviation (% GDP)</i>		
	Aid	Remittances	Exports		Aid	Remittances	Exports
Albania	91.1	15.5	22.6	Albania	2.95	0.26	4.92
Algeria	21.3	25.2	12.6	Algeria	0.30	0.69	6.28
Argentina	28.1	13.8	14.5	Argentina	0.56	0.50	1.77
Armenia	12.9	26.2	12.3	Armenia	1.36	0.49	4.20
Azerbaijan	20.1	21.0	18.1	Azerbaijan	0.97	0.48	3.50
Bangladesh	13.8	10.2	9.9	Bangladesh	0.38	0.12	2.44
Belize	37.9	13.1	7.1	Belize	2.84	0.11	2.87
Bolivia	16.8	44.2	9.8	Bolivia	1.98	0.73	2.10
Cambodia	22.1	56.8	14.0	Cambodia	1.28	2.41	4.36
Colombia	28.0	31.0	8.5	Colombia	3.95	2.11	1.38
Croatia	25.4	8.7	6.1	Croatia	4.26	0.13	1.82
Dominica	32.5	35.1	19.6	Dominica	2.10	0.65	8.14
Ecuador	24.9	77.8	8.7	Ecuador	0.65	3.48	2.50
Egypt	23.3	14.8	8.5	Egypt	1.25	0.68	1.91
El Salvador	15.3	13.0	11.9	El Salvador	1.03	0.70	2.77
Georgia	11.9	9.3	13.9	Georgia	0.84	0.04	2.54
Guatemala	15.3	31.3	6.0	Guatemala	0.48	0.85	1.20
Guyana	39.8	19.5	10.7	Guyana	5.94	0.18	6.91
Honduras	29.3	55.8	7.2	Honduras	1.52	5.60	1.91
India	15.8	15.3	5.4	India	0.11	1.70	1.01
Indonesia	34.2	12.1	6.9	Indonesia	0.13	2.08	1.71
Jordan	33.3	13.3	6.0	Jordan	3.53	2.68	2.92
Kazakhstan	14.4	20.5	6.8	Kazakhstan	0.84	2.83	1.49
Kyrgyz Rep	8.1	18.7	7.3	Kyrgyz Rep	1.08	0.44	1.57
Lao PDR	20.4	54.3	10.7	Lao PDR	2.74	2.89	2.38
Lebanon	42.6	13.4	6.7	Lebanon	3.79	0.53	1.10
Macedonia	30.5	7.7	5.6	Macedonia	2.34	0.27	1.39
Moldova	20.5	9.6	13.6	Moldova	1.32	0.15	5.45
Mongolia	31.7	12.0	9.5	Mongolia	3.13	0.25	3.16
Morocco	27.3	17.1	6.1	Morocco	1.87	0.42	1.33
Nicaragua	30.6	4.4	13.0	Nicaragua	5.06	0.57	2.80
Oman	92.9	4.3	12.2	Oman	1.55	0.33	4.51
Pakistan	27.3	17.1	6.1	Pakistan	0.38	0.71	2.78
Panama	40.2	21.6	7.0	Panama	2.07	0.38	4.73
Paraguay	23.5	22.9	13.6	Paraguay	0.29	0.28	4.04
Peru	18.3	7.6	12.9	Peru	0.21	0.22	2.54
Philippines	19.2	13.7	6.4	Philippines	1.41	0.39	1.66
Samoa	20.0	10.3	3.6	Samoa	5.72	0.46	0.87
Sao Tome	25.4	18.9	14.8	Sao Tome	16.49	1.25	3.68
Sri Lanka	20.3	9.5	8.0	Sri Lanka	1.18	0.96	3.20
St. Vincent	38.4	47.4	11.2	St. Vincent	3.01	0.05	6.11
Surinam	52.49	25.9	17.5	Surinam	4.04	1.28	8.33
Syrian Arab.	52.5	38.0	10.3	Syrian Arab.	1.76	0.35	3.50
Tunisia	26.4	9.2	6.9	Tunisia	0.28	0.52	2.26
Turkey	116.1	19.0	9.1	Turkey	6.38	1.39	1.50
Vanuatu	20.76	37.3	7.8	Vanuatu	3.33	0.68	3.16
Venezuela	40.1	44.1	10.4	Venezuela	0.27	0.89	3.26
Yemen, Rep,	22.8	3.7	13.5	Yemen, Rep,	0.80	0.10	4.37

