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## **Aid, Volatility and Growth Again**

### **When Aid Volatility Matters and When it Does Not**

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**Abstract**

In previous papers we have argued that aid is likely to mitigate the negative effects of external shocks on economic growth (*i.e.* that aid is more effective in countries which are more vulnerable to external shocks). Recently an important debate has emerged about the possible negative effects of aid volatility itself. However, the cushioning effect of aid may involve some volatility in aid flows, which then is not necessarily negative for growth. In this paper we examine to what extent the time profile of aid disbursements may contribute to an increase or a decrease of aid effectiveness. We first show that aid, even if volatile, is not clearly as pro-cyclical as often argued, and, even if pro-cyclical, is not necessarily destabilizing. We measure aid volatility by several methods and assess pro-cyclicality of aid with respect to exports, thus departing from previous literature, which usually assess pro-cyclicality of aid with respect to national income or fiscal receipts. The stabilizing/destabilizing nature of aid is measured by the difference in the volatility of exports and the volatility of the aid plus exports flows. Then, in order to take into account the diversity of shocks to which aid can respond, we consider the effect of aid on income volatility and again find that aid is making growth more stable, while its volatility reduces this effect. We finally evidence through growth regressions that the higher effectiveness of aid in vulnerable countries is to a large extent due to its stabilizing effect.

## 1. Introduction

While a rising concern was perceptible about the problems raised by volatility, several recent papers, followed by more official documents and political declarations, have underlined the problem induced by aid volatility (Bulir and Hamann, 2001, 2003, 2005; Eifert and Gelb, 2005; Fielding and Mavrotas 2005; Lensink and Morrissey, 2000; Pallage and Robe, 2001; Rand and Tarp, 2002; IMF and World Bank, 2005): if aid is volatile, it may contribute to macroeconomic instability, then be itself a factor of vulnerability. This concern has been reinforced by the prospect of an acceleration of disbursements in order to achieve the Millennium Development Goals. It may be particularly relevant for African countries, which are highly vulnerable and where the prospects of aid increase mainly apply.

However, in the context of the aid effectiveness debate, we have argued in two previous papers (Guillaumont and Chauvet, 2001; Chauvet and Guillaumont, 2004) that aid is likely to cushion the negative effects of external shocks on economic growth (*i.e.* that aid is more effective in countries that are more vulnerable to external shocks). Aid volatility prosecution may thus be misplaced if aid has a compensatory profile: in that case aid volatility, rather than a problem, would be a solution. Indeed, any cushioning effect of aid involves some volatility in aid flows: if aid is to mitigate trade and climatic shocks, then aid will obviously be volatile. This kind of aid volatility should not have a negative impact on growth, since it is likely to protect the growth process of the developing countries vulnerable to external shocks.

This is why volatility of aid is not so much prosecuted than its unpredictability and its pro-cyclicality. Unpredictability of aid is supposed to be harmful, but is difficult to assess. Its assessment would need a forecasting model of aid at the recipient level, where the predicted level would depend among other factors on the kind of aid delivered and on the shocks likely to occur. Pro-cyclicality is easier to measure. It has been essentially assessed with respect to

national income or fiscal revenue. Here we analyse the pro or contra-cyclical of aid mainly with respect to exports, because exports volatility, which results to a large extent from commodity price shocks, is more likely to be exogeneous than national income or fiscal revenue volatility. However pro-cyclical may not be the most relevant concept to assess the economic consequences of aid volatility, what we intend to do with regard to growth. This is why in this paper we design another concept, which is the stabilizing impact of aid, here measured with respect to exports.

Section 2 assesses the concepts of aid volatility, pro-cyclical, and stabilizing impact. Referring to the evolution of exports of goods and services, we argue that aid is not as pro-cyclical as it is often asserted. We measure the stabilizing character of aid with the difference between the volatility of exports and the volatility of exports plus aid. Using this indicator, we argue that a pro-cyclical aid can still be stabilizing, and that there may be cases where aid is contra-cyclical and destabilizing, depending on the relative volatility of aid with respect to exports.

