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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., aid is more effective in countries that 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 procyclical as often argued, and, even if procyclical, is not necessarily destabilizing. We measure aid volatility by several methods and assess procyclicality of aid with respect to exports, thus departing from previous literature, which usually assesses procyclicality 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. Finally, we find evidence through growth regressions that the higher effectiveness of aid in vulnerable countries is to a large extent due to its stabilizing effect.

Keywords: aid, shocks, stability, growth

JEL classification: F35, F43, O42

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Acronyms

EVI	economic vulnerability index
GDP	gross domestic product
GMM	generalized method of moments
LDCs	least developed countries
LICs	low-income countries
MDGs	Millennium Development Goals
ODA	official development aid
PWT	Penn World Tables
WDI	*World Development Indicators* (of the World Bank)

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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 (Bulíř 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, and 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 (MDGs). It may be particularly relevant for African countries, which are highly vulnerable and where the prospects of increased aid 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., 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 would be a solution instead of a problem. 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 prosecuted as much as its unpredictability and its procyclicality. 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. Procyclicality is easier to measure. It has been essentially assessed with respect to national income or fiscal revenue. Here we analyse the pro- or contracyclicality 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 procyclicality may not be the most relevant concept for assessing the economic consequences of aid volatility, which we intend to do with regard to growth. This is why we design in this paper another concept, which is the stabilizing impact of aid, measured here with respect to exports.

Section 2 assesses the concepts of aid volatility, procyclicality and stabilizing impact. Referring to the evolution of exports of goods and services, we argue that aid is not as procyclical as 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 procyclical aid can still be stabilizing, and that there may be cases where aid is contracyclical 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, to a large extent, due 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 Contracyclicality, volatility and stabilizing character of aid with regard to exports

The contracyclical 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 contracyclicality is always related to the choice of a reference aggregate and of a trend measurement.

2.1 Contracyclical aid: with reference to which aggregate?

Previous literature has so far assessed contracyclicality of aid with respect to national income (e.g., Pallage and Robe 2001) or fiscal receipts (e.g., Bulíř and Hamann 2001, 2003, 2005). Here we compare aid cycles to those of exports of goods and services.[1] This can be justified on two grounds. First, as we are concerned with the macroeconomic vulnerability to external shocks, it is better to compare aid with the aggregate the most likely to be affected by exogeneous shocks. Many low-income developing countries suffer hugely 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 that generally, however, occurs with some delay. Furthermore, if Dutch disease effects were to occur immediately and symmetrically, aid volatility would be stabilizing to some extent: aid increase, leading to a real exchange rate appreciation, would induce a slowdown of exports, and conversely.

2.2 Cycles: how are they measured?

Several alternative methodologies are available for analysing the cyclical characteristics and the volatility of aid and exports. Following Bulíř and Hamann (2001, 2003, 2005), Pallage and Robe (2001) and Rand and Tarp (2002), an Hodrick-Prescott filter (1997) can be used to extract the trend and cycle components of aid and of the reference flow, here exports. The Hodrick-Prescott filter decomposes a series, x_t (where x_t is the

[1] Here as a reference flow, we consider the 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 (Caballero 2002): extending the reference flow to capital movements seems less relevant in the case of the poorest and highly aid-dependent countries. In the emerging economies the issue is less the procyclicality of aid than of capital flows (underlined by Kaminsky, Reinhart and Végh 2003).

logarithm of the observed series X_t), in a cycle, x_t^c, and a trend, x_t^g, by minimizing the following function:

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

where λ is the smoothing parameter of x_t^g. The choice of the value of λ depends on the frequency of observations. On annual data, Pallage and Robe (2001) use λ equals 100, while Bulíř and Hamann (2001) use λ equals 7. The study of Ravn and Uhlig (2002) shows that on annual data, λ should be of the order of 6.25, so we follow Bulíř and Hamann (2001) and choose λ to equal 7. 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 is used by Lensink and Morrissey (2000) to measure aid volatility. Due to uncertainty about the deterministic or stochastic nature of this trend, it is convenient to estimate an equation of the following form:

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

The predicted value, $\hat{x}_t$, is the trend component while the residual, ε_t, is the cycle component. As previously, contracyclicality 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 here is estimated on the whole period under consideration (referred below as the global adjustment method).