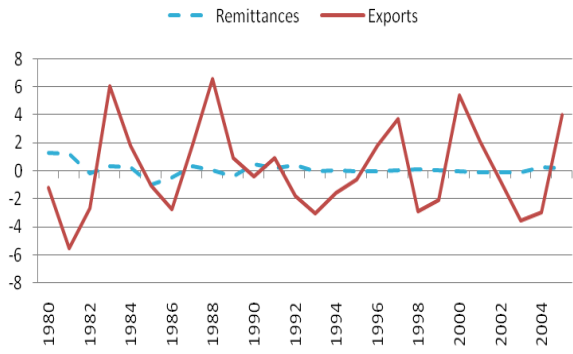
Appendix 3b- Volatility of foreign aid, remittances and exports, sub-Saharan African recipients

Countries	<i>Standard deviation (%)</i>			Countries	<i>Weighted standard deviation (% GDP)</i>		
	Aid	Remittances	Exports		Aid	Remittances	Exports
Benin	14.8	15.7	12.2	Benin	1.50	0.15	2.34
Botswana	17.4	13.8	8.7	Botswana	0.24	0.46	3.44
Burkina F.	12.1	14.7	14.5	Burkina F.	1.55	0.46	1.86
Cameroon	22.7	49.3	9.2	Cameroon	1.96	4.13	2.19
Cape verde	14.1	9.9	9.5	Cape verde	2.51	0.56	5.91
Comoros	19.1	11.8	19.1	Comoros	2.64	0.56	5.91
Congo, Rep.	41.5	41.9	13.6	Congo, Rep.	1.41	1.03	7.03
Cote d'Iv	41.3	16.7	9.5	Cote d'Iv	1.84	0.46	3.80
Djibouti	29.7	7.0	6.0	Djibouti	6.99	0.04	3.80
Ethiopia	19.5	32.8	7.5	Ethiopia	1.33	0.75	2.26
Gambia, The	19.4	49.9	10.3	Gambia, The	3.15	0.60	4.83
Ghana	22.4	32.9	20.4	Ghana	1.45	1.19	4.82
Guinea	22.1	72.4	7.1	Guinea	5.10	0.79	0.93
Guinea-B.	25.3	17.2	24.0	Guinea-B.	7.01	0.26	8.89
Kenya	16.7	18.7	6.8	Kenya	5.10	1.60	1.59
Lesotho	14.1	11.5	16.0	Lesotho	0.87	1.27	3.81
Madagascar	26.5	19.5	10.8	Madagascar	3.48	1.21	2.57
Malawi	17.4	3.3	11.1	Malawi	2.77	0.10	4.53
Mali	11.8	18.9	9.2	Mali	2.55	0.33	2.77
Mauritania	20.3	65.6	8.0	Mauritania	2.63	1.05	3.84
Mozambique	22.4	12.1	8.4	Mozambique	4.07	0.72	2.82
Namibia	19.0	9.9	6.1	Namibia	1.24	0.47	1.92
Nigeria	32.1	117.6	24.5	Nigeria	0.30	13.18	11.21
Rwanda	20.4	39.7	22.1	Rwanda	5.72	0.97	2.04
Senegal	20.5	13.0	9.7	Senegal	2.29	0.60	4.32
Seychelles	26.5	54.5	7.2	Seychelles	2.10	0.96	3.69
South Afr.	8.3	20.6	7.6	South Afr.	0.45	0.69	2.14
Sudan	24.8	46.1	12.3	Sudan	1.46	0.78	4.25
Swaziland	32.8	9.2	10.7	Swaziland	1.66	0.22	5.84
Tanzania	12.9	31.0	6.4	Tanzania	1.40	0.19	1.67
Togo	25.0	23.3	15.5	Togo	4.19	0.27	5.21
Uganda	13.9	20.8	27.5	Uganda	1.12	1.64	3.84
Zimbabwe	36.7	154.8	7.6	Zimbabwe	1.85	3.10	2.51

