Preliminary draft
June 1999

AID AND PERFORMANCE:

A REASSESSMENT

by

Patrick GUILLAUMONT

and Lisa CHAUVET[*]

CERDI, CNRS and University of Auvergne[**]

[*] The authors benefited during the preparation of this paper from the remarks and comments of Jacky Amprou, Jean-Louis Arcand, Elliot Berg, Jean-François Brun, Jean-Louis Combes, Sylviane Guillaumont Jeanneney, and the participants at the 1999 ABCDE workshop at the World Bank, in particular Paul Collier, David Dollar, Alan Gelb. All of them are acknoledged for. The usual disclaimers apply.

[**] CERDI, Tel. 04 73 43 12 00 Fax. 04 73 43 12 28
E.mail : CERDI@u-clermont1.fr

Abstract

Two visions on aid effectiveness and allocation are compared. The first one, corresponding to the new aid paradigm, argues that aid is effective only if domestic policies are good. According to a second assumption presented here the aid effectiveness depends on the external and climatic environment: the worse this environment, or the more vulnerable the recipients countries, the higher the aid effectiveness. Cross-sectional econometric tests related to GDP growth on two twelve-year pooled periods clearly favour the second assumption. However the two views can be conciliated in a principle of performance based aid allocation, considering performance as the outcomes adjusted for the impact of environmental factors. Performance, so defined, can be measured by several ways which are themselves compared. Such a principle leads to allocate more aid the worse the (external) environment (for a given policy) and the better the policy (for a given environment).

Résumé

Cet article compare deux conceptions relatives à l'efficacité de l'aide et à son allocation. La première, qui correspond au nouveau paradigme de l'aide, soutient que l'aide n'est efficace que si la politique économique des pays receveurs est bonne. Selon la seconde, présentée ici, l'efficacité de l'aide dépend de l'environnement externe et climatique (naturel), meilleur est cet environnement (ou moins le pays est vulnérable) moins l'aide est efficace. Les tests économétriques transversaux relatifs à des taux de croissance empilés sur deux périodes de douze ans donnent clairement l'avantage à la seconde hypothèse. Toutefois, les deux vues peuvent être conciliées dans le principe d'une allocation de l'aide fondée sur les performances, à condition de définir celles-ci comme les résultats économiques ajustés pour l'impact de l'environnement. Dans cet esprit, plusieurs mesures de performances sont à leur tour comparées. Le principe énoncé conduit à accorder plus d'aide si l'environnement est mauvais, pour une politique donnée, ou/et si la politique est bonne (pour un environnement donné).

AID AND PERFORMANCE: A REASSESSMENT

«They went never any rejected from my door »
T.S. Eliot

1 - Introduction

Aid has been assessed (World Bank 1998, Burnside and Dollar 1997). The question raised thirteen years ago by Cassen et alii (*Does Aid Work?* 1986) has been answered. It can work, depending on policies. If they are good, aid will be efficient, if they are not, aid will be useless, at best. Aid has to be allocated to those countries pursuing good policies, to a larger extent, it is argued, than is already the case. Aid effectiveness and aid selectivity issues are thus simultaneously solved. Coming after thirty years of academic work and political discussions and facing a resilient agnosticism about the effects of external aid on development (see the survey of H. White, 1994), the new paradigm may appear reassuring. However it raises two basic and related problems: is good policy the only conditioning factor? Is it the single right criterion according to which aid should be allocated ? If the answer to these questions is negative, aid needs to be reassessed, which is what we try to suggest.

In this paper we argue that aid effectiveness (also) depends on exogenous (mostly external) environment factors (terms of trade trend and real value of exports instability, climatic shocks, etc...): we posit that the worse the environment, the greater the need for aid and the higher its productivity.

Thus for the rationale of aid allocation, environment matters: aid has also to be allocated to those countries affected by a poor environment (i.e. by external shocks). This is presently the case, but to a rather limited extent. This suggests an alternative paradigm, in which aid compensates for negative shocks and also supports good policies. To put it another way, aid can be viewed as an insurance as well as a reward.

Indeed the two paradigms are not exclusive. They can be combined as far as aid effectiveness may depend both on policies and on the environment. The principle of aid

allocation based on « performance » (and of performance conditionality) previously suggested (Collier, Guillaumont, Guillaumont Jeanneney, Gunning 1997) is consistent with this perspective.

The paper is organised as follows.

We first consider (section 2) a growth cum-aid model in which growth depends on three categories of factors: i) structural or initial factors, ii) shocks or environment factors and iii) policy factors. Aid is added to these factors, as are two other interactive variables, reflecting that aid's marginal contribution to growth depends positively on policies, as expected by Burnside and Dollar, and negatively on environment, as we expect. Omitting either environment or policy variables leads to two special models, with specific implications which are discussed below.