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* (World Bank 2006).[2]

The pro- or contracyclical character of aid is measured by the correlation between the cycle of aid and that of exports over a given time period.[3]

2.3 Is aid really procyclical?

Previous studies on aid volatility conclude that aid is more often procyclical than contracyclical; aid, at best, is not correlated with the cycles of national income or fiscal revenues (Bulíř and Hamann 2001, 2003, 2005; Pallage and Robe 2001): for instance, Bulíř and Hamann (2001) find that aid is modestly procyclical with correlation coefficients mainly concentrated on the right of zero and with only a small number of

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2 We use the ODA (official development aid) variable in current US dollar and then deflate it using the unit value of world imports from the UN Statistical Division. The same deflator is used for exports.

3 Our dataset for growth estimations is on five-year averages from 1970-74 to 1995-99. The correlations of cycles are measured on six to eight years: five years of the sub-period and one to three years before.

countries with contracyclical aid. Table 1, referring to exports, (with cycles measured with respect to a global adjustment) gives a slightly different picture.

Table 1, using the global adjustment method of cycle estimation suggests that for the whole sample of developing countries, aid during the 1970s and 1080s was indeed slightly more procyclical than contracyclical with respect to export (11 or 12 significantly positive correlations and 6 significantly negative correlations). In the 1990s (regardless of the subset of countries), two evolutions are worth mentioning: (i) the total number of significant cases decreases; (ii) the number of negative cases converges towards the number of positive cases. In subgroups of countries (Africa, low-income countries—LICs, least developed countries—LDCs), the same pattern applies, except that in the 1970s the average correlation is negative.

Table 1
Is aid pro or contracyclical? Coefficients of correlation between aid and export cycles

		1970-79		1980-89		1990-99	
Developing countries	Average	0.015		0.110		0.015	
	No. of positive correlations	39	[12]	52	[11]	46	[5]
	No. of negative correlations	31	[6]	27	[6]	44	[5]
Sub-Saharan Africa	Average	-0.031		0.234		0.061	
	No. of positive correlations	16	[8]	26	[9]	21	[2]
	No. of negative correlations	15	[3]	7	[1]	18	[2]
LICs	Average	-0.020		0.189		0.025	
	No. of positive correlations	19	[7]	29	[6]	23	[3]
	No. of negative correlations	17	[3]	8	[1]	21	[3]
LDCs	Average	-0.006		0.209		0.023	
	No. of positive correlations	14	[6]	21	[5]	17	[2]
	No. of negative correlations	11	[2]	5	[1]	17	[2]

Note: Number of cases significant at 10% given in brackets. Cycles measured according to the global adjustment method.

2.4 What makes aid stabilizing or not?

Pro- or contracyclicality is indeed an important parameter. But it is not the only relevant one to determine whether aid inflows are stabilizing or destabilizing. Procyclical aid can still be stabilizing if its volatility is lower than that of exports. On the reverse, there may be cases where aid is contracyclical 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 of both aid contracyclicality and of its relative volatility with respect to exports, as well as of the relative trend levels of aid and exports.