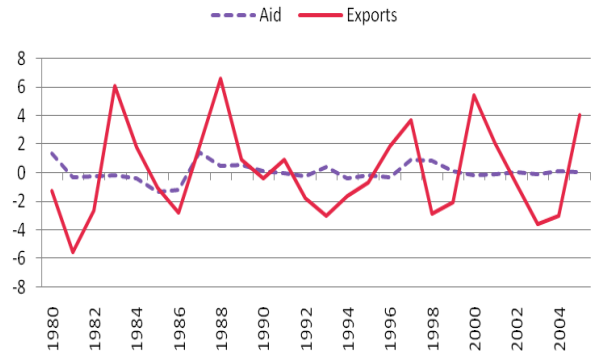
Appendix 4- Cyclicity of remittances, official assistance and exports for some countries



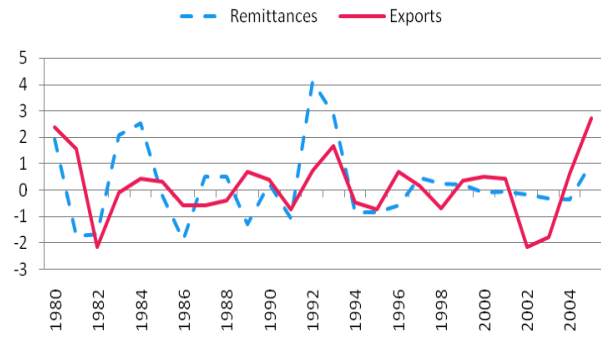
### Botswana



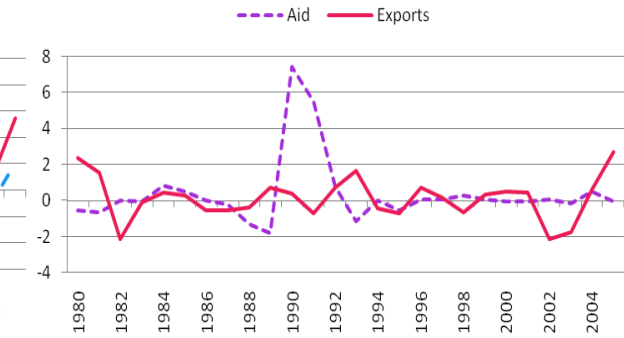
### Botswana



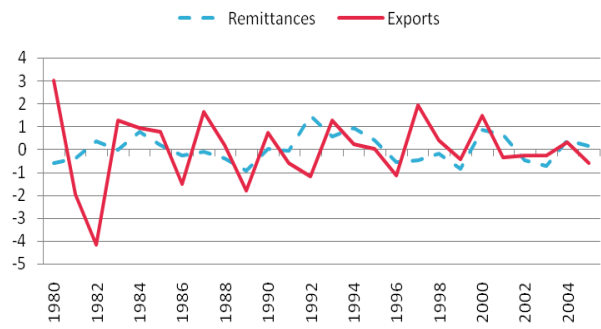
### Egypt



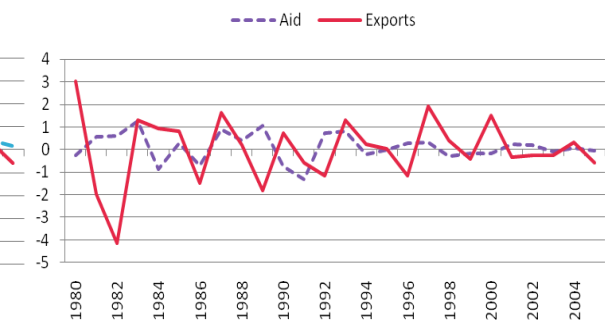
### Egypt



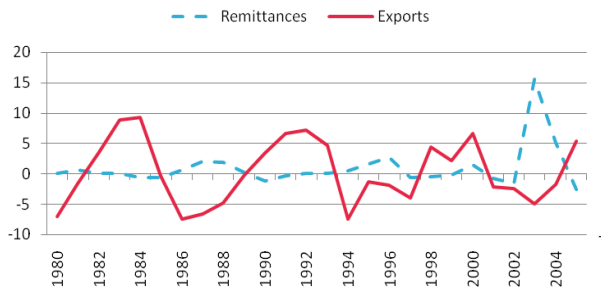
### El Salvador



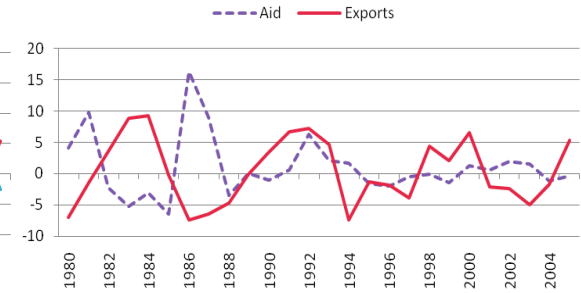
### El Salvador

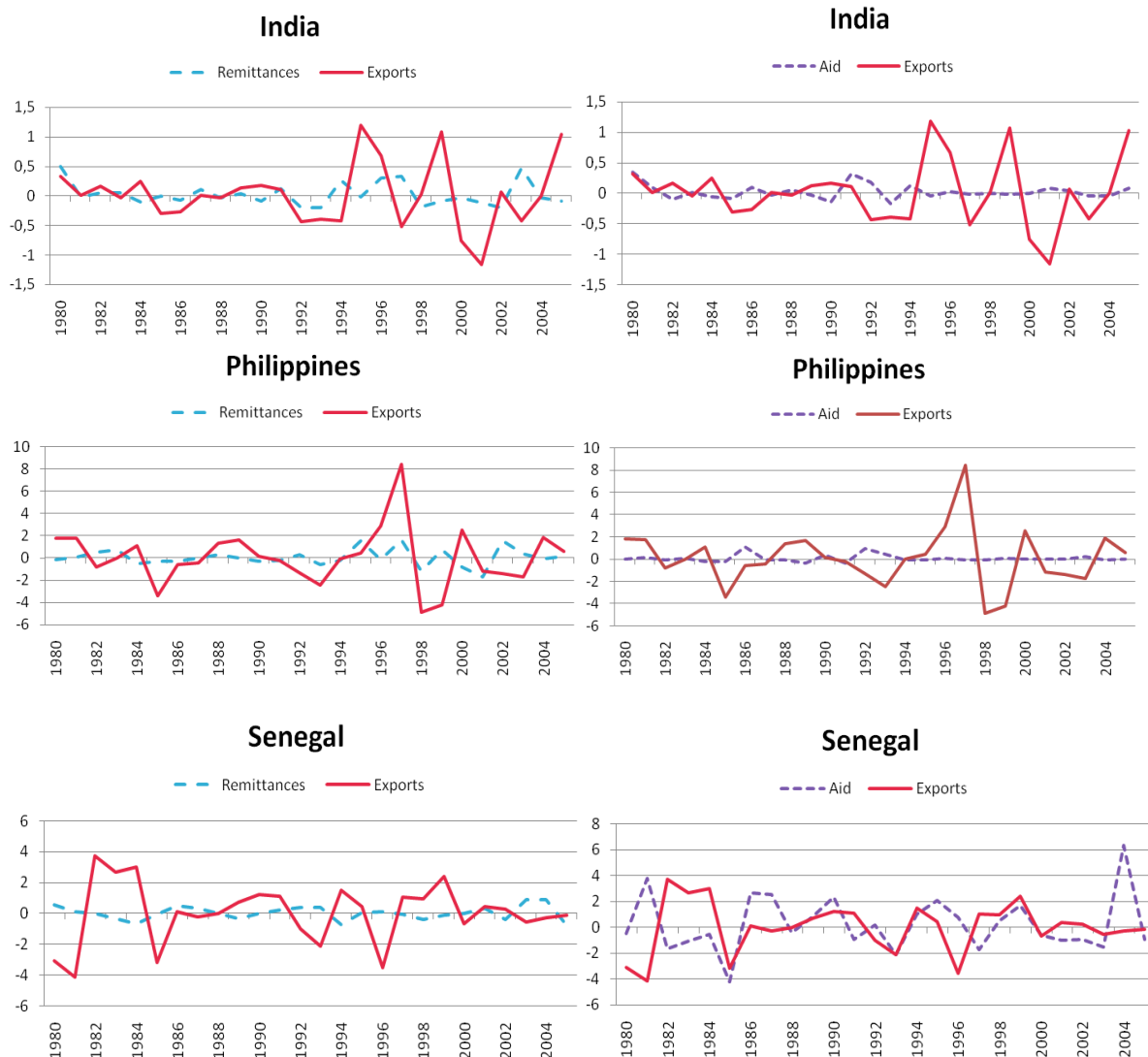


### Gambia



### Gambia





Appendix 5.A- List of countries and corresponding period for aid data

Countries	Years	Countries	Years
Albania	1988-2005	Lesotho	1980-2005
Algeria	1980-2005	Macedonia, FYR	1993-2005