Since the instability of exports is not the only kind of exogeneous shocks faced by low income countries, section 3 studies the stabilizing or destabilizing character of aid in a broader perspective. It examines through panel data the impact of aid on the volatility of income: controlling for the traditional variables of income volatility (including exports instability) we find that the level of aid has a stabilizing impact, while its volatility has a destabilizing impact.

In section 4, coming back to the stabilizing impact of aid with respect to exports, we use this indicator in growth regressions. We can explain that the higher aid effectiveness in vulnerable countries is due to a large extent to its stabilizing effect: exogeneous trade shocks have a negative impact on growth and aid mitigates this impact. Finally, section 5, presents the main conclusions of the paper.

## 2. Contra-cyclicality, volatility and stabilizing character of aid with regard to exports

The contra-cyclical character of aid can be measured by the correlation between the “cycle” of aid (*i.e.* the deviation from its trend) and the “cycle” of the aggregate to which aid is compared. Thus contra-cyclicality is always related to the choice of a reference aggregate and of a trend measurement.

### 2.1. *Contra-cyclical aid: with reference to which aggregate?*

Previous literature has so far assessed contra-cyclicality of aid with respect to national income (e.g. Pallage and Robe, 2001) or fiscal receipts (e.g. Bulir and Hamann, 2001, 2003, 2005). Here we compare aid cycles to that of exports of goods and services.<sup>1</sup> This can be justified on two grounds. First, as far as we are concerned by macroeconomic vulnerability to external shocks, better is to compare aid with the aggregate the most likely to be affected by exogeneous shocks. Many low income developing countries hugely suffer from export price shocks which can directly be assessed through the instability of exports. Second, national income and fiscal revenues are more likely to be influenced by aid disbursements than exports. Exceptions are countries suffering from Dutch disease, which however generally occurs with some delay. Anyway if Dutch disease effects were to occur immediately and symmetrically, aid volatility would be to some extent stabilizing: aid increase, leading to a real exchange rate appreciation, would induce a slow down of exports, and conversely.

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<sup>1</sup> Here we consider as a reference flow exports of goods and services, but not international capital flows, the volatility of which may exacerbate the consequences of trade shocks in middle income countries, as studied in the case of Chile (Caballerro, 2002): extending the reference flow to capital movements seems less relevant in the

## 2.2. Cycles: how are they measured?

Several alternative methodologies are available to analyse the cyclical characteristics and the volatility of aid and exports. Following Bulir and Hamann (2001, 2003, 2005), Pallage and Robe (2001) and Rand and Tarp (2002), an H-P filter (Hodrick et Prescott, 1997) can be used to extract the trend and cycle components of aid and of the reference flow, here exports. The H-P filter decomposes a series,  $x_t$ , (where  $x_t$  is the logarithm of the observed series  $X_t$ ) in a cycle,  $x_t^c$ , and a trend,  $x_t^g$ , by minimising the following function:

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

where  $\lambda$  is the smoothing parameter of  $x_t^g$ . The choice of the value of  $\lambda$  depends on the frequency of observations. On annual data, Pallage and Robe (2001) use  $\lambda$  equals 100, while Bulir and Hamann (2001) use  $\lambda$  equals 7. The study of Ravn and Uhlig (2002) shows that on annual data,  $\lambda$  should be of the order of 6.25 so we follow Bulir and Hamann (2001) and choose  $\lambda$  equals 7. The pro or contra-cyclical character of aid is measured by the correlation between the cycle of aid and that of exports over a given time period.<sup>2</sup> The volatilities of aid and exports are measured by the respective standard errors of their cycles.

Another way of measuring trend and cycles, more frequently used for the analysis of export instability, is to perform an econometric estimate of the trend. This method was used by Lensink et Morrissey (2000) to measure aid volatility. Due to the uncertainty about the deterministic or stochastic nature of this trend, it is convenient to estimate an equation of the following form:

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case of the poorest and highly aid-dependent countries. In emerging economies the issue is less the pro-cyclicality of aid than of capital flows (underlined by Kaminsky *et al.*, 2003).

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

The predicted value,  $\hat{x}_t$ , is the trend component, while the residual,  $\varepsilon_t$ , is the cycle component. As previously, contra-cyclicality is measured by the correlation of the cycles of aid and exports. The respective volatilities of aid and exports are measured by the standard errors of the residuals. The trend is here estimated on the whole period under consideration (so called global adjustment).