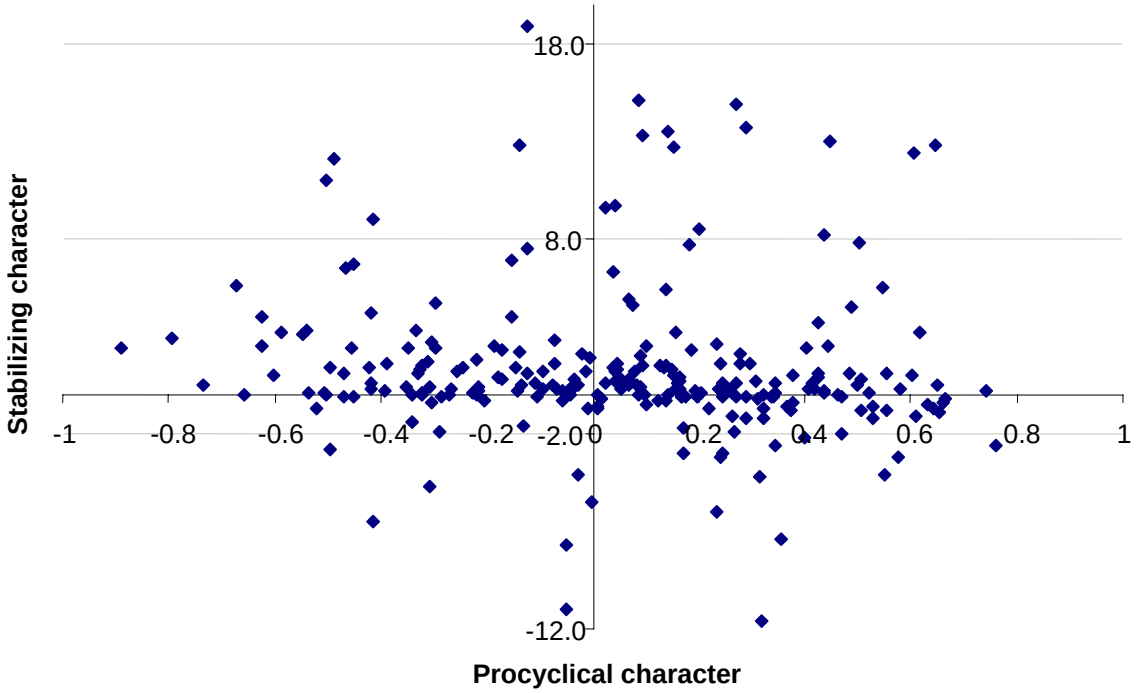
What is the real picture? To assess the stabilizing character of aid we build an index which is the difference between the volatility of exports and the volatility of aid plus exports:

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

If the difference is positive, aid is considered to be stabilizing; if negative, aid is seen as destabilizing (with regard to exports). Figure 1 represents the procyclical character of aid versus its stabilizing character over three 10-year periods covering the years 1970 to 1999 (volatilities are measured by the global adjustment method). We have 239 observations, corresponding to 102 contracyclical versus 137 procyclical cases (significant or not). In addition to the 102 cases of contracyclical aid, 20 still appear to be associated with a negative stabilizing indicator due to high aid volatility and aid levels. On the other hand, procyclical aid is most often associated with a positive stabilizing indicator: of the 137 cases of procyclical aid, only 49 or one-third correspond to destabilizing aid, leaving a majority of seemingly 'paradoxical' cases (88) where aid is both procyclical and stabilizing. Thus the cases where aid appears to be stabilizing represent 71 per cent of the observations, and they represent aid that is as often procyclical (88 cases) as contracyclical (82 cases).

To summarize, aid volatility is a matter of concern only if it is destabilizing, which occurs in a minority of cases, and is more likely when it is procyclical rather than contracyclical. The stabilizing character of aid is also a function of the volatility and of the level of aid compared to that of the reference flow, exports in this paper. Although aid is procyclical in a slight majority of the cases (57 per cent), with most of these being statistically insignificant, aid is still likely to be stabilizing in a clear majority of cases (71 per cent). The stabilizing character of aid with respect to exports basically depends on three characteristics of aid: its contra/procyclicality, its relative volatility and its relative trend level, all three with respect to exports.

Figure 1
Procyclical versus stabilizing aid, 1970-99, ten-year averages.



Note: The cyclical character of aid is measured as the correlation of the cycles of aid and the cycles of exports (global adjustment method). The stabilizing character of aid is measured as the volatility of exports minus the volatility of the sum of exports and aid.

Source: Aid data are from OECD-DAC and exports are from World Bank (2006).

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 need to focus on a major but specific source of shocks, namely exports volatility. Developing countries, however, also face other kinds of shocks (in particular, climatic instability) and aid may have a dampening effect also with regard to these. It is possible to aggregate several kinds of shocks in a vulnerability index 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 higher aid effectiveness in more vulnerable countries. But it is more difficult to assess the contracyclicality or the stabilizing character of aid with respect to several shock variables that are introduced both additively and multiplicatively; nor is it very meaningful to consider the contracyclicality and stabilizing character of aid with respect to each of these separately. In this section, we propose a synthetic way to assess whether aid has been stabilizing or destabilizing. We examine the extent to which *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 and Stiglitz 2001), some try to distinguish between structural and policy factors (Combes et al. 2000), others focus on internal and external factors (Raddatz 2005). Some papers rely on cross-country or panel regressions (the first two mentioned above), others (Raddatz, e.g.) focus on timeseries for each country and try to measure factors explaining a conditional variance. None of the cross-country or panel regressions (to our knowledge) consider what the impact of aid has been. Only timeseries studies try to assess the impact of aid shocks among several kinds of shocks on the forecast error of income per capita, or the reaction of aid to several kinds of shocks. Furthermore, they do not measure the impact of the aid average level and volatility on multi-year income volatility, which we are now trying to do.