The model is then estimated on a sample of developing countries on two pooled twelve-year periods (section 3). We find that aid's contribution to growth depends significantly on the environment, with the expected sign, but not on policy (at least with the expected sign). We provide a tentative explanation for this finding. The model is estimated first by OLS, then through a TSLS procedure, with aid simultaneously assumed to depend both on the environment (shocks) and on policy. It also appears that aid is negatively related to the quality of the external environment. In other words aid flows to countries suffering from more severe external shocks.

Finally (section 4) we comment on the implications of our results for aid allocation and conditionality. We argue in favour of aid being allocated according to «performance», and define performance as the growth outcome adjusted for the total impact of the environment (in particular, shocks), i.e. its direct impact and its impact through policy : so defined, growth performance, compared to growth outcome, is increased both by an unfavorable environment and by good policy. These are precisely the two kinds of factors which are assumed to increase aid's effectiveness, but the environment does so more clearly than policy, according to our results. Due to analytical doubts about the possibility of adequately capturing the main components of good policy, through an index, and due to political doubts about the effectiveness of conditionality based solely on policy instruments, we suggest measuring «performance» without using policy variables, and consider it as a possible indicative aid allocation criterion.

2 – Conceptual framework: how benign is it to neglect external environment?

A brief review of the literature : from the two-gap to a two-target approach

Aid effectiveness has been extensively studied during the past forty years. Among others, the work of Chenery and Strout (1966) made the contribution of aid to growth depending on one of several potentially binding constraints (successively absorptive capacity, savings, and foreign exchange). In line with this paper the popular two-gap view (where the gaps correspond to the savings gap and the foreign exchange gap) assumed that the effects of aid on growth depended on the nature of the main gap or need faced by a country. Moreover the now rather dated literature on absorptive capacity and aid, before and after the Chenery-Strout paper, illustrated ***the reliance of aid effectiveness*** on specific factors, mainly human resources (c.f. Millikan and Rostow 1957, Rosenstein-Rodan 1961, Adler 1965, Guillaumont 1971). (Other analyses of aid's effects through computable general equilibrium models have also examined the factors conditioning these effects (see for instance Chenery, Lewis, de Melo, Robinson 1986).

Paradoxically the numerous cross-sectional studies of the effects of aid on GDP growth, with very different model specifications, have generally introduced aid simply as an additional factor in the relationship without any interactive effect with other factors. Aid was supposed to have the same (positive or negative) effect on the growth rate of all the countries, after controlling for a specific set of other (additive) factors. Usually, the results were insignificant at the usual levels of confidence (see Mosley 1987, White 1992)[1].

In recent cross-sectional investigations, Burnside and Dollar (1997) have made a significant step forward by considering that aid's contribution to growth could depend on some features specific to each receiving country, namely on their policy. They find that aid, especially when they exclude middle income countries from their sample, has a significant positive effect on growth only when policy is "good enough". But aid's contribution to growth may also depend on factors other than policy, namely external or environment factors, an alternative assumption which is here considered. Having put aside the two-gap model,

[1] Note that the meaning of “aid” in the aid effectiveness literature strongly differs among studies (some mainly focused on official development assistance…, others on aggregate capital inflows…).

because of its excessive rigidity, we can however remember its main lesson concerning the dependence of aid's effects country-specific conditions[2].

Basic assumptions on aid effectiveness

In a neo-classical framework, as indicated by Burnside and Dollar, aid is expected to accelerate the transition to steady state growth. This transitory contribution to growth, they suppose, is variable according to policy. Why ?

Two main reasons can be given. First it is well known that the *ex post* rate of return of aid financed projects is higher when the macroeconomic framework is good than when it is poor. Their return is lessened by distortions such as a black market for foreign exchange, import quotas, etc.., as is the return of other projects. Second, due to the possible fungibility of public resources (c.f. evidenced by Devarajan et alii 1998, Feyzioglu et alii 1998, Pack and Pack 1993) , a good allocation of public expenditures renders the marginal efficiency of aid financed expenditure higher. These two reasons, which do not consider aid to be a significantly different form of financial flows, face some limitations.

First, if aid, through conditionality, is likely to lead or to allow a country to adopt better policies, the poorer the initial policy, the larger the room for improvement: in that case policy is endogenous to aid, a problem to be handled in the econometric model. Adjustment lending can be all the more efficient in reforming policy that policy has to be reformed. If policy is initially good, adjustment aid has less chance to be very efficient in leading to real improvement.