We shall use alternatively these two measures of volatility to check the robustness of our results. Both aid and exports are measured in absolute terms, in constant dollars (100=2000). Aid and exports data are from the *World Development Indicators* (WDI, 2006).

### 2.3. *Is aid really pro-cyclical?*

Previous studies on aid volatility conclude that more often than contra-cyclical, aid is pro-cyclical, at best not correlated with the cycles of national income or fiscal revenues (Bulir and Hamann, 2001, 2003, 2005; Pallage and Robe, 2001): for instance Bulir and Hamann (2001) find that aid is modestly pro-cyclical with correlation coefficients mainly concentrated on the right of zero and with only a small number of countries with contra-cyclical aid. Referring to exports, Table 1 (with cycles measured with respect to a global adjustment) gives a slightly different picture.

Table 1 suggests that for the whole sample of developing countries, during the seventies and eighties, aid was indeed slightly more pro-cyclical than contra-cyclical with respect to export (11 or 12 significantly positive correlation and 6 significantly negative correlations). In the nineties (whatever the subset of countries) two evolutions are worth mentioning: (1) the

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<sup>2</sup> Our dataset for growth estimations is on five-year averages from 1970-74 to 1995-99. The correlations of



total number of significant cases decreases; (2) the number of negative cases converges towards the number of positive cases. In subgroups of countries (Africa, Low Income Countries, Least Developed Countries), the same pattern applies, except that in the seventies the average correlation is negative.

Table 1 – Is aid pro or contra-cyclical?

		1970-79	1980-89	1990-99
<i>Developing Countries</i>	Average	0.015	0.110	0.015
	Number of positive correlation	39 [12]	52 [11]	46 [5]
	Number of negative correlation	31 [6]	27 [6]	44 [5]
<i>Sub-Saharan Africa</i>	Average	-0.031	0.234	0.061
	Number of positive correlation	16 [8]	26 [9]	21 [2]
	Number of negative correlation	15 [3]	7 [1]	18 [2]
<i>LICs</i>	Average	-0.020	0.189	0.025
	Number of positive correlation	19 [7]	29 [6]	23 [3]
	Number of negative correlation	17 [3]	8 [1]	21 [3]
<i>LDCs</i>	Average	-0.006	0.209	0.023
	Number of positive correlation	14 [6]	21 [5]	17 [2]
	Number of negative correlation	11 [2]	5 [1]	17 [2]

In brackets: number of cases significant at 10%.

#### 2.4. What does make aid stabilizing or not?

Pro or contra-cyclicity is indeed an important parameter. But it is not the only relevant one to determine whether aid inflows are stabilizing or destabilizing. Pro-cyclical aid can still be stabilizing if its volatility is lower than that of exports. On the reverse there may be cases where aid is contra-cyclical and destabilizing, when its volatility is significantly higher than that of exports, in a proportion depending on the relative level of aid and exports. Overall, the stabilizing character of aid with respect to export volatility is a function both of

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cycles are measured on six to eight years: five years of the sub-period and one to three years before.

aid contra-cyclical and of its relative volatility with respect to exports, as well as of the relative trend levels of aid and exports.

What is the real picture? To assess the stabilizing character of aid we build an index which is the difference between the volatility of exports and the volatility of aid plus exports:

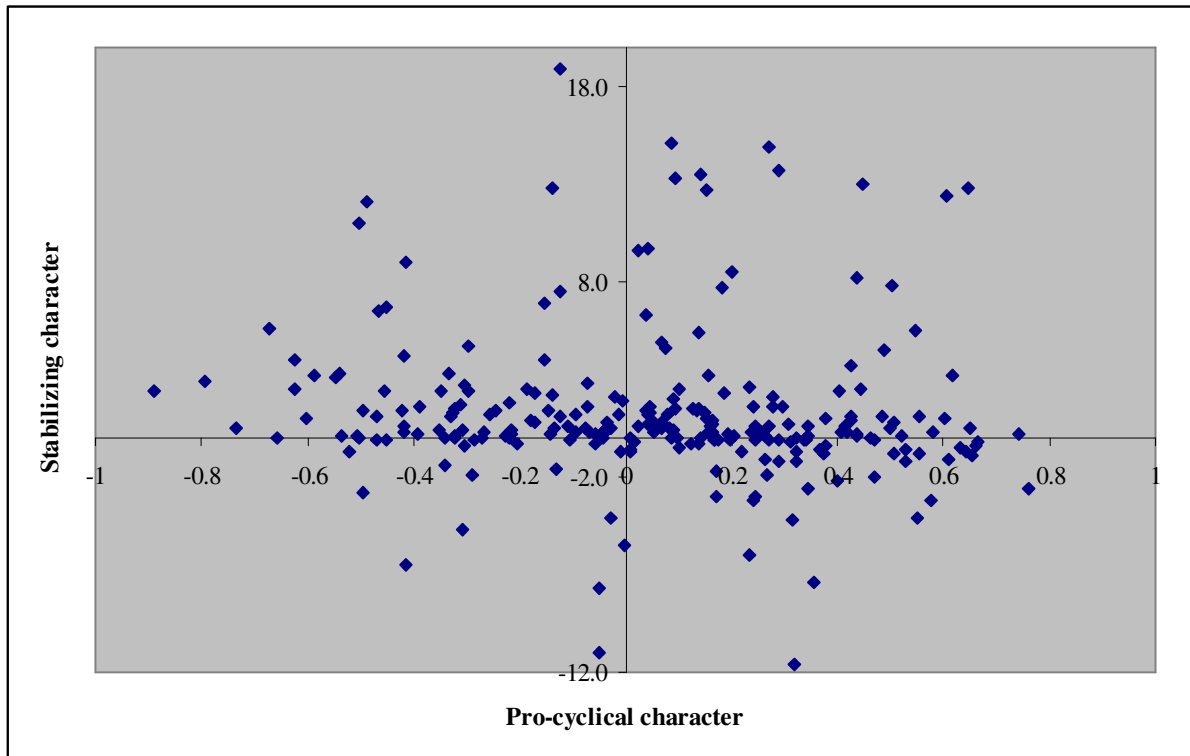
$$\text{Stabilizing character of aid} = \text{Volatility of (X)} - \text{Volatility of (X + A)}.$$

If the difference is positive, aid is considered as stabilizing; if it is negative, aid is seen as destabilizing (with regard to exports). Figure 1 represents the pro-cyclical character of aid *versus* its stabilizing character over 1970-1999 (volatilities are measured by the global adjustment method). We have 239 observations, corresponding to the 102 contra-cyclical versus 137 pro-cyclical cases (significant or not). Over the 102 cases of contra-cyclical aid, still 20 appear to be associated with a negative stabilizing indicator, due to high aid volatility and aid levels. On the other hand, pro-cyclical aid is most often associated with a positive stabilizing indicator: over the 137 cases of pro-cyclical aid only 49 correspond to a destabilizing aid (one third), leaving a majority of seemingly “paradoxical” cases (88) where aid is both pro-cyclical and stabilizing. Thus the cases where aid appears to be stabilizing represent 71% of the observations and they correspond to an aid as often pro-cyclical (88 cases) as contra-cyclical (82 cases).

To summarize, aid volatility is a matter of concern only if it is destabilizing, which occurs in a minority of cases, more likely when it is pro-cyclical rather than contra-cyclical. The stabilizing character of aid is also a function of the volatility and of the level of aid compared to that of the flow of reference, here exports. Although aid is pro-cyclical in a slight majority of cases (57%), most of them being statistically insignificant, it is still likely to be stabilizing in a clearer majority of cases (71%). The stabilizing character of aid with respect to

exports basically depends on three characteristics of aid, its contra/pro-cyclicality, its relative volatility and its relative trend level, all the three with respect to exports.

Figure 1 – Pro-cyclical versus stabilizing aid, 1970-1999, ten-year averages.



