Can Foreign Aid Cushion

External Political Shocks?

Abstract

This paper studies the cushioning effect of foreign aid against external political shocks and proposes an extended econometric model of aid effectiveness. Foreign aid and a set of interaction terms with aid are introduced in growth regressions. The results suggest that political instability has a negative impact on aid effectiveness, but that vulnerability to trade shocks and external political shocks have a positive impact, implying that aid can compensate for the negative influence of such shocks on economic growth. The latter result leads to an extended notion of vulnerability – covering both economic and political shocks faced by developing countries – with a positive impact on aid effectiveness.

Key words

Foreign aid, economic growth, regional socio-political instability, spillovers and contagion effects, cross-country analysis.

JEL codes

C33, F35, O11, O19, O50

Introduction

Civil wars have a disastrous influence on the economic performance of developing countries, but even at peace, a developing country can still suffer from civil wars in its neighborhood. It has been estimated that the negative impact of a civil war – or more generally of political instability – on economic growth is almost as high for neighbors as for the country itself (Ades & Chua, 1997; Murdoch & Sandler, 2002; Collier & Hoeffler, 2004a, Chauvet & Collier, 2005). Some contributions to the aid effectiveness literature have highlighted the cushioning effect of aid against external price shocks (Collier & Dehn, 2001) and trade and climatic shocks (Guillaumont & Chauvet, 2001; Chauvet & Guillaumont, 2004). In this paper, we address the question of whether foreign aid can compensate for the negative impact of regional political instability on growth in the same way as it compensates for the impact of external economic and climatic instability.

We propose an extended model of aid effectiveness. Burnside and Dollar (2000) launched the study of the conditions of aid effectiveness with the introduction, in growth regressions, of an interaction term for aid and economic policies. The positive impact of this cross term was interpreted as aid being more effective in developing countries pursuing sound economic policies. A selectivity principle thus emerged, based on the quality of policies (rapidly extended to the quality of institutions) in receiving countries. This had major policy implications for aid agencies. For example, the *Millennium Challenge Account* (MCA) initiative, launched by the US administration in 2002, was directly inspired by the debate on selectivity criteria, advocating that increases in US aid should be directed in priority towards countries with sound economic policies and institutions.

Nonetheless, the Burnside-Dollar analysis has been widely debated on different grounds such as the robustness of the econometric results, the concept of "good" economic policy or the alternative factors affecting aid effectiveness. In this paper, we propose an extended analysis of the factors that may influence aid effectiveness. The standard model captures some factors of aid effectiveness already identified in the literature: (1) the quality of economic policies (Burnside & Dollar, 2000); (2) diminishing returns to aid (Hansen & Tarp, 2001); (3) economic vulnerability to external trade shocks (Guillaumont & Chauvet, 2001); (4) internal

socio-political instability (Chauvet & Guillaumont, 2004). But the core of the analysis is based on a fifth hypothesis: the ability of aid to cushion the negative impact of external political instability on growth.

The conceptual framework is presented in section 1. Section 2 presents the econometric methodology, data and variables. In section 3, econometric tests of the standard model are proposed. The fifth hypothesis – the impact of external political shocks on growth and aid effectiveness – is tested in section 4. The last section provides our concluding remarks.

1. Conceptual framework: five hypotheses tested

Standard model

The role of economic policies

The introduction by Burnside and Dollar (2000) of an interaction term between aid and economic policy in growth regressions triggered an intense debate on the factors that might have an impact on aid effectiveness. Burnside and Dollar capture good economic policies with low inflation rate, budget balance and trade openness policy. A composite policy indicator is constructed as the sum of the three variables, weighted for their respective impact on growth. Structural, institutional and political variables are also introduced in the growth regressions. The estimations are performed by OLS and TSLS, on four-year sub-periods from 1970 to 1993, for 56 developing countries. After excluding five outliers from their sample, Burnside and Dollar show that the aid-policy interaction term is significantly positive, suggesting that aid is more effective in countries with sound economic policies.[1]

Hypothesis 1: the quality of economic policies has a positive influence on aid effectiveness.

Diminishing returns to aid

The hypothesis of marginal diminishing returns to aid has two main theoretical foundations. First, the absorptive capacity of receiving countries may be limited. Thus, higher amounts of aid may be relatively less productive. The second relates to the so-called Dutch

disease: massive aid may entail a real exchange rate appreciation with a corresponding adverse effect on economic growth.

Diminishing returns to aid have traditionally been captured by an aid squared variable in econometric growth analysis. However, Hansen and Tarp (2000, 2001) stress that the introduction of non-linearities in the aid-growth relationship – either aid squared or aid interacted with policies – has no theoretical foundations and comes from a simple second-order approximation of the standard Solow model.[2] The different non-linearities simply reflect greater precision in the approximation of the functional form of the model.

Since there is no real theoretical foundation as to whether the non-linearities in the aid-growth relationship should be captured by aid squared or by aid interacted with policies, this question is mainly empirical. According to Hansen and Tarp (2000, 2001), aid squared and aid interacted with policy constitute a subset of quadratic and interaction terms, which are potentially proxies for each other. They introduce simultaneously in a Burnside-Dollar type regression an aid squared variable and aid interacted with policy: aid and aid squared are significant – consistent with the hypothesis of diminishing returns to aid – whereas aid interacted with policy is no longer significant.

Hypothesis 2: aid has marginal diminishing returns.

Aid effectiveness depends on economic vulnerability

Guillaumont and Chauvet (2001) add the issue of vulnerability to external trade and climatic shocks. They introduce an interaction term for aid and structural vulnerability to test whether foreign aid is more effective in countries vulnerable to external shocks. They defend the idea that aid may protect the growth process by diminishing the risk of fiscal deficit and by smoothing public expenditure in case of external shocks. In this case, aid acts as insurance, protecting the growth process of developing countries from the negative impact of external shocks. The marginal contribution of aid to growth is thus higher in countries vulnerable to such external shocks.

The indicator of vulnerability used by Guillaumont and Chauvet (2001) captures climatic instability (instability of agricultural value added), long term trade shocks (trend in the terms of trade), short term trade shocks (instability of exports) and the size of population (to capture the

structural exposure to shocks). The composite indicator of structural vulnerability is constructed as the sum of these variables, weighted for their respective impact on growth. The growth regressions suggest that vulnerability to external shocks significantly reduces growth. Moreover, the higher the vulnerability, the more aid is effective: foreign aid seems to compensate for the negative impact of vulnerability on growth.