Second the thesis of higher aid efficiency due to a better general allocation of public funds relies on two assumptions. One is of course fungibility. Without fungibility, the argument can be reversed: the poorer the allocation of domestic resources, the stronger the possible improvement of the whole allocation induced by aid. But even if resources are fungible, as they are likely to be, the quality of expenditure in a given sector or for a specific purpose is expected to be higher when financed by aid: expenditures financed by aid for any project normally involve, through the "aid dialogue", a transfer of knowledge on their design and implementation, and may induce some specific reforms (indeed this is an old justification

[2] Another assumption, tested by Chauvet (1998), was that aid effectiveness depends (negatively) on socio-

given for project aid, see for instance Hirschman 1967, de Vries 1967, Guillaumont 1975, and an argument well taken in the World Bank 1998).

It now appears that the selectivity argument, which proposes that aid should be allocated according to the quality of policy, remains somewhat ambiguous. On the grounds that policy based selectivity can accelerate growth, the argument is not perfectly clear, and has to be empirically tested (this has already been done, and will be discussed below). If aid is not actually more productive when policy is better, the argument could appear only to be a moral one, and, we can add, politically appealing: aid would be viewed as a reward for good policies. However, in this case, aid can be presented as an incentive to adopt good policies, an argument that is itself open to debate (Berg 1997a, 1997b).

Besides good policies, other factors can be assumed to influence aid effectiveness. Her we assume that developing countries affected by external or climatic shocks need more foreign support and that in these countries foreign aid is more effective, other things being equal. The reason is that more vulnerable countries need some kind of insurance in order to avoid the interruption or collapse of growth process (possibly leading to lasting recession). An abundant literature has shown the negative effects on growth in developing countries of different kinds of shocks, either durable, such as a declining trend of the terms of trade, or transitory, such as the instability of the real value of exports or other exogenous instabilities (climate) (cf for instance Collier and Gunning 1997, Dawe 1997, Guillaumont 1994, Guillaumont, Guillaumont Jeanneney, Brun 1999, Ramey and Ramey 1995, Rodrick, 1998). The point raised here is that aid is likely to make a greater marginal contribution to growth in countries suffering from shocks. To put it another way : the negative effects of shocks are expected to be dampened by aid. An extreme case in a growth perspective is that of emergency aid : it is not only a humanitarian matter, it may also be a factor that contributes to the sustainability of growth.

We have thus two main kinds of factors likely to influence aid effectiveness, as well as what we may call two corresponding "aid paradigms". The first is that of aid aimed at supporting good policies, expected to reinforce their effect, or at least to reward them. The second stresses that aid has to allow countries to overcome their vulnerability, to face shocks in better conditions, or at least to (partially) compensate for their effects. Aid supporting

---

political instability.

policies appears to be designed as an incentive, and aid facing vulnerability as a (macro) insurance. Possible shortcomings are moralising advice in one case, moral hazard in the other one.

A related question is to know whether aid is actually allocated according to the quality of the policy or to that of the environment (i.e. to vulnerability), whatever the other factors of aid allocation are. Assuming that aid decisions are (partially) driven by the objective of maximising the growth of recipients, the answer would depend on the preceding question about which of these two factors, policy or the environment, have a greater influence on aid effectiveness. We have thus to test jointly their respective influence on aid effectiveness and aid allocation.

Of course there may be other factors that condition aid effectiveness, in particular those identified in the earlier literature on aid and gathered within the absorptive capacity concept; these are mainly centered on human resources (these important factors were once considered also as a criterion, debatable indeed, for aid allocation)[3].

The empirical model: the aid vulnerability relationship

The general model corresponding to the previous assumptions can be written as follows, with some notation similar to that of Burnside and Dollar:

. g_{it} : the growth rate of real per capita GDP of country i during period t

. A_{it} : the level of aid as a fraction of GDP received by country i in period t

. P_{it} : a vector of macroeconomic policy variables in country i at time t

. E_{it} : a vector of external and climatic environment variables in country i at time t (i.e. a vector of vulnerability variables)

. X_{it}: a vector of initial conditions and other exogeneous variables such as y_{it} the level of real per capita GDP in country i at the beginning of period t, or h_{it} the level of human capital per capita in country i at the beginning of period t.