### 3. Broader perspective: the impact of aid on growth volatility

In order to assess the extent to which the stabilizing character of aid influences growth, we will need to focus on a major but specific source of shocks, namely exports volatility. However, developing countries are facing other kinds of shocks (in particular climatic instability) and aid may have a dampening effect also with regard to them. It is possible to aggregate several kinds of shocks in an index of vulnerability, such as the UN economic vulnerability index (EVI) (see Guillaumont, 2006), or in an appropriate index as we have done earlier (Guillaumont and Chauvet, 2001; Chauvet and Guillaumont, 2004), in order

to test, through a multiplicative variable, the hypothesis of a higher aid effectiveness in more vulnerable countries. But it is more difficult to assess aid contra-cyclical or stabilizing character with respect to several shock variables, introduced both additively and multiplicatively; and it is not very meaningful to consider the contra-cyclical and stabilizing character of aid with respect to each of them separately. In this section, we propose a synthetic way to assess whether aid has been stabilizing or destabilizing: we examine to what extent *income volatility* has been influenced by the average level of aid inflow and the level of its volatility.

### *3.1. Traditional factors of income growth volatility*

There are few papers on the determinants of growth volatility. Some are focused on policy factors (Easterly, Islam, Stiglitz, 2001), some try to split up structural and policy factors (Combes *et al.*, 2000), others to split up internal and external factors (Raddatz, 2005). Some papers rely on cross-country or panel regressions (the first two quoted above), others on time series for each country and try to measure factors explaining a conditional variance (Raddatz). None of the cross-country or panel regressions (to our knowledge) consider what has been the impact of aid. Only time-series studies try to assess the impact of aid shocks among several kinds of shocks on the forecast error of income per capita, as well as the reaction of aid to several kinds of shocks. Anyway they did not measure the impact of the aid average level and volatility on multi-year income volatility, what we now try to do.

The previous studies of the factors of aid volatility give information on what should be the appropriate control variables in any estimation of the effect of aid on income volatility, under the condition that they are not themselves affected by aid.

### 3.2. When aid dampens growth volatility

We estimate an equation where income volatility is a function of aid to GDP ratio and aid volatility. The level of aid is likely to have a stabilizing impact, consistently to what has been found with regard to exports volatility. Aid volatility may have a positive or a negative impact, according to its level and pro or contra-cyclical with respect to the various kinds of shocks that affect income volatility. We control for initial income, and lagged income volatility as well as export to GDP ratio and the volatility of exports which are likely to be major factors of income volatility in developing countries. Aid and export volatilities are weighted by their levels.

$$\begin{aligned} \text{Volatility of } y_{i,t} = & \alpha_1 \text{Volatility of } y_{i,t-5} + \alpha_2 y_{i,t-5} + \alpha_3 X / GDP_{i,t} + \alpha_4 X / GDP_{i,t} \times \text{Vol.} X_{i,t} \\ & + \alpha_5 ODA / GDP_{i,t} + \alpha_6 ODA / GDP_{i,t} \times \text{Vol.} A_{i,t} + \varepsilon_{i,t} \end{aligned}$$

In Table 2 are presented the results of the estimations of the income volatility equation. Lagged income volatility, initial income, aid ratio and aid volatility are instrumented. We use two estimation methods, implying different sets of instruments. First, we use the generalized method of moments. Lagged income volatility and initial income are instrumented using twice-lagged income volatility and initial income. Instruments used for aid are those of Tavares (2003) *i.e.* the total budget of aid of the five major donors weighted by distance variables: cultural distance (same language, same religion) and geographical distance (distance from Brussels, Tokyo and Washington). This list of instruments is supplemented with the average growth rate of the two major donors of each receiving country.

We also use the application of the GMM method proposed by Arellano and Bond (1991) in which first-differenced equations are instrumented by lagged level variables. We

assume that income volatility, initial income, aid and aid volatility are predetermined and instrument them using their lags from  $t-1$  to  $t-3$ . In column (1) and (2) we measure volatility from a global adjustment, and test the robustness in column (3) using the H-P method.

All regressions support the view that export volatility is a highly significant factor of the volatility of income. When significant (regression (2)), the level of exports has also a positive effect on income volatility: economies more open to trade are also more prone to external shocks. The level of aid is negative, and significant in column (1) and (3), while aid volatility is significantly positive in all regressions. It seems that aid volatility contributes to overall income volatility whereas the level of aid tends to dampen it.

Table 2 – Income volatility estimation, 5-year averages, 1970-1999.