Agentina	1980-2005	Madagascar	1980-2005
Armenia	1991-2005	Malawi	1980-2005
Azerbaijan	1991-2005	Mali	1980-2005
Banglades	1980-2005	Mauritania	1980-2005
Belize	1980-2005	Moldova	1997-2005
Benin	1980-2005	Mongolia	1981-2005
Bolivia	1980-2005	Morocco	1980-2005

Botswana	1980-2005	Mozambique	1980-2005
Burkina Faso	1980-2005	Namibia	1985-2005
Cambodia	1987-2005	Nicaragua	1980-2005
Cameroon	1980-2005	Nigeria	1980-2005
Cape Verde	1986-2005	Oman	1980-2004
Colombia	1980-2005	Pakistan	1980-2005
Comoros	1980-2005	Panama	1980-2005
Congo, Rep.	1980-2005	Paraguay	1980-2005
Cote d'Ivoire	1980-2005	Peru	1990-2005
Croatia	1994-2005	Philippines	1980-2005
Djibouti	1987-1995	Rwanda	1980-2005
Dominica	1980-2005	Samoa	1982-2005
Ecuador	1980-2007	Sao Tome and P.	1980-2005
Egypt, Arab rep.	1980-2008	Senegal	1980-2005
El Salvador	1980-2009	Seychelles	1980-2005
Ethiopia	1980-2005	South africa	1993-2005
Gambia, The	1980-2007	Sri Lanka	1980-2005
Georgia	1991-2005	St Vincent & the G.	1980-2005
Ghana	1980-2005	Sudan	1980-2005
Guatemala	1980-2005	Surinam	1980-2005
Guinea	1986-2005	Swaziland	1980-2005
Guinea-Bissau	1980-2005	Syrian Arab Republic	1980-2005
Guyana	1980-2005	Tanzania	1988-2005
Honduras	1980-2005	Togo	1980-2005
India	1980-2005	Tonga	1980-2005
Indonesia	1980-2005	Tunisia	1980-2005
Jordan	1980-2005	Turkey	1980-2005
Kazakhstan	1991-2005	Uganda	1980-2005
Kenya	1980-2005	Vanuatu	1980-2005
Kyrgyz Republic	1992-2005	Venezuela, RB	1980-2005
Lao PDR	1984-2005	Yemen, Rep.	1990-2005
Lebanon	1992-2005	Zimbabwe	1980-1993