The growth equation suggested by the literature on growth determinants and the previous discussion on aid would be

[3] See the previous references to Millikan and Rostow (1958) and Rosenstein-Rodan (1961).

$$g_{it} = \beta_o + \beta_x X_{it} + \beta_e E_{it} + \beta_p P_{it} + \beta_a A_{it} + \beta_{ap} . A_{it} . P_{it} + \beta_{ae} . A_{it} . E_{it} + \varepsilon_{igt} \quad (1)$$

Note that this equation simply adds the two variables, E_{it} and $A_{it} . E_{it}$, to the initial Burnside-Dollar model. To avoid an excessive number of interactive variables we shall use scalar indices both for policy and for environment (vulnerability), respectively drawn from a linear combination of policy variables and a linear combination of vulnerability variables, as explained in more detail below, (by a way proximate to that used by Burnside and Dollar for policy). In what follows we replace the vectors E_{it} and P_{it} by the composite indices $\tilde{E}_{it}$ and $\tilde{P}_{it}$. According to this equation the possible contribution of aid to growth is

$$\frac{\partial g_{it}}{\partial A_{it}} = \beta_a + \beta_{ap} . \tilde{P}_{it} + \beta_{ae} \tilde{E}_{it} \qquad (\beta_a > 0, \quad \beta_{ap} > 0, \quad \beta_{ae} < 0) \quad (1')$$

Also noted by Burnside and Dollar, aid and policy may be endogenous and "depend on the independent variables in the system and on each other". This problem can be solved by creating instruments for aid and policy only if appropriate instruments are found, i.e. not correlated with the growth residual, ε_{igt}.

Consider, in that perspective, the implication of having added the E_{it} variables. We suppose that both policy and aid depend on these environment (vulnerability) variables which also influence growth and as such are not appropriate instruments for policy and aid.

Indeed one of the major expected effects of external shocks is to render sound macroeconomic policy less likely and even to induce wrong policy choices: for instance real value of exports instability often leads to over-investment and/or to public deficits. It may be also that policy choices are influenced by some initial conditions such as the level of human capital. Finally, policy could be influenced by aid, either positively through conditionality, or negatively if it is a substitute to public effort: the result is ambiguous and actually insignificant in some regressions of this kind (as in Burnside-Dollar, see also Boone 1996, World Bank 1998 for the diversity of relationships between aid and reform). So we can write:

$$P_{it} = \pi_o + \pi_e E_{it} + \pi_x X_{it} + \pi_a A_{it} + \varepsilon_{ipt} \quad (2)$$

This policy equation needs several comments:

- if the policy indicator is endogenous to growth, then ε_{ipt} is correlated with the growth residual ε_{igt}.
- in order to instrument P_{it} in the growth equation the vector X_{it} should include some structural variables explaining policies which are not already explaining growth: instrumentation of policies in a growth equation is a difficult task indeed
- on the other hand all the variables included in the vector X_{it} of structural or initial variables used in eq. 1 are not likely to influence policy: we find below that only human capital (education) among these possible explanatory variables is significant, so we can replace in eq. 2 the vector X_{it} by a single variable h_{it} representing the initial level of human capital[4]
- leaving the variable A_{it} in equation (2) is debatable because its effect is ambiguous and it has been proven to be insignificant in previous studies (Burnside and Dollar) as it is in our estimations (see below).

So we can rewrite equation (2) as follows:

$$P_{it} = \pi'_o + \pi'_e E_{it} + \pi'_h h_{it} + \varepsilon'_{ipt} \qquad (\pi_e > 0, \pi_h > 0) \qquad (2')$$

Concerning aid, it is not totally candid to assume that its allocation between developing countries may depend on the specific needs revealed by the environment vulnerability variables. It also and mostly depends, as is well known, on some initial conditions and structural variables, such as GDP per capita and the size of the population. Finally it could be influenced by policy, as it is hoped to be, according to the new aid paradigm.

We can write

$$A_{it} = \alpha_o + \alpha_e E_{it} + \alpha_x X_{it} + \alpha_\pi P_{it} + \varepsilon_{iat} \qquad (\alpha_e < 0, \alpha_\pi > 0) \qquad (3)$$

Note that
- if the environment indicator is endogenous to growth, then ε_{iat} is correlated with the growth residual ε_{igt}.
- in order to instrument aid in the growth regression, the vector X_{it} should include some structural variables explaining aid which are not already explaining growth: the variables representing the strategic position or the preferential political links with the main donors are

[4] Note that other variables X'_{it} will have to be found for the instrumentation of policy in the growth regressions.

good candidates for such a role (let us call S_{it} the vector of these variables for country i during the period t)

- among the main variables which are included in the vector X_{it} (or E_{it}) and which explain aid are the GDP per capita and the population size (let us call X'_{it} and E'_{it} the vectors X_{it} and E_{it} without these variables and S_{it})