	Volatility from global adjustment		HP
	GMM (1)	DIFF-GMM (2)	GMM (3)
Volatility of income, lagged	0.611 (5.18)***	0.328 (2.71)***	0.402 (4.37)***
Ln income p.c., initial	-1.214 (2.42)**	-4.033 (2.08)**	-0.002 (0.58)
Aid/GDP	-26.634 (2.41)**	-0.726 (0.13)	-0.253 (2.23)**
Volatility of Aid x Aid/GDP	0.671 (2.18)**	0.051 (2.70)***	3.803 (2.13)**
X/GDP	-0.414 (0.47)	5.958 (1.89)*	-0.012 (1.25)
Volatility of X x X./GDP	0.005 (1.70)*	0.008 (3.76)***	0.280 (1.83)*
Constant	11.363 (2.90)***		0.032 (1.21)
Observations	331	343	326
Number of countries	92	93	82
R-squared	0.15		0.20
Hansen p-value	0.71	0.27	0.18
Anderson p-value	0.15		0.16
AR(1) p-value		0.06	
AR(2) p-value		0.29	
Instruments		62	

All regressions include time dummies. Robust t statistics in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

#### **4. Stabilizing aid: its growth effectiveness**

##### *4.1. Aid is more effective in countries vulnerable to external shocks*

The debate initiated by the influential paper of Burnside and Dollar (1997, 2000) has at least made clear that aid effectiveness is likely to depend on specific features of the recipient country. The feature focused on by Burnside and Dollar was the quality of economic policy and institutions. The debate on the Burnside and Dollar thesis has been mainly related to the robustness of their econometric results (Hansen and Tarp, 2001) and to the consistency of their relying hypotheses. In two previous papers (Guillaumont and Chauvet, 2001; Chauvet and Guillaumont, 2004) we have argued that a major factor conditioning aid effectiveness in recipient countries was the economic vulnerability they face. In vulnerable countries foreign support has a high marginal productivity in avoiding collapses when shocks occur or long standing recessions afterwards; it is expected to smooth public expenditures and to lower the risk of fiscal deficit. Consequently the marginal contribution of aid to growth of recipient countries is expected to be higher in developing countries exposed to external shocks. This effect of vulnerability on aid effectiveness was captured in a growth regression by a multiplicative explanatory variable (aid to GDP ratio x vulnerability indicator) which was significantly positive. The measure of the vulnerability variable was not the same in the two papers. Only the 2001 paper used a concept of vulnerability close to that used for LDCs identification, including (small) population size, exports instability and agricultural

production instability. The 2004 paper used a narrower concept, limited to exports instability and (negative) terms of trade trend.<sup>3,4,5</sup>

For the purpose of our present analysis we use an even narrower concept of vulnerability; that is we focus on that part of vulnerability due to external trade shocks, as captured by exports instability. We do so because we intend to analyse aid effectiveness with respect to its contra-cyclical and to its stabilizing impact and consequently need a reference aggregate (exports) to which we can compare aid cycles.

The second step of our econometric analysis of aid effectiveness consists in estimating a baseline model of the form:

$$y_{i,t} = \alpha_1 y_{i,t-5} + \alpha_2 \text{Exports volatility}_{i,t} + \alpha_3 \text{ODA/GDP}_{i,t} + \alpha_4 \text{Exports volatility}_{i,t} \times \text{ODA/GDP}_{i,t} + \varepsilon_{i,t}$$

where  $y_{i,t}$  is the logarithm of real income per capita (PWT 6.1) of country  $i$  ( $i=1\dots N$ ) in period  $t$  ( $t=1\dots T$ ). As in the previous section, we use both GMM and Difference-GMM estimators. Lagged income and aid (as well as aid interacted with exports volatility) are instrumented. According to the estimation method, we use the two sets of instruments presented in section 3.

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<sup>3</sup> Were also taken into account the impact on aid effectiveness of : (i) political instability (negative effect), (ii) present economic policy (positive effect) ; and (iii) previous economic policy (negative effect, due to the possible effect of aid on policy improvement from a “bad” initial situation).

<sup>4</sup> Another paper by Collier and Dehn (2001) also evidenced the role of aid as a factor mitigating export price shocks considered on a year by year basis, defined from a forecasting model, and retained only if they were on the tail of the distribution; although this model did not allow to measure the long term effect of instability on growth, it made a useful distinction between the effect of a change of aid, found to lower the negative effect of a negative shock, and the effect of aid level itself, found to increase the positive effect of a positive shock.