Similarly, Collier and Dehn (2001) test the link between export price shocks, growth and aid effectiveness. They identify extreme negative and positive price shocks using the price index compiled by Deaton and Miller (1995). Collier and Dehn (2001) show that negative price shocks have a negative impact on growth (positive shocks are not significant). They also test the capacity of aid to compensate for price shocks and show that changes in aid interacted with negative price shocks have a significant and positive impact on growth.

Hypothesis 3: aid is more effective in countries which are vulnerable to external shocks.

Aid effectiveness is influenced by internal socio-political instability

There is a relatively wide consensus on the fact that socio-political instability has a negative impact on economic growth. Different kinds of socio-political instability have been considered in the literature. Some authors examined very specific kinds of political instability, in particular elite instability (Fosu, 1992; de Haan & Siermann, 1996; Alesina, Ozler, Roubini & Swagel, 1996), which has a negative impact on growth. Some have considered an extended notion of socio-political instability. Vieneris and Gupta (1986) and Alesina and Perotti (1996) used factor analysis to construct composite indicators for different forms of social and political violence. They show that their socio-political indicators have a negative impact respectively on saving and investment. Similarly, Guillaumont, Guillaumont Jeanneney and Brun (1999) measure socio-political instability with the sum of *coups d'état*, civil wars and other violent political events. This variable has a significantly negative impact on growth. Finally, Azam, Berthélemy and Calipel (1996) examine the impact of political risk. They estimate the probability of socio-political troubles (strikes, riots, demonstrations, *coups d'état*) using health and military expenditures, schooling rates and regional variables. Introduced in a growth regression, this estimated probability has a negative effect.

The impact of socio-political instability on growth seems well established, but little is said about its influence on aid effectiveness. Recently, Collier and Hoeffler (2004b) studied the impact of aid on growth in post-war periods and concluded that aid is more effective in post-conflict situations, especially after a few years of peace. Apart from post-conflict periods, Chauvet and Guillaumont (2004) explore the impact of socio-political instability in a broader perspective (*coups d'état*, demonstrations and civil wars) and show a negative influence of this kind of instability on aid effectiveness.

Hypothesis 4: socio-political instability has a negative influence on aid effectiveness.

Despite the intense debate following the work of Burnside and Dollar (2000), no consensus has been reached regarding the factors of aid effectiveness. Roodman (2004) tested the relative robustness of the different studies cited in this section. The robustness checks cover the issue of outliers, time periods and estimation methodology. He concludes that the weakest group of studies is that of Burnside and Dollar (2000) and Collier and Dehn (2001). According to the author, the results of Collier and Hoeffler (2004b), Hansen and Tarp (2001) and Guillaumont and Chauvet (2001) seem stronger.[3]

Can foreign aid cushion regional political shocks?

A "good neighborhood" is essential to the process of development (Easterly & Levine, 1998). These authors show the contagion effects of economic performance between neighboring countries. Trade exchanges, foreign investment and imitation of policy choices contribute to this contagion. Ades and Chua (1997) explore the consequences of regional political instability for growth. They show that regional political instability has strong negative externalities for developing countries – to a similar extent as internal political instability. They define regional political instability as the average of revolutions and *coups d'état* in the neighborhood. They also study the transmission mechanisms and show that regional political instability has a significantly negative impact on trade between neighboring countries and that it increases government military expenditures and decreases education expenditures.

In the framework of an arms race model, Collier and Hoeffler (2001) confirm this result. They study the respective impact of internal and external threats of conflict on the level of military expenditures. Their estimations suggest that the influence of external threats

predominates. They also examine the negative externalities of civil wars for neighboring countries and identify two transmission mechanisms: the increase in military expenditures and the contagion of rebel movements.

More recently, Murdoch and Sandler (2002) study both national and cross-border consequences of civil wars. They estimate the impact of civil wars on the growth of developing countries, taking into account the negative externalities of conflicts for neighboring countries. These countries can suffer from collateral damages, with destruction of infrastructures and physical capital, as well as from flows of refugees. Moreover, the closeness of a conflict and the risk of contagion create a feeling of uncertainty, disastrous for investment, especially foreign investment. They can also result in disruptions in trade exchanges, and shortages in inputs. Murdoch and Sandler (2002) introduce different variables to capture civil war (number of months of war, number of deaths) and show that civil war and its externalities for neighbors have a significantly negative impact on growth in developing countries.

Doré, Anne and Engmann (2003) evaluate the impact of the 1999-2000 sociopolitical crisis in Côte d'Ivoire on the growth performance of nine of its neighbors in the sub-region (Burkina Faso, Ghana, Guinea, Guinea-Bissau, Mali, Niger, Senegal and Togo). They identify three sets of transmission mechanisms: (i) through trade and transportation (the landlocked neighbors using Abidjan seaport started shipping through other countries, like Togo); (ii) through capital flows and current transfers (notably worker remittances which decreased following repatriation of migrants); (iii) through reduced investment.

TABLE 1

Table 1 shows that countries with neighbors at war tend to have a lower growth rate of income *per capita*. It also suggests that countries with neighbors at war tend to receive more aid. However, the influence of regional political instability on aid effectiveness has never been studied. External political shocks are likely to result in two opposing impacts on aid effectiveness: (i) if foreign aid compensates for the negative impact of political instability on the growth of neighboring countries, then aid should be more effective in countries undergoing such external political shocks; (ii) on the contrary, if aid is more effective in a stable political environment – whether national or regional – then external political shocks should have a

negative impact on aid effectiveness. The way in which regional political instability may possibly influence aid effectiveness is unknown. Yet this question is crucial. If foreign aid can cushion external political shocks, its contribution to the provision of regional public goods – like peace and regional political stability (Cook & Sachs, 1999; Hamburg & Holl, 1999; Mendez, 1999; Kanbur, 2001; Ferroni, 2001; Arce & Sandler, 2002) – will be reinforced.

Hypothesis 5: aid effectiveness is influenced by political instability in neighboring countries i.e. by external political shocks. The sign is a priori unknown.

Hypotheses 1-5 suggest that the impact of aid on growth is likely to be influenced:

1. positively by the quality of economic policies – Burnside-Dollar effect,
2. negatively by the amount of aid – diminishing returns to aid,
3. positively by structural economic vulnerability – cushioning effect of aid,
4. negatively by national socio-political instability
5. by external political shocks

Equation (1) summarizes the different factors influencing the impact of foreign aid on growth:

$$\frac{\partial g}{\partial A} = f\left(\underset{+}{EP_{i,t}},\ \underset{-}{A_{i,t}},\ \underset{+}{EV_{i,t}},\ \underset{-}{SPI_{i,t}},\ \underset{?}{CW_{j,t}} \right), \tag{1}$$

where g denotes income *per capita* growth, $A_{i,t}$ aid as a percentage of national income, $EP_{i,t}$ economic policy, $EV_{i,t}$ vulnerability to trade shocks, $SPI_{i,t}$ socio-political instability in country i, $CW_{j,t}$ civil war in country j – neighbor of country i.