So we can rewrite equation (3) as follows:

$$A_{it} = \alpha'_o + \alpha'_e E'_{it} + \alpha_s S_{it} + \alpha_x X'_{it} + \alpha'_\pi P_{it} + \varepsilon'_{iat} \qquad (3')$$

We now have a system of three equations which have to be identified. The inclusion of E_{it} variables in a system where they would be omitted is likely to eliminate biases in the coefficients of aid's contribution to growth as far as they are correlated with growth (positively), with aid (we assume negatively) and with policies (we assume positively). It can be shown that, assuming no relationship between aid and policy, the omission of E_{it} leads one to overrate the (presumed positive) impact of aid and/or of the interactive Aid x Policy variable on growth. Instrumentation of aid and policy does not eliminate biases if vulnerability factors are used as instruments, but are not included in the growth regression.

In order to estimate our model, we shall have of course to use a two-stage least squares procedure, the growth equation being estimated with simultaneous instrumentation of aid and policy, but we also shall have to look for specific instruments not likely to be correlated with growth. Their validity will be assessed through the use of tests or over-identification.

We can make a step further towards a simpler model which allows one to avoid the acute problem of finding acceptable instruments for policy variables and moreover is convenient to test the total effect of aid and vulnerability on growth. Let us combine (1) and (2'). We obtain:

$$g_{it} = \beta'_o + \beta'_x X_{it} + \beta'_e \tilde{E}_{it} + \beta'_a A_{it} + \beta'_{ae} A_{it}.\ \tilde{E}_{it} + \beta'_{ah} A_{it} h_{it} + \varepsilon'_{igt} \qquad (4)$$

We note that

$$\beta'_e = \underset{+}{\beta_e} + \underset{+}{\beta_p \pi'_e}$$

$$\beta'_a = \underset{+}{\beta_a} + \underset{?}{\beta_{ap}\ \pi'_o}$$

$$\beta'_{ae} = \underset{-}{\beta_{ae}} + \underset{?}{\beta_{ap} \pi'_e}$$

Note that using eq. 2', we have assumed that A_{it} has no significant impact on policy ($\pi_a \approx 0$).

We have a new interactive variable ($A_{it}.h_{it}$) which here only results from the two combined assumptions : human capital improves policy and policy influences aid effectiveness ; it may be also that human capital directly improves aid effectiveness.

3 - An econometric estimation of conditional aid effects

Any econometric estimation of aid effects requires preliminary choices to be made regarding the measurement of aid and on the time period covered. Once these choices have been explained, we present the nature and sources of the variables used in the model, followed by the results of growth regressions obtained with OLS and with TSLS. Finally, we present specific results for aid and policy regressions.

Aid measurement

ODA (Official Development Assistance), as defined and measured by the OECD, is indeed a somewhat arbitrary concept (due to the criterion of 25% grant element calculated with an unchanging discount rate of 10%). Thus, the effort made by the World Bank (Chang, Fernandez-Arias and Serven 1998) to measure «true » aid flows according to a « new approach » is welcome. This measure, already used by Burnside and Dollar on a provisional basis, is the sum of the grants and the grant equivalent of official loans, itself measured by taking into account the level of interest rates in lending countries. This may be an appropriate procedure if one wishes to evaluate the quality of the aid offered by a donor country. But it does not seem to be a relevant measure of the potential benefit drawn by a recipient country during a given period from the net flow actually received : the real counterpart of ODA flows or their impact on public finance seems to be better caught by the net disbursements than by the grant equivalent. Thus the macro-economic effects of aid can reasonably be assessed by taking actual disbursements as the explanatory variable[5]. In our regressions, the aid variable is the ratio of net ODA disbursements to GDP, as directly calculated by the OECD[6].

[5] Of course, it would be interesting to test the sensibility of the results with the two different measures of aid and the same model.
[6] However, we made an alternative estimation with the new definition of aid as the grant element (Effective Development Assistance, EDA) but the results of the TSLS growth regressions do not differ significantly.

Length of the observation period

We are interested in an assessment of the effects of aid on growth over a long period of time. We can of course cover a long period by simply stacking observations on a number of shorter periods (Burnside and Dollar take six four year periods). But to test the assumptions presented above, we need a balance between two considerations. When the focus is on policy, it is convenient to limit the length of the period, due to possible changes in policies. Vulnerability on the other hand, may be measurable only over a longer period, and may be its effects on growth. The aid effects themselves, as they are related to institutions, infrastructure, human capital and even structural policy may be delayed over a number of years. This may be the case even when the aid aims to support imports, since it can avoid collapses that have lasting effects.