<sup>5</sup> A good survey of these papers is given by McGillivray (2003). Moreover, Roodman (2004) presents a thorough assessment of the econometric robustness of various papers, confirming the relative robustness of our 2001 results (the 2004 paper is not analyzed). These are found to be more robust than those by Collier and Dehn, themselves more robust (for the effect of aid change) than those of Burnside and Dollar, but less robust than the results of Hansen and Tarp, who do not address the vulnerability issue.



The first two columns of Table 3 present the estimation of the baseline model. They show that the significantly negative impact of exports volatility can be mitigated by aid, since aid interacted with the volatility of exports is significantly positive.

#### 4.2. *The export stabilizing impact of aid and growth*

The last step of our analysis is to assess the impact on growth of the stabilizing character of aid. Columns (3) to (5) of Table 3 present these results. They show that when the stabilizing character of aid is introduced into the baseline model it is significantly positive, while aid interacted with exports volatility loses its significance in two out of three regressions.

Let's recall that the stabilizing impact of aid with respect to exports depends on: (i) the relative level of aid; (ii) a contra-cyclical pattern; (iii) the relative volatility compared to exports. These three components of the stabilizing character of aid can compensate or reinforce each other. In regressions (1) and (2) only the stabilizing impact of the *level* of aid was captured through the multiplicative term. In regressions (3) to (5) all three components are captured through the indicator of "stabilizing character". This indicator seems in regressions (4) and (5) to capture all the dampening effect of aid. Regression (3) suggests that there may be a stabilizing impact of the *level* aid, distinct from the overall stabilizing impact which is also determined by the time profile of aid (contra-cyclicity and relative volatility).

Table 3 – Growth equations, 5-year averages, 1970-1999.

	Instability from global adjustment				HP
	GMM (1)	DIFF-GMM (2)	GMM (3)	DIFF-GMM (4)	GMM (5)
Ln income p.c, t-5	0.942 (42.90)***	0.690 (10.16)***	0.985 (34.32)***	0.611 (7.40)***	0.947 (41.84)***
Volatility of X	-0.003 (2.59)**	-0.0001 (1.11)	-0.020 (3.25)***	-0.0063 (1.75)*	-1.575 (2.56)**
Aid / GDP	-2.382 (4.15)***	-0.521 (2.16)**	-1.587 (2.35)**	-0.262 (1.15)	-1.527 (3.37)***
Volatility of X x Aid / GDP	0.085 (2.75)***	0.011 (1.85)*	0.088 (2.79)***	0.010 (1.12)	3.472 (0.79)
Stabilizing character of aid			0.019 (2.83)***	0.006 (1.76)*	3.147 (1.67)*
Constant	0.659 (3.53)***		0.527 (2.51)**		0.556 (2.69)***
Observations	445	389	445	389	291
Number of countries	91	94	91	94	72
R-squared	0.96		0.95		0.96
Hansen p-value	0.21	0.17	0.99	0.24	0.45
Anderson p-value	0.00		0.14		0.00
AR (1) p-value		0.01		0.00	
AR (2) p-value		0.32		0.32	
Instruments		47		54	

All regressions include time dummies. Robust t statistics in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

## 5. Conclusion

Somewhat diverging from the current concern about aid volatility, this paper argues that aid has a stabilizing impact first with respect to exports volatility, second and more generally as a dampening factor of income volatility. Aid volatility may lower and possibly cancel this effect when it is pro-cyclical with regard to exogeneous shocks, and even, but more hardly, when it is contra-cyclical and very high compared to other sources of shocks. Even if it is pro-cyclical aid is stabilizing with respect to exports, if its volatility is lower than

that of exports. And when it is contra-cyclical, it is stabilizing only as far as its volatility does not exceed a certain threshold.

It has not indeed been possible in this paper to examine how aid can contribute to the average long term growth by mitigating the negative impact of the growth volatility evidenced in the literature (Ramey and Ramey, 1995; Hnatkovska and Loayza, 2005; Guillaumont, 2006). Testing this effect would imply to move from a medium term (adopted in this paper) to a long term framework.

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