2. Variables, data and econometric methodology

The econometric analysis of aid effectiveness proposed in this paper is based on growth estimations of the form:

$$\ln Y_{i,t} - \ln Y_{i,t-1} = \alpha \ln Y_{i,t-1} + X_{i,t}\delta + \eta_i + \varepsilon_{i,t}, \tag{2}$$

where $Y_{i,t}$ denotes income *per capita* of country i (i = 1…N) in period t (t = 1…T), η_i country specific effects, and $\varepsilon_{i,t}$ the error term. $X_{i,t}$ is a set of economic growth determinants, which in

this study comprises economic policy, economic vulnerability, internal and external socio-political instability, foreign aid and a set of variables interacted with aid.

Data and variables

The sources of data and the definitions of variables are presented in detail in appendix (Table A). Economic growth is measured as the log-difference of income *per capita* measured in purchasing power parity (Summers & Heston, 1991). For the nineties, it has been updated by the Global Development Network (GDN, 1999). Foreign aid is measured by the net disbursements of official development assistance in percentage of gross national income (OECD-DAC).

Following Burnside and Dollar (2000), the policy indicator is constructed as the sum of inflation and openness policy, weighted for their respective impact on growth. The policy indicator differs slightly from that of Burnside and Dollar, for two reasons: (i) they take into account budget surplus, which is not included in the present analysis due to measurement issues (a budget surplus *excluding* grants artificially increases the deficit in countries receiving large amounts of grants, and a budget surplus *including* grants means that grants are introduced twice in the regressions with aid) ; (ii) Burnside and Dollar use the Sachs and Warner (1997) indicator of openness policy, whereas in this study openness policy is measured as the part of observed openness that is not explained by structural factors, namely the size of the population, the extent of mining and oil resources, the level of development, terms of trade improvements and transportation costs (Combes, Guillaumont, Guillaumont Jeanneney & Motel Combes, 2000). Openness policy is the residual of the estimation of observed openness on this set of structural factors.

Following Guillaumont and Chauvet (2001), economic vulnerability is given two dimensions: (i) short term trade shocks, captured by export instability[4]; (ii) long term trade shocks, measured by the trend in the terms of trade. The economic vulnerability indicator is constructed as the sum of these two variables, weighted for their respective impact on growth.

Following Taylor and Hudson (1972) and Gupta (1991) two categories of socio-political instability are distinguished: elite and mass instability. Elite instability is measured by the number of successful *coups d'état* (Banks, 1996). Data on *coups d'état* is only available up to

1988, so it is updated for 1988-1999 with the CERDI database. Mass instability can be subdivided further into two different categories: first, social conflicts, captured by the number of demonstrations (Banks, 1996); second, internal violent wars, captured by the number of months of civil war. Months of war are measured on the basis of a civil war database constructed by Chauvet (2001).

Regional political instability is introduced to capture the negative externalities of political troubles in neighboring countries. It is captured by the number of months of civil wars in bordering countries (Chauvet, 2001).

Each indicator – economic policy, economic vulnerability and socio-political instability – is constructed as a weighted sum of the different variables. The weights are the respective impact on growth of each variable. For comparative purposes, these variables are transformed to fit a scale from 0 to 100:

$$\tilde{X} = 100\left(\frac{X - X_{\min}}{X_{\max} - X_{\min}}\right),$$

where $\tilde{X}$ is the transformed value of X, $X_{\min}$ and $X_{\max}$ being respectively the minimum and maximum values of X. Given that the results are easier to interpret if the impact on growth of each transformed variable goes in the same direction as the other variables in the composite indicator, the scale was reversed for inflation and terms of trade (see Table 3 below).

Econometric methodology

Whenever country-specific effects are correlated with variables of the model – which is always the case when $\ln Y_{it-1}$ is on the right-hand side of the equation – OLS estimation of equation (2) is biased. Moreover, when the time dimension, T, is small the within estimator is also asymptotically biased. An alternative way to deal with the correlation of country-specific effects with the lagged dependent variable is to eliminate the specific effects by first-differencing the model. Equation (2) can be re-written:

$$(3) \qquad y_{i,t} - y_{i,t-1} = \beta\left(y_{i,t-1} - y_{i,t-2}\right) + \left(X_{i,t} - X_{i,t-1}\right)\delta + \left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right),$$

where $\beta = \alpha + 1$ and $y_{i,t} = \ln Y_{i,t}$. However, OLS and within estimators are still biased, since the endogenous lagged dependent variable remains correlated with the error term. Anderson and

Hsiao (1981, 1982) proposed to instrument the first-differenced variable, $\Delta y_{i,t-1}$, by its lag in level, y_{it-2}, or in difference, Δy_{it-2}. These two instruments are highly correlated with $y_{i,t-1} - y_{it-2}$, but are not correlated with $\varepsilon_{i,t} - \varepsilon_{i,t-1}$, if the residuals are not auto-correlated.

Arellano and Bond (1991) proposed an application of the generalized method of moments (GMM) exploiting all the orthogonality conditions existing between the lagged endogenous variable and the error term. Besides $y_{i,t-2}$, all the endogenous lagged variables of order greater than two are valid instruments for the equation in first-difference. Arellano and Bond (1991) propose a two-step approach. The first-step estimator assumes homoscedastic residuals, while the second-step estimator is robust to heteroscedasticity. When the sample is small, the standard errors are likely to be downward biased in the second-step estimations. In this case, the first-step estimator must be used. This methodology also allows for the potential endogeneity of explanatory variables $X_{i,t}$ to be taken into account. Lagged values (from $t - 2$) of the endogenous explanatory variables $X_{i,t}$ are valid instruments for the first-differenced equation. A drawback to this approach is that the number of instruments increases rapidly with the number of periods and instrumented explanatory variables.

The assumption that there is no residual auto-correlation is essential if the lagged variables are to be used as instruments for the endogenous variables. If the error terms of the equation in level, $\varepsilon_{i,t}$, are not auto-correlated, the first-order auto-correlation of first-differenced residuals, $\Delta\varepsilon_{i,t}$, should be significant, whereas their second-order auto-correlation should not be significant. The validity of instruments is also tested with a Sargan test of over-identification.