In order to keep a balance between a shorter period likely to capture the reversibility of policy stances, and a longer period appropriate to the meaning of the concept of vulnerability, and to some lagged effects of aid, we have chosen to analyse the (growth) effects of aid over two pooled twelve-year periods (1970-1981 and 1982-1993), thus allowing us to cover twenty-four years.

Definition of the variables and base specification of the growth regression

Following the traditional economic growth literature, we have introduced a first set of structural exogenous factors (corresponding to the X_{it} vector of equation (1)) to explain the growth of real per capita GDP : the initial per capita GDP (source Summers and Heston, 1993) to capture convergence effects, the average years of secondary schooling over age 25 at the beginning of the period (h_{it}) (source Barro and Lee, 1996), the rate of population growth, financial depth, measured by the ratio of M2 to GDP (source WDI), as a proxy for the initial distortions in the financial system, a measure of previous political instability (a weighted sum of the number of revolutions per year and of the number of assassinations per million inhabitants per year) (source Barro and Lee, 1993). The last two variables are lagged one period to avoid simultaneity problems. We also added the ethnolinguistic fragmentation index often used in the recent literature (Mauro, 1995, Easterly and Levine, 1997, Arcand, Guillaumont and Guillaumont-Jeanneney, 1999).[7]

[7] We have also introduced the squared value of this variable according to the assumption of polarisation (Arcand, Guillaumont and Guillaumont-Jeanneney, 1999) but it was then deleted because it was not significant.

A second set of exogenous variables corresponds to the vector E_{ij} of the model, the "environment variables" aimed at capturing the exogenous vulnerability of a country. Instead of working with a "bad environment" indicator we use a "good environment" indicator to compare easily the result with the "good policy" hypothesis. To construct this indicator, we use four variables previously normalised on a scale from 0 to 100. They are weighted by their impact on growth, as it appears in regression (1-1) in Table 1.

The structural vulnerability of a country is assumed to result from the size of the shocks it faces and from its exposure of these shocks (Guillaumont, 1998).There are several kinds of possible shocks (a similar presentation of the indicator of these shocks is given in Guillaumont, Guillaumont-Jeanenney, Brun, 1999). One of them is the climatic shock. There are many different climatic or ecological shocks (droughts, floods, cyclones, earthquakes,…) : a rough proxy of the size of the shocks can be given by the instability of agricultural value added; weighting this instability index by the ratio of agricultural value added to GDP allows one to take into account the exposure of the economies to this kind of shock (Guillaumont and Guillaumont, 1988). Another major kind of shock is constituted by trade shocks : here we distinguish long term shocks, through the trend of the terms of trade, and short term shocks, captured by the index of instability of the real value of exports (deflated by the unit value of exports). Finally we use the logarithm of population, as a proxy for the structural exposure to these two last kinds of shocks : large countries are indeed less vulnerable to trade shocks than smaller ones. Note that instabilities are measured with respect to a linear trend value. Moreover, as far as we are interested in a "good environment" indicator, we need to invert the scale of the instability variables, so that they reflect "relative stabilities".

Finally, following Dollar and Burnside (1997) the policy variables used are the inflation rate as a measure of monetary policy, the budget surplus, and the Sachs and Warner (1995) trade openness variable. These variables are then normalised on a scale from 0 to 100 and combined in a policy indicator. They are weighted by their impact on economic growth, as is shown in regression (2) in Table 1.

The two composite indicators of 1) environment / vulnerability and 2) macro-economic policy, have been constructed respectively from the OLS regressions (1.1) and (1.2)

of Table 1. We note that in each equation, all the variables intended to become the components of the respective indicators are highly significant.

OLS Growth regressions results

We can now turn to the OLS growth regressions including the aid to GDP ratio (A_{it}) as an explanatory variable, and the aid interactive variables as well[8]. The results are given in Table 2.

The first regression (2.1) which corresponds to eq. 1 presented above in the "empirical model" gives significant results for nearly all variables (only ethnolinguistic fragmentation has a p value above 10%, actually 15%). In particular three variables $\hat{E}_{it}, \hat{P}_{it}$, and A_{it} are highly significant: growth seems positively influenced by a good environment (low vulnerability), good macro-economic policy, and a high level of aid. Moreover, and this is our main concern, aid effectiveness is higher when vulnerability is high (i.e. lower when the environment is good), as it was expected to be. But, contrary to Burnside-Dollar's findings, the better the macro policy, the lower aid's effectiveness. We have presented above in section 2 some reasons why this could be the case : the weaker the initial quality of policy, the stronger the improvement which can be brought by aid.