Earlier studies of the factors of aid volatility offer information on what should be the appropriate control variables in an estimation of the effect of aid on income volatility under conditions in which they themselves are not 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 contracyclicality with respect to the various kinds of shocks that affect income volatility. We control for initial income, and lagged income volatility as well as the export-to-GDP ratio and the volatility of exports, likely to be the major factors of income volatility in developing countries. Aid and export volatilities are, respectively weighted, by the aid-to-GDP ratio and the export-to-GDP ratio.

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

Table 2 presents the results of the estimations of the income volatility equation. Lagged income volatility, initial income, aid ratio and aid volatility are instrumented. We use three estimation methods, implying different sets of instruments. First, we use the generalized method of moments method (GMM). Lagged income volatility and initial income are instrumented using twice-lagged income volatility and initial income. Instruments used for aid are those given in Tavares (2003), i.e., the total aid budget of 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. Finally, we use the system GMM method proposed by Arellano and Bover (1995) and Blundell and Bond (1998). Compared to difference GMM, equations in level are added to the system and instrumented using the lagged difference of endogenous variables.

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

	Volatility from global adjustment			Hodrick-Prescott
	GMM	DIFF-GMM	SYS-GMM	GMM
	(1)	(2)	(3)	(4)
Volatility of income, lagged	0.611 (5.03)***	0.293 (2.22)**	0.482 (6.57)***	0.402 (4.37)***
Ln income p.c., initial	-0.970 (-2.02)**	-2.102 (-0.68)	-0.856 (-2.13)**	-0.002 (-0.58)
Aid/GDP	-0.227 (-1.92)*	-0.107 (-1.92)*	-0.081 (-1.61) (*p*=0.11)	-0.253 (-2.23)**
Volatility of aid x aid/GDP	0.006 (1.75)*	0.002 (1.88)*	0.003 (2.07)**	0.038 (2.13)**
X/GDP	-0.004 (-0.47)	0.051 (1.70)*	0.008 (0.67)	-0.012 (-1.25)
Volatility of X x X/GDP	0.00005 (1.72)*	0.00007 (1.67)*	0.00006 (2.55)**	0.003 (1.83)*
Constant	9.556 (2.43)**		7.798 (2.43)**	0.032 (1.21)
Observations	319	319	319	326
Number of countries	87	87	87	82
R-squared	0.24			0.20
Hansen p-value	0.68	0.17	0.33	0.18
AR(1) p-value		0.07	0.03	
AR(2) p-value		0.15	0.12	
Instruments		62	73	

Notes: All regressions include time dummies.
Robust t-statistics in parentheses;
* significant at 10%; ** significant at 5%; *** significant at 1%;
DIFF-GMM and SYS-GMM are two-step estimators;
The two-step covariance matrix is derived from Windmeijer (2000) i.e., corrected for the finite-sample bias.

As for measuring volatility, we use the two different methods presented in section 2.2. Our core results (columns (1) to (3)) are those using a global adjustment. We provide robustness checks when using the Hodrick-Prescott filter to measure volatility (column (4)).

All regressions support the view that export volatility is a highly significant factor of the volatility of income. The higher the level of exports, the stronger the effect of export instability on income volatility: economies more open to trade are also more prone to external shocks. The coefficient of the level of aid is negative, and significant in columns (1), (2) and (4), while that of aid volatility is significantly positive in all regressions. It seems that aid volatility contributes to overall income volatility, whereas the average level of aid dampens it.

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 by Burnside and Dollar (1997, 2000) has at least made it clear that aid effectiveness is likely to depend on the specific features of the recipient country. The feature highlighted by Burnside and Dollar is the quality of economic policy and institutions. The debate on the Burnside and Dollar thesis has been related mainly 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 argue that a major factor conditioning aid effectiveness in recipient countries is the economic vulnerability they face. In vulnerable countries, foreign support has a high marginal productivity in avoiding collapses when shocks or long-standing recessions occur afterwards; it is expected to smooth public expenditures and to lower the risk of fiscal deficit. Consequently, the marginal contribution of aid to the growth of recipient countries is expected to be higher in the developing countries exposed to external shocks. This effect of vulnerability on aid effectiveness is captured in a growth regression by a multiplicative explanatory variable (aid to GDP ratio x vulnerability indicator) which is significantly positive. The measure of the vulnerability variable is not the same in the two papers. Only the 2001 paper uses 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.[4, 5, 6]

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4 Also taken into account were factors that impact on aid effectiveness, such as (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).