However, when the first-differenced variables are weakly correlated with their lagged values in level, the instruments available for equations in first-difference are weak (Alonso-Borrego & Arellano, 1996; Blundell & Bond, 1998; Bond, Hoeffler & Temple, 2001). Blundell and Bond (1998) find evidence that if the variables are highly persistent, the first-difference GMM estimator suffers from a large bias – under-estimation – on small samples. In this case, they propose to estimate a system of level and first-difference equations, where first-difference equations are instrumented with lagged variables in level, and level equations are instrumented with lagged variables in difference.

The choice of the best estimator for equation (2) depends on the trade-off between the three following points:

- Sample size: when T is greater than 30 periods, the within estimator is not biased, and is the best alternative. In our case, $T = 7$ suggesting that the within estimator is biased.
- Endogeneity: in presence of endogenous explanatory variables, instrumental variable methodology, such as the first-difference GMM estimator (Arellano & Bond, 1991) or the system-GMM estimator (Blundell & Bond, 1998), must be used.
- Variability of data: if the variability of the data is not reduced too much by the transformation in first-difference, the first-step difference estimator can be used when T is finite. Otherwise, the system GMM estimator proposed by Blundell and Bond (1998) must be used. The standard errors of the variables of the model, both in level and in first-difference, are presented in Table 2. In conformity with the results of Bond *et al.* (2001), the variability of income *per capita* is greatly reduced by the transformation in first-difference. However, the variability of economic policy, socio-political instability, structural economic vulnerability and aid, is barely affected by the transformation in first-difference, suggesting that the first-step estimator of Arellano and Bond (1991) can be used.

TABLE 2

Thus, the GMM methodology is used on variables transformed in first-difference and instrumented by their lagged values (from $t - 2$) in level. All the explanatory variables of the model are instrumented, except the trend in the terms of trade, which by definition is assumed to be exogenous. Because the standard errors of the second-step estimation suffer from an under-estimation bias on small samples, inference is based on first-step estimations.[5] Second-step estimations were also estimated to ensure that the coefficients are stable (results are available from the authors on request). The Sargan test and the test for first and second-order auto-correlation of the residuals are presented, to confirm the validity of the instruments. Finally, the number of instruments is also reported in the tables. Estimations are on five-year sub-periods from 1965-1969 to 1995-1999. The sample includes 58 countries, presented in Table B in appendix. Finally, to capture international business cycles, time dummies are included in all regressions.

3. Estimation of the standard model

This section presents the estimations of the standard model. First, composite indicators of economic policy, economic vulnerability and internal socio-political instability are constructed. Then, they are introduced in growth estimations with aid and a set of interaction terms with aid. At this stage, the Burnside-Dollar model is simply extended to take into account alternative factors of aid effectiveness already highlighted in the literature. Besides aid interacted with economic policy (*hypothesis 1*), aid squared (*hypothesis 2*) is also introduced, as well as aid interacted with economic vulnerability (*hypothesis 3*) and aid interacted with socio-political instability (*hypothesis 4*). The fifth hypothesis – whether or not aid can mitigate external political shocks – is tested in the next section.

Construction of composite indicators

The first step of the econometric analysis is to construct the composite indicators for economic policy, economic vulnerability and socio-political instability. Each variable used in these indicators is weighted for its impact on growth. All the variables are introduced simultaneously in the same growth regression so that each variable is purged of the impact of all the other variables in the model. It also avoids omitted variable bias, as all the variables included in the growth regression are significant.

TABLE 3

Regression (1) of Table 3 suggests that all the variables have a significant impact on growth, with the expected sign.[6] However, economic policy and socio-political instability variables are only significant at 10%. Nested tests are also presented in Table 3 for aid (*p-value* = 0.216), as well as for human capital[7] (*p-value* = 0.392), and financial depth[8] (*p-value* = 0.538). The absolute value of the coefficients from the first-step regression is used to weight the variables included in each composite indicator.[9] These indicators are presented in Table 4.

TABLE 4

Regression (2) of Table 3 presents the results when the different variables are replaced by the three composite indicators. The indicators are significant and have the expected sign: while socio-political instability and economic vulnerability have a negative impact on growth, the quality of economic policy has a positive impact on growth.

The impact of policies, vulnerability and socio-political instability on aid effectiveness

The three indicators can now be introduced in growth regressions next to foreign aid and a set of quadratic (AID^2, *hypothesis 2*) and interaction terms with aid: *AID* x *EP* (*hypothesis 1*), *AID* x *EV* (*hypothesis 3*) and *AID* x *SPI* (*hypothesis 4*). Hansen and Tarp (2000, 2001) suggest that aid squared and the different interaction terms with aid are likely to be proxies for each other. For example, aid squared may capture the impact of aid interacted with economic policy, and inversely. We proceed in three steps: (i) introduction of aid and aid squared; (ii) introduction of the different interaction terms; and (iii) introduction simultaneously of all the quadratic and interaction terms.

Table 5 presents the results. Regression (1) suggests that foreign aid is not significant. In regression (2), the aid variable has a positive sign, but is not significant (*p-value* = 0.161), while aid squared is significantly negative, corresponding to the assumption of diminishing returns to aid (Lensink & White, 2001; Hansen & Tarp, 2000, 2001; Collier & Dollar, 2001, 2002).[10]

TABLE 5

In regression (3), the three interaction terms are introduced, but aid squared is omitted. Only the interaction of aid and socio-political instability has a significant impact on growth. This impact is negative, suggesting that aid is less effective in a politically unstable environment. The interaction term between aid and economic vulnerability is not really significant (*p-value* = 0.11), but still has the positive sign found by Guillaumont and Chauvet (2001). Contrary to Burnside and Dollar, aid interacted with policy is not significant (*p-value* = 0.203). Finally, foreign aid has a significantly negative impact on growth.

In regression (4), all the quadratic and interaction terms are simultaneously introduced. While aid squared loses its significance, aid interacted with economic vulnerability becomes significant at 10% (*p-value* = 0.054). Aid interacted with socio-political instability remains highly significant. These results question those of Hansen and Tarp (2000, 2001) who suggested that the interaction of aid and policy introduced by Burnside and Dollar (2000) was in fact capturing diminishing returns to aid. Here, it seems that a sharper specification than that of Hansen and Tarp (also taking into account interaction of aid with vulnerability and political instability) does not confirm the diminishing returns hypothesis.