## Appendix 5.B- List of countries and corresponding period for remittances

Countries	Years	Countries	Years
Albania	1992-2005	Lesotho	1980-2005
Algeria	1980-2005	Macedonia, FYR	1996-2005
Argentina	1992-2005	Madagascar	1984-2005
Armenia	1995-2005	Malawi	1994-2005
Azerbaijan	1998-2005	Mali	1980-2005
Bangladesh	1980-2005	Mauritania	1980-2005
Belize	1984-2005	Moldova	1995-2005
Benin	1980-2005	Mongolia	1998-2005
Bolivia	1980-2005	Morocco	1980-2005
Botswana	1980-2005	Mozambique	1980-2005
Burkina Faso	1980-2005	Namibia	1990-2005
Cambodia	1992-2005	Nicaragua	1991-2005
Cameroon	1979-2005	Nigeria	1980-2005
Cape Verde	1986-2005	Oman	1980-2004
Colombia	1980-2005	Pakistan	1980-2005
Comoros	1980-2005	Panama	1980-2005
Congo, Rep.	1995-2005	Paraguay	1980-2005
Cote d'Ivoire	1980-2005	Peru	1990-2005
Croatia	1993-2005	Philippines	1980-2005
Djibouti	1992-1995	Rwanda	1980-2005
Dominica	1980-2005	Samoa	1982-2005
Ecuador	1980-2005	Sao Tome and P.	1998-2005
Egypt, Arab rep.	1980-2005	Senegal	1996-2005
El Salvador	1980-2005	Seychelles	1989-1996
Ethiopia	1981-2005	South africa	1980-2005
Gambia, The	1980-2005	Sri Lanka	1980-2005
Georgia	1997-2005	St Vincent & the G.	1986-2005
Ghana	1980-2005	Sudan	1980-2005
Guatemala	1980-2005	Surinam	1980-1993
Guinea	1995-2005	Swaziland	1980-2005
Guinea-Bissau	1996-2005	Syrian Arab Republic	1980-2005
Guyana	1991-2005	Tanzania	1995-2005
Honduras	1980-2005	Togo	1980-2005
India	1980-2005	Tonga	1980-1993
Indonesia	1983-2005	Tunisia	1980-2005
Jordan	1980-2005	Turkey	1980-2005
Kazakhstan	1995-2005	Uganda	1999-2005
Kenya	1980-2005	Vanuatu	1982-2004
Kyrgyz Republic	1993-2005	Venezuela, RB	1985-2005
Lao PDR	1984-2005	Yemen, Rep.	1990-2005
Lebanon	1990-2005	Zimbabwe	1980-2005

Appendix 6- Robustness checks

**Table 5.A: Income volatility estimation 5-year averages, 1980-2005, whole sample**

	System –GMM Hodrick-Prescott		
Volatility of y t-1	0.219*** (10.02)	0.334*** (3.59)	0.316*** (3.02)
Initial y (log)	20.13*** (2.97)	20.53*** (3.88)	18.12*** (3.46)
X/GDP	0.119 (0.46)	-0.350 (-0.82)	-0.009 (-0.03)
Volatility of X*X/GDP	2.075* (1.85)	3.163 (1.09)	1.951 (1.48)
Rem/GDP	-0.626* (-1.93)		
Aid/GDP		-0.551* (-1.80)	
(Rem+Aid)/GDP			-0.544* (-1.73)
Time dummies	yes	yes	Yes
Observations	259	276	259
Countries	75	78	75
Hansen p8value	0.40	0.58	0.61
AR(2) p-value	0.89	0.88	0.89