5 A paper by Collier and Dehn (2001) also evidences 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 does not allow measuring the long-term effect of instability on growth, it makes 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.

For the purpose of the 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 contracyclicality 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 of estimating a baseline model of the form:

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

where $y_{i,t}$ is the logarithm of real income per capita (PWT 6.1) of country i ($i = 1...N$) in period t ($t = 1...T$). As in the previous section, we use both GMM and system-GMM estimators. Difference-GMM estimator is also used and gives very similar results. The results are not shown because of space limitations, but are available upon request. 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.

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 stabilizing impact of aid with regard to exports, and its effect on growth

The last step of our analysis is to assess the impact of the stabilizing character of aid on growth 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 one out of three regressions.

Recall that the stabilizing impact of aid with respect to exports depends on: (i) the relative level of aid; (ii) a contracyclical pattern; and (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 is captured through the multiplicative term. In regressions (3) to (5) all three components are captured through the indicator of "stabilizing character". This indicator seems to capture in regression (5) all the dampening effects of aid since the level of aid interacted with exports volatility is no longer significant. However regressions (3) and (4) suggest that there may be a specific impact of the *level* of aid in countries facing an instability in exports, distinct from what we have called its stabilizing impact (with respect to exports): the latter depends on the year-to-year time

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6 A good survey of these papers is given in 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 not analysed). These are found to be more robust than those by Collier and Dehn, which themselves are 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.

profiles of aid and exports (contracyclicality, relative volatility, etc.), the former also depends on the way by which in the medium-term aid may have a dampening effect on macroeconomic variables, possibly by allowing more countercyclical policies, in particular through the management of foreign reserves.

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

	Instability from global adjustment				Hodrick-Prescott
	GMM	SYS-GMM	GMM	SYS-GMM	GMM
	(1)	(2)	(3)	(4)	(5)
Ln income p.c, t-5	0.942 (40.37)***	1.074 (33.22)***	0.977 (36.79)***	1.041 (36.82)***	0.947 (41.84)***
Volatility of X	-0.002 (-2.35)**	-0.0001 (-0.94)	-0.017 (-3.22)***	-0.008 (-3.31)***	-0.016 (-2.56)**
Aid / GDP	-0.021 (-3.96)***	-0.001 (-0.40)	-0.012 (-1.94)*	-0.002 (-0.96)	-0.015 (-3.37)***
Volatility of X x aid / GDP	0.001 (2.46)**	0.00009 (1.68)*	0.001 (2.41)**	0.0002 (3.51)***	0.0003 (0.79)
Stabilizing character of aid			0.017 (2.84)***	0.008 (3.23)***	0.031 (1.67)*
Constant	0.527 (2.68)***	-0.529 (-1.98)*	0.417 (2.03)**	-0.185 (-0.79)	0.556 (2.69)***
Observations	365	365	365	365	291
Number of countries	87	87	87	87	72
R-squared	0.96		0.97		0.96
Hansen p-value	0.06	0.26	0.55	0.27	0.45
AR (1) p-value		0.00		0.00	
AR (2) p-value 2		0.25		0.24	
Instruments		47		58	

Notes: All regressions include time dummies.
Robust t-statistics in parentheses;
* significant at 10%; ** significant at 5%; *** significant at 1%.
SYS-GMM are two-step estimators.
The two-step covariance matrix is derived from Windmeijer (2000), i.e., corrected for the finite-sample bias.

5 Conclusion

Diverging somewhat 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 procyclical with regard to exogeneous shocks, and even, albeit more rarely, when it is contracyclical and very high compared to other sources of shocks. Even if it is procyclical, aid is stabilizing with respect to exports if its volatility is lower than that of exports. And when it is contracyclical, it is stabilizing only as far as its volatility does not exceed a certain threshold.

Indeed, it has not been possible to examine in this paper 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 moving from a medium-term (adopted in this paper) to a long-term framework.

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