Of course, one should be cautious regarding the robustness of these results. We note that, introduced separately, the two interactive variables are no longer significant (regressions 2.2 and 2.3).

Aid and policy regressions

As noted above, it is likely that the aid and policy variables are endogenous. Before proceeding to the estimation of the TSLS growth regression where aid and policy are instrumented, it seems interesting to consider independently the aid and the policy regressions, corresponding to equations (2) and (3) of the model.

Aid regressions are given in Table 3. It appears significantly determined by the structural variables traditionally used in aid allocation functions (initial GDP per capita, infant mortality, population size). The variables assumed to represent "donors interests" in some

[8] We have not introduced the results with the interactive variable Human Capital x Aid as it appears in equation (4) because this interactive variable was not significant. It was not significant in the TSLS growth regressions as well.

other studies here are not significant[9]. Concerning our two composite indicators, it appears that the environment / vulnerability indicator is highly significant[10]: high vulnerability results in more aid, as expected. But the policy indicator does not appear significant, contrary to the results found by Burnside and Dollar: there would thus be room to improve aid allocation on that side. This may due to the longer period of observation we have chosen, which prevents one from capturing the short or medium term reactions of aid to policy changes.

Policy regressions are given in Table 4. Only two variables appear to be significant (plus the negative dummy for the period 1970-1981 corresponding to the poor policies of this period) : the level of human capital which seems to improve the quality of policies, and the state of the external / climatic environment. Bad environment made it more difficult to implement good policies (and so had a negative effect on growth, not only directly but also through policy). One aspect of the economic vulnerability to shocks is precisely that shocks may result in worse policy.

TSLS growth results

Finally, we come to the results obtained for growth regressions with a two-stage least square procedure. We first re-estimate (eq. 5.1) the full model corresponding to eq. 1, by instrumenting the following variables: $\hat{E}_{it}, \hat{P}_{it}$, A_{it} , $A_{it} \times \hat{E}_{it}$, $A_{it} \times \hat{P}_{it}$. Instruments are the independent variables of the aid regression and the lagged values of the policy variables, plus some multiplicative variables[11].

The results in this regression (5.1) are the same as those obtained using OLS (Table 1, eq. 1.1), with one exception: the interactive variable $A_{it}\ \hat{P}_{it}$, previously significantly negative, is no longer significant, which makes these results less contrary with those of Burnside-Dollar, but confirms the ambiguousness of the impact of policy on aid effectiveness.

[9] We introduced a dummy variable for Egypt but it did not change the results, either in the aid regressions or in the growth TSLS regressions.

[10] Note that, in this case, the environment / vulnerability indicator does not include the population variable. The indicator then is the weighted sum of the trend of terms of trade and of the value added and real value of exports instabilities.

[11] The full list of the instruments is : lagged aid (1966-1969 for the first period and 1978-1981 for the second period), the squared log of initial GDP and of initial population size, the initial infant mortality rate, the latter squared, log population x infant mortality, variables likely to represent donors own interests, and the lagged values of the inflation rate, the fiscal surplus and the openness dummy, (1966-1969; 1978-1981).

Actually, the main point is that aid effectiveness is increasing with the vulnerability of the country (i.e decreasing with the quality of the environment). We have

$$\frac{\partial g_{it}}{\partial A_{it}} = 0.84 - 0.13\ \hat{E}_{it}, \qquad \text{hence } \frac{\partial g_{it}}{\partial A_{it}} > 0 \text{ when } E_{it} \leq 6.46$$

It follows that according to this estimation more aid had a positive effect on growth only when the environment was bad, i.e. only in vulnerable countries.

The results can also be interpreted in another way : they show that the negative effects of a bad environment (high vulnerability) can be lessened by aid (for any likely level of aid, since $\partial g / \partial \hat{E}_{it} = 0.066 - 0.13.A_{it} < 0$ only if $A_{it} > 50$ %).

Three other regressions are presented in the Table 5 which allow one to compare the two models of aid effectiveness (eq. 5.2 and 5.3 or 5.4). Significant results for the aid effects are obtained with the "vulnerability model" but not with the "policy model".

An important point concerning the TSLS regressions is the choice of good instruments for the aid and policy variables. A way to check that the instruments are not correlated with the growth residual is to perform an over-identification test[12] (Hausman, 1983). The results of this test are given in the last rows of Table 5 and suggest that the instruments chosen are appropriate and that the model is well-specified.