**Table 5.B: Income volatility estimation 5-year averages, 1980-2005, sub-Saharan African countries**

	System –GMM Hodrick-Prescott		
Volatility of y t-1	0.456*** (4.44)	0.610** (9.09)	0.450*** (5.97)
Initial y (log)	5.059*** (2.77)	7.489** (1.97)	6.468*** (2.93)
X/GDP	-0.171 (-1.61)	-0.116 (-0.87)	-0.027 (-0.30)
Volatility of X*X/GDP	1.484*** (2.56)	2.526* (1.76)	1.867*** (2.66)
Rem/GDP	-0.079 (-1.20)		
Aid/GDP		-0.264* (-1.80)	
(Rem+Aid)/GDP			-0.067* (-1.67)
Time dummies	yes	yes	Yes
Observations	110	124	112
Countries	30	33	32
Hansen p8value	0.43	0.90	0.39
AR(2) p-value	0.26	0.54	0.24

Appendix 7- The determinants of the stabilizing impact  
Year to year and country approach

Let us consider that B is aid or remittances, X is exports, D corresponds to the variation and S represents the stabilizing impact (of aid or remittances with regard to exports). We then have:

$$a = \frac{B}{X}; b = \frac{DA}{DX}; C = B + X; b' = \frac{DB}{DX} = \frac{b}{a}; \frac{DX}{DC} = \frac{1}{(1+b)}; \frac{B}{C} = \frac{a}{(1+a)}; \frac{X}{C} = \frac{1}{(1+a)}$$

- For  $\frac{DX}{DC} > 0$  (B is procyclical) we have:  $S = \frac{\frac{DX}{X} - \frac{DC}{C}}{\frac{DX}{X} \left[ \frac{a-b}{1+a} \right]}$

- For  $\frac{DX}{DC} < 0$  (B is countercyclical) we have:  $S = \frac{\frac{DX}{X} + \frac{DC}{C}}{\frac{DX}{X} \left[ \frac{2+a+b}{1+a} \right]}$

Then there are 4 possible cases:

- 1- Aid (or remittances) is procyclical ( $b > 0$ )
  - 1a.  $S > 0$  if  $a > b$  or  $b' < 1$
  - 1b.  $S < 0$  if  $a < b$  or  $b' > 1$
- 2- Aid (or remittances) is countercyclical ( $b < 0$ )
  - 2a.  $S > 0$  always for  $b > -1$  (since  $a - b > 0$ ) and for  $b < -1$  if  $2 + a + b > 0$  (as long as  $a > -b - 2$ )
  - 2b.  $S < 0$  for  $-1 < b < -(2 + a)$  or  $a < -b - 2$

### Econometric approximation at the country level

Econometric estimation of the factors determining the stabilizing impact (S) should be conducted separately for various sub-samples.

Let us call IB, IX and IC the respective instability of B, X and C.  $CorBX$  corresponds to the correlation between DB and DX.

- 1- Aid (or remittances) is procyclical ( $CorBX > 0$ )

$$S = IX - IC = f\left(IX \times \frac{B}{B+X}, IB \times CorBX \times \frac{B}{B+X}, \frac{IB}{IX} \times \frac{B}{B+X}\right)$$

When  $S > 0$ ,  $Log(S) = f\left[\log(IX), \log(IB), \log\left(\frac{B}{B+X}\right), \log(CorBX)\right]$

- 2- Aid (or remittances) is countercyclical ( $CorBX < 0$ )

$$S = IX - IC = f\left(IX, \frac{B}{B+X}, IB \times CorBX \times \frac{B}{B+X}\right)$$

When  $S < 0$ ,  $Log(-S) = f\left[\log(IX), \log(IB), \log\left(\frac{B}{B+X}\right), \log(-CorBX)\right]$



Créée en 2003, la **Fondation pour les études et recherches sur le développement international** vise à favoriser la compréhension du développement économique international et des politiques qui l'influencent.



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