Although socio-political instability and economic vulnerability both have a negative impact on growth, they have different impact on aid effectiveness. Aid seems to mitigate the negative impact of economic vulnerability on growth, while its effectiveness is reduced in a politically unstable environment. The latter result can be explained by the fact that, contrary to external economic shocks, internal political events are endogenous and depend on the political choices made by governments.

4. Can foreign aid cushion external political shocks?

The impact of external political shocks on aid effectiveness

If aid effectiveness is influenced in a negative way by internal socio-political instability in the receiving countries, can we deduce that an unstable regional political environment is harmful for aid effectiveness (*hypothesis 5*)? Aid may be less effective in an unstable political environment, whether the source of the instability is national or regional. But aid may also play a cushioning role against external political shocks, as it does for trade shocks. For example, aid could protect growth from a civil war in a neighboring country by helping to cope with refugees, hence avoiding the potential contagion of conflicts. Similarly, aid could help countries facing financial costs linked to neighboring countries' wars (stocks of goods blocked at borders, shortages of inputs and the resulting financial losses). If aid compensates for the negative impact of external political shocks on growth, then aid effectiveness should be greater in countries facing such shocks.

To test the fifth hypothesis, the number of months of civil wars in neighboring countries and its interaction with aid are introduced in the regressions. Results are presented in Table 6. In regressions (1) and (2) growth equations are estimated respectively with and without aid squared.

Confirming previous results, aid effectiveness is influenced positively by economic vulnerability and negatively by socio-political instability.[11] The number of months of civil wars in neighboring countries has a negative and significant effect on growth, confirming the results of Murdoch and Sandler (2002): violent political instability in a country has negative externalities for the growth of its neighbors. However, this variable interacted with aid has a significantly positive impact on growth. Thus, aid seems to be more effective in countries with politically unstable neighbors, suggesting that aid can cushion external political shocks.

TABLE 6

The marginal contribution of foreign aid to growth is computed from regression (2) of Table 6. It depends on economic vulnerability as well as regional and national political instability. The aid and policy variables are not significant, so they are not included in the calculation:

$$\frac{\partial g}{\partial A} = -6.694.SPI + 18.17.EV + 0.023.CW \text{ in neighboring country}.$$

Table 7 presents the contribution of aid to growth. For average levels of vulnerability and regional and national political instability, a 1% increase in aid with respect to GNI leads to an increase in economic growth of 1.3%. Next, we examine different scenarios depending on different groups of countries. In the following columns, the marginal contribution of aid is calculated at the mean value of all variables, except for one variable which takes the mean value for the first or last quintile of the distribution (lower and upper 20%). In countries with no national political instability, the contribution of aid to growth increases to 1.505%. Aid effectiveness in countries more prone to external shocks increases to 1.668% when these shocks are economic and to 1.752% when they are political.

TABLE 7

It should be noted that the measure of regional political shocks is limited to civil wars in bordering countries. This concept should be deepened and extended to other types of political instability – such as, for example, elite instability (Ades & Chua, 1997). Nonetheless, the econometric results regarding external political instability are of particular interest regarding the prospect of providing regional public goods such as peace and political stability. Indeed, if aid can cushion the impact of external political shocks on growth, it can contribute to protecting some countries from disruptions in the growth process, potentially avoiding the spread of conflicts and instability. This indirect effect of aid – via growth – on regional stability suggests that the legitimacy of foreign aid might be improved in an international context where global and regional stability are increasingly on the agenda.

Towards an extended concept of vulnerability?

Economic vulnerability, socio-political instability and external political shocks all have a negative impact on the economic growth of developing countries. However, the three factors have a different impact on aid effectiveness: negative for internal political instability, but positive for economic vulnerability and regional political instability. Aid effectiveness is influenced in the same way by economic and political external shocks. A *sixth hypothesis* can be drawn from this: an extended notion of vulnerability in developing countries, which takes into account both exogenous trade shocks and regional political shocks.

In order to aggregate external trade and political shocks in a composite indicator of extended vulnerability, the first growth equation is re-estimated to identify the weights for each variable, corresponding to their respective impact on growth.

TABLE 8

The results are presented in Table 8, and are very close to those given in Table 3. Regional political instability has a negative impact, but is not significant (*p-value* = 0.218). This result is surprising since this variable was strongly significant in the growth regressions of Table 6.[12] In column (2) the same regression is estimated but the different variables are replaced by the

composite indicators.[13] The number of months of civil war in the neighborhood is still not significant, although its *p-value* decreases (*p-value* = 0.151).

On the basis of these regressions, a composite indicator of extended vulnerability is constructed.[14] The results are given in Table 9.

TABLE 9

The last step of our analysis is to introduce these indicators into the growth regressions. The results are presented in Table 10. Foreign aid seems to be more effective in politically stable countries. The extended vulnerability indicator is negatively significant, suggesting that external trade and political shocks faced by developing countries are disastrous for growth. When interacted with aid, the indicator is significantly positive: by cushioning economic and political shocks, foreign aid is more effective when allocated to countries facing such shocks.

TABLE 10

The econometric results are summarized in Table 11.

TABLE 11

Conclusion – Aid effectiveness and global public goods

This paper suggests that aid effectiveness depends on its ability to mitigate the negative impact of external shocks – both economic and political – on economic growth. Aid effectiveness also differs depending on whether the political instability is internal or external to the developing economies: foreign aid is likely to protect economic growth from political instability in neighboring countries, but aid is less effective in countries facing destabilizing internal political events.

Most civil conflicts have regional stakes because of the risk of contagion and destabilization in the entire region in question. Thus, political stability and peace may be regional (or even global) public goods (Hamburg & Holl, 1999; Mendez, 1999; Arce and

Sandler, 2002). Aid, by compensating for the negative externalities of civil wars for the neighbors, may contribute to the provision of regional public goods such as political stability.

Finally, the econometric analysis proposed in this paper is subject to limitations which imply that the conclusions should be regarded with caution. First, a highly restricted notion of external political shocks is considered, and it would be interesting to extend it to other violent, or less violent, political events. Also, the definition of neighboring countries (common borders) is very simple, and close economic ties or trade exchanges might be considered as alternative definitions to test the impact of external political shocks. Finally, although the results suggest a cushioning effect of aid against external economic and political shocks, this analysis has still to explore the means by which aid might cushion such shocks. Further research is needed on this point to clearly identify the mechanisms at work.

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Table 1 – *Descriptive statistics, 1960-1999.*

Averages	All countries		Africa	
	No civil war in neighbors	Civil war in neighbors	No civil war in neighbors	Civil war in neighbors
Income *p.c.* growth (in %)	8.78	4.95	4.92	-1.50
ODA / GNI (in %)	4.47	5.92	7.42	10.31

ODA/GNI is from OECD-DAC. Income *p.c.* growth is from Summers and Heston (1991) and GDN (1999).

Table 2 – *Variability of data, 278 observations.*

Variables of the model	Standard errors	
	level	First-difference
Ln income *per capita*	17.430	3.961
ODA / GNI	5.517	4.776
Openness policy	16.900	18.444
Inflation	11.460	10.455
Number of months of civil war	32.384	24.146
Coups d'état	13.724	17.835
Demonstrations	8.832	12.905
Export instability	2.298	4.936
Trend in the terms of trade	8.416	11.978

All variables are transformed on a scale from 0 to 100. Note that in econometric estimations, income *per capita* and ODA/GNI are not transformed. When income is not transformed, its standard error in level is equal to 0.697 while in difference it is equal to 0.159, confirming the results of Bond *et al.* (2001). When aid is not transformed, its standard error is 0.054 in level and 0.047 in difference, in accordance with Hansen and Tarp (2001).

Table 3 – *Construction of indicators, 1965-1999.*

Ln Income *p.c.* $_t$ (GMM1)	(1)		(2)	
Ln Income *p.c.* $_{t-5}$	0.623***	(4.34)	0.480***	(2.71)
Economic policy			1.987***	(3.24)
Openness policy	0.0011*	(1.71)		
Inflation[(1)]	0.0015*	(1.78)		
Socio-political instability			-0.573*	(-1.95)
Months of civil war	-0.0009*	(-1.78)		
Coups d'état	-0.0018*	(-1.72)		
Demonstrations	-0.0018*	(-1.66)		
Economic vulnerability			-0.664***	(-3.02)
Export instability	-0.0031***	(-3.69)		
Trend in TOT[(1)]	-0.0016**	(-2.21)		
Constant	0.025*	(1.86)	0.040***	(2.80)
Observations (countries)	278 (58)		278 (58)	
Wald test [(2)]	497 (14)		104 (10)	
Test ODA/GNI [(3)]	0.216		0.749	
Test human capital [(3)]	0.392		0.569	
Test financial depth [(3)]	0.538		0.293	
AR(1) [(3)]	0.006		0.062	
AR(2) [(3)]	0.994		0.714	
Sargan test [(2)]	47.98 (93)		43.01 (51)	
Nb of instruments	108		62	

Time dummies are introduced in all regressions. First-step estimations are corrected for heteroscedasticity. T-Student in parentheses. ***: significant at 1%; **: significant at 5%; *: significant at 10%. Economic policy, socio-political instability and vulnerability variables are transformed on a scale from 0 to 100. (1) the scale has been inverted so that all variables of the same indicator have the same sign. (2) : χ^2, degrees of freedom in parentheses. (3) : *p-values*.

Table 4 – *Composite indicators, 1960-1999.*

EP = 0.0011 . openness policy + 0.0015 . inflation rate

SPI = 0.0009 . months of civil war + 0.0018 . coup d'état + 0.0018 . demonstration

EV = 0.0031 . instability of exports + 0.0016 . trend in the terms of trade

Coefficients from first-step GMM estimation – Table 3, regression (1).

Table 5 – *Estimations of the standard model, 1965-1999.*

Ln Income *p.c.* $_t$	(1)	(2)	(3)	(4)
Ln Income *p.c.* $_{t-5}$	0.491***	0.515***	0.637***	0.566***
	(4.31)	(5.50)	(5.09)	(6.36)
Economic policy (EP)	1.729***	1.735***	1.243***	1.949***
	(2.84)	(3.48)	(2.65)	(3.56)
Socio-political instability (SPI)	-0.526**	-0.466**	-0.510**	-0.142
	(-2.34)	(-2.08)	(-2.08)	(-0.49)
Economic vulnerability (EV)	-0.561**	-0.676**	-1.893***	-1.552**
	(-2.08)	(-2.47)	(-3.52)	(-2.56)
ODA / GNI	-0.097	0.979	-1.866**	-1.246
	(-0.32)	(1.40)	(-2.16)	(-0.98)
ODA / GNI, squared		-0.987**		0.761
		(-1.98)		(1.31)
EP x (ODA / GNI)			3.939	-2.719
			(1.27)	(-0.51)
SPI x (ODA / GNI)			-4.812*	-11.174***
			(-1.74)	(-2.77)
EV x (ODA / GNI)			15.426	19.364*
			(1.60)	(1.93)
Constant	0.039***	0.035***	0.025**	0.036***
	(3.64)	(3.66)	(2.14)	(3.81)
Observations (countries)	278 (58)	278 (58)	278 (58)	278 (58)
Wald test (1)	160 (11)	315 (12)	364 (14)	490 (15)
Test human capital (2)	0.564	0.859	0.189	0.222
Test financial depth (2)	0.267	0.162	0.748	0.294
AR(1) (2)	0.019	0.006	0.001	0.001
AR(2) (2)	0.653	0.998	0.801	0.938
Sargan test (1)	43.31 (73)	41.93 (97)	45.21 (122)	40.84 (106)
Nb of instruments	85	110	137	122

Times dummies included in all regressions. First-step GMM estimations corrected for heteroscedasticity. T-Student in parentheses. ***: significant at 1%; **: significant at 5%; *: significant at 10%. (1) : χ^2, degrees of freedom in parentheses. (2) : *p-values*.

Table 6 – *Influence of external political shocks on aid effectiveness, 1965-1999.*

Ln Income *p.c.* $_t$	(1)		(2)	
Ln Income *p.c.* $_{t-5}$	0.703***	(8.66)	0.686***	(9.03)
Economic Policy (EP)	1.499***	(3.19)	1.424***	(3.12)
Socio-political instability (SPI)	-0.387*	(-1.69)	-0.293	(-1.15)
Economic vulnerability (EV)	-1.992***	(-3.81)	-1.857***	(-3.56)
Months of civil war in neighboring countries	-0.0016*	(-1.66)	-0.0017*	(-1.70)
ODA / GNI	-0.974	(-1.01)	-0.848	(-0.86)
ODA / GNI, squared			0.516	(1.41)
EP x (ODA / GNI)	-2.604	(-0.82)	-6.184	(-1.60)
SPI x (ODA / GNI)	-4.658*	(-1.85)	-6.694*	(-1.87)
EV x (ODA / GNI)	15.438	(1.58)	18.176**	(1.97)
Months of war in neighboring count. x ODA/GNI	0.022**	(2.44)	0.023***	(2.61)
Constant	0.065**	(2.25)	0.076**	(2.51)
Observations (countries)	278 (58)		278 (58)	
Wald test (1)	544.23 (16)		1336 (17)	
AR(1) (2)	0.000		0.0001	
AR(2) (2)	0.969		0.948	
Sargan test (1)	42.29 (174)		39.11 (179)	
Nb instruments	191		197	

Times dummies included in all regressions. First-step GMM estimations corrected for heteroscedasticity. T-Student in parentheses. ***: significant at 1%; **: significant at 5%; *: significant at 10%. The variable of regional political instability is transformed on a scale from 0 to 100. (1) : χ^2, degrees of freedom in parentheses. (2) : *p-values*

Table 7 – *Marginal contributions of aid to growth, 58 countries, 1970-1999.*

	Coefficients regres. (2)	Mean 278 points	Effect at mean	Mean of lower 20%	Mean of upper 20%	SPI of lower 20%	*EV* of upper 20%	Wars of upper 20%
Socio-political instability	-6.694*	0.030	-0.201	0.000	0.101	0.000	-0.201	-0.201
Economic vulnerability	18.17**	0.073	1.326	0.056	0.093	1.326	1.689	1.326
Months of neighbor wars	0.023***	7.808	0.179	0.000	27.26	0.179	0.179	0.627
Marginal effect of a 1% increase of ODA / GNI (%)			1.305			1.505	1.668	1.752

*: significant at 10%; **: significant at 5%; ***: significant at 1%.

Table 8 – *An extended concept of vulnerability, 1965-1999.*

Ln Income *p.c.* $_t$	(1) Indicator 1	(2) Indicator 2
Ln Income *p.c.* $_{t-5}$	0.662*** (4.11)	0.660*** (5.64)
Economic policy		1.359*** (2.67)
Openness policy	0.0013* (1.85)	
Inflation (1)	0.0016* (1.73)	
Socio-political instability		-0.626*** (-3.51)
Months of civil war	-0.0008* (-1.93)	
Coups d'état	-0.0017* (-1.66)	
Demonstrations	-0.0023* (-1.73)	
Economic vulnerability		-0.943*** (-3.42)
Export instability	-0.0026** (-2.19)	
Trend in TOT (1)	-0.0021***(-2.77)	
Months of civil war in neighboring countries	-0.0009 (-1.23)	-0.0008 (-1.44)
Constant	0.022 (1.49)	0.023** (2.14)
Observations (countries)	278 (58)	278 (58)
Wald test (2)	498.33 (15)	190.21 (11)
AR(1) (3)	0.005	0.001
AR(2) (3)	0.959	0.873
Sargan test (2)	39.72 (94)	43.16 (100)
Nb instruments	110	112

All regressions contain time dummies. First-step estimations are corrected for heteroscedasticity. T-Student in parentheses. ***: significant at 1%; **: significant at 5%; *: significant at 10%. Economic policy, national and regional socio-political instability and vulnerability variables are transformed on a scale from 0 to 100. (1) the scale has been inverted so that all variables of the same indicator have the same sign. (2) : χ^2, degrees of freedom in parentheses. (3) : *p-values*.

Table 9 – *Construction of a composite indicator of extended vulnerability.*

From regression (1) :

EP = 0.0013 . openness policy + 0.0016 . inflation
SPI = 0.0008 . civil war months + 0.0017 . coups d'état + 0.0023 . demonstrations
EV = 0.0026 . export instability + 0.0021 . trend in terms of trade

From regression (2) :

Extended vulnerability = EV + 0.0008 . months of civil war in neighboring countries

Coefficients are from table 8, regressions (1) and (2).

Table 10 – *Aid effectiveness and extended vulnerability, 1965-1999*

Ln Income *p.c.* $_t$		(1)		(2)	
Ln Income *p.c.* $_{t-5}$		0.726***	(9.67)	0.624***	(5.38)
Economic policy	(EP)	1.452***	(3.58)	1.522***	(3.77)
Socio-political instability	(SPI)	-0.404*	(-1.67)	-0.421	(-1.47)
Extended vulnerability	(ExtV)	-2.017***	(-3.40)	-1.571***	(-2.61)
ODA / GNI		-1.275	(-1.38)	-2.269	(-1.64)
ODA / GNI, squared				0.498	(1.06)
EP x (ODA / GNI)		-1.546	(-0.65)	1.508	(0.39)
SPI x (ODA / GNI)		-4.986*	(-1.68)	-7.481**	(-2.33)
ExtV x (ODA / GNI)		14.449*	(1.65)	16.135*	(1.68)
Constant		0.019**	(2.21)	0.030***	(2.69)
Observations (countries)		278 (58)		278 (58)	
Wald test (1)		327 (14)		398 (15)	
AR(1) (2)		0.000		0.001	
AR(2) (2)		0.973		0.725	
Sargan test (1)		53.19 (138)		43.58 (119)	
Nb instruments		153		135	

Times dummies included in all regressions. First-step GMM estimations corrected for heteroscedasticity. T-Student in parentheses. ***: significant at 1%; **: significant at 5%; *: significant at 10%. (1) : χ^2, degrees of freedom in parentheses. (2) : *p-values*

Tableau 11 – *Conclusions of econometric tests*.

Hypotheses	Econometric results
Hypothesis 1 Economic policy influences the effect of aid on growth	Contrary to Burnside and Dollar, *AID* x *EP* is never significant in our estimations.
Hypothesis 2 Diminishing returns to aid	AID^2 is only significant in estimations omitting the interaction terms with aid, suggesting that when the quadratic relationship is significant it captures in fact the non-linearities in the aid-growth relationship (function of *EV*, *SPI*…).
Hypothesis 3 Economic vulnerability influences the effect of aid on growth	*AID* x *EV* has a significantly positive impact on growth, suggesting that aid is more effective when allocated to countries facing external economic shocks: *cushioning effect of aid*.
Hypothesis 4 Internal socio-political instability influences the effect of aid on growth	*AID* x *SPI* is significantly negative in all regressions, suggesting that aid is less effective in politically unstable countries.
Hypothesis 5 External political shocks influence the effect of aid on growth	Aid interacted with external socio-political instability, *AID* x CW_j, is significantly positive: aid can mitigate the negative externalities of regional civil wars on the growth of developing countries.
Hypothesis 6 An extended concept of vulnerability?	An extended vulnerability indicator, aggregating economic and political shocks, has a positive impact on aid effectiveness. This implies that, because aid can cushion both economic and political shocks, it is more effective in countries facing such shocks.

Appendix

Table A – Definitions and sources of variables.

Variables	Sources	Definitions and remarks
Ln Income *per capita*	Summers and Heston (1991), and GDN (1999).	Calculated in purchasing power parity.
Aid (ODA/GNI)	OECD-DAC. www.oecd.org.	Net disbursements of official development assistance, in percentage of GNI.
Inflation	Global Development Network (GDN, 1999)	Average annual growth rate of consumer price index.
Openness policy	WDI (2000) for exports of good and services, population and natural resources. GDN (1999) for income *per capita*. UNCTAD for terms of trade.	Residual of the regression of observed openness on the different structural factors.
Export instability, weighted by natural export rate	World Development Indicators (WDI, 2000).	Mean quadratic deviation (to a deterministic trend). The natural export rate is the predicted value obtained from the regression of observed openness on structural factors.
Trend in the terms of trade	UNCTAD (various years).	Computed on sub-sample of 8, 9 or 10 years according to data availability.
Successful *coups d'état*	Banks (1996) and CERDI.	
Demonstrations	Banks (1996).	Data on demonstrations is only available up to 1995, so 1995 data is considered as a proxy for the last sub-period of our analysis (1995-99).
Number of months of civil war and number of months of civil wars in neighboring countries	Chauvet (2001).	When many neighboring countries face a civil war, the number of months is cumulated.
Human capital	Barro and Lee (2000).	Percentage of population (aged 15 years and more) with secondary schooling.
Financial depth	GDN (1999).	M2 / GDP.

Table B –58 countries of the sample.

Algeria	Madagascar
Argentina	Malaysia
Bangladesh	Malawi
Bolivia	Mali
Brazil	Morocco
Burundi	Mexico
Cameroon	Mozambique
Chile	Nicaragua
China	Niger
Colombia	Nigeria
Congo	Pakistan
Congo (ex-Zaire)	Panama
South Korea	Papua New Guinea
Costa Rica	Paraguay
Ivory Coast	Peru
Egypt	Philippines
El Salvador	Dominican Rep.
Ecuador	Rwanda
Gabon	Senegal
Gambia	Sierra Leone
Ghana	Sri Lanka
Guatemala	Syria
Honduras	Thailand
Mauritius	Togo
India	Trinidad and Tobago
Indonesia	Tunisia
Jamaica	Uruguay
Jordania	Venezuela
Kenya	Zimbabwe

Notes

[1] They first introduce a quadratic interaction term (*Aid*^{2} x *Policy*), which is significant on the sample of 56 countries. Once they exclude the five outliers from the sample, this term is no longer significant. This analysis has been harshly debated by Dalgaard and Hansen (2001), who argue that other outliers could have been identified, and that the five outliers retained by Burnside and Dollar are debatable.

[2] Following Mankiw *et al.* (1992) : $g_{yt} = \alpha_0 + \alpha_1 \log(i_t) - \rho \log(y_0)$. If $i_t = \gamma_1 s_t + \gamma_2 a_t$, (where i_t is investment, s_t is saving and a_t is aid) the second-order Taylor approximation is given by (Hansen & Tarp, 2000: 390):

$$g_{yt} = \beta_0 + 2\left(\frac{\alpha_1\gamma_1}{\bar{\iota}}\right)s_t + 2\left(\frac{\alpha_1\gamma_2}{\bar{\iota}}\right)a_t - \frac{1}{2}\left(\frac{\alpha_1\gamma_1^2}{\bar{\iota}}\right)s_t^2 - \frac{1}{2}\left(\frac{\alpha_1\gamma_2^2}{\bar{\iota}}\right)a_t^2 - \left(\frac{\alpha_1\gamma_1\gamma_2}{\bar{\iota}}\right)s_t a_t - \rho\log(y_0), \text{ with } \bar{\iota} = \gamma_1\bar{s} + \gamma_2\bar{a}.$$

Hansen and Tarp (2000) underline that saving, s_t, can be captured through institutional and economic policy variables. In this case, aid squared, policy squared and aid interacted with policy appear in the equation.

[3] Many articles have been published on aid effectiveness since 2000, and the review given in this paper is obviously incomplete. On recent developments in this literature, see for example: Burnside and Dollar (2004), Clemens, Radelet and Bhavnani (2004), Easterly, Levine and Roodman (2004), Kosack (2003), Lensink and Morrissey (2000).

[4] Export instability (constant dollars) is measured as :

$$\text{Exports instability} = 100\sqrt{\frac{1}{n}\left(\frac{e-\hat{e}}{\hat{e}}\right)^2},$$

where $\hat{e}$ is the predicted value from the following regression : $exports_t = \beta_1\, time + \varepsilon_t$. It is estimated for each country on sub-periods of 10 years (i.e. on two sub-periods, present and past). Export instability is weighted by the natural export rate (the export rate purged of openness policy).

[5] Standard errors are corrected for heteroscedasticity (Stata 8) and the Sargan test is computed from the second-step estimations. The result is a χ^2 with degrees of freedom corresponding to the number of identification restrictions, under the null hypothesis that instruments are valid.

[6] The signs of inflation and terms of trade trend are respectively positive and negative because their scale has been inverted.

[7] This variable is not introduced by Burnside and Dollar (2000) and Hansen and Tarp (2001), but it is traditionally introduced in growth regressions.

[8] Financial depth is measured by *M2* as a share of GDP (GDN, 1999). This variable is introduced by Burnside and Dollar (2000) and Hansen and Tarp (2001), to capture the development of the financial system (King & Levine, 1993). It is not significant in our framework.

[9] The absolute value of the coefficients is used in order to avoid reversing the impact of the composite indicators on growth, given that, if the coefficients (weights) are negative, then the composite indicators are pre-multiplied by –1, since all variables lay between 0 and 100.

[10] The turning point calculated from regression (2) is equal to 49.6% of GNI (close to that of Lensink & White, 2001). No country in our sample is in the decreasing part of the curve.

[11] However, *AID* x EV_t is not significant in the first regression (*p-value* = 0.115).

[12] Moreover, this variable is hardly correlated with the other variables of the model (never higher than 0.10).

[13] *EP*, *EV*, *SPI* are constructed from regression (1) of Table 8 (see Table 9). The correlations of the number of months of civil wars with the three composite indicators is weak (always less than 0.10).

[14] A second indicator was constructed using the first regression of Table 8, giving very similar results in the following estimations (available from the author on request).