[12] The hypothesis tested is : H0 : $g = \alpha X + \varepsilon$ versus $g = \alpha X + \beta Z + \varepsilon$ where X are exogenous and endogenous variables and Z are the instruments. We test whether $\beta = 0$ (i.e. the instruments and specification of the model are appropriate). We cannot reject H0 if the calculated chi squared is less than the critical value of chi squared statistics.

4 – Implications: a performance-based aid allocation

We now draw the implications of the previous analysis for aid allocation. We suggest that previous results are consistent with an allocation based on performance, then suggest some precisions in the meaning and measurement of performances.

The rationale for an allocation according performances

It has been previously suggested that aid allocation should be conditioned by performance (Collier, Guillaumont, Guillaumont Jeanneney and Gunning 1997). This proposal took place in the debate about conditionality reform and as such primarily concerned program or adjustment aid. Its purpose was to avoid the shortcomings of a conditionality relying on the instruments of economic policy and leading to a weak internalization or ownership of the reform process, then to superficial and reversible reforms. Thus a performance conditionality was proposed as an alternative to the present instrument conditionality. We note that beyond aid for adjustment this proposal may concern by a more or less indicative way the global amount of aid to be allocated to a country.

Our point is now that a general principle of aid allocation according to performance is consistent with the empirical findings of this paper. We provisionaly define economic performance as the economic outcome (here we focus on growth, but it can also be poverty reduction) not resulting from exogeneous factors (initial conditions and external environment), i.e. economic outcomes adjusted for the impact of these factors. So economic performance is expected to reveal the effectiveness of policy, irrespective of the instruments used. It is somewhat a difference between gross results and the impact of structural and environmental factors.

First, what have we found about policy which is relevant for our purpose ? Aid effectiveness does not significantly depends on the quality of policy –as could be expected from theoretical assumptions-, but policy -at least some identified macro policy variables- is independently a significant factor of growth. Moreover policy does not seem to have been significantly influenced by aid. So if policy, whatever the instruments are, can be improved through a new aid allocation process, grounded on performance, this new aid allocation criterion can lead to a higher aid effectiveness.

Second and presumably main finding, aid effectiveness depends on external environment. All other things equal, aid is more effective in more vulnerable countries. So an aid allocation which takes into account shocks faced by the countries and gives additional aid to those more vulnerable countries is likely to increase aid effectiveness.

Thus aid allocation according performance may conciliate the two aims of aid we opposed above, supporting policy and facing vulnerability, because performance is adjusted for vulnerability and reveals policy (a given observed rate of growth means a higher performance when the country faced an unfavorable environment). But the two implicit aid criteria behind the idea of performance do not play the same role. If aid has to be allocated according to (revealed) policy, it is not because it is more productive when policy is good, but because it will give an incentive to improve policy (whatever the instruments are). If aid is to be allocated according to structural vulnerability, it is because it is expected to be more conducive to growth. Note then that it is also a compensation for the negative impact of vulnerability on growth (we can assume no moral hazard, since the compensation will be limited to a small fraction of the vulnerability impact).

We can summarize the argument using the equation (4) and knowing that $\beta'_{ah} \cong 0$. The marginal contribution of aid to growth is:

$$\frac{\partial g_{it}}{\partial A_{it}} = \beta'_a + \beta'_{ae} \,.\, \tilde{E}_{it} \qquad (\beta'_a > 0,\ \beta'_{ae} < 0) \qquad (5)$$

So there are two main ways to increase aid effectiveness:

- to improve the quality of aid (in order to increase β'_a),
- to allocate aid according to performance, which means both:
  . increasing the reaction of policy to aid (which would involve π_a in equation (2) becoming significantly positive, and subsequently an increase of β'_a)
  . giving more aid when $\tilde{E}_{it}$ is low ($\beta'_{ae} < 0$), i.e. to vulnerable countries.

Measurement of performances

If performance may be a logical criterion of aid allocation, we need to know precisely how it can be measured. There are indeed several possible measures of performances. What we need is a comparative measure of performance, allowing to rank the countries. We propose to define a (growth) performance indicator of a country i comparable

to that of other countries as its rate of growth adjusted for the effect that exogenous factors (initial conditions, trade or climatic environment) have on it both directly and through their influence on policy. This definition will be compared with two other proximate methods of performance measurement. Then performance of some particular countries will be considered with regard to the actual level of aid they receive.

To link the measurement method with our previous conceptual framework, let us come back to eq (1) and combine it with eq (3) in order to eliminate aid from the growth equation, intended to be used as an aid criterion. Since aid is a function of exogeneous factors (initial conditions and external environment factors) and of policy, we obtain a reduced form of growth equation where growth only depends on these exogeneous factors i.e. the X_{it} and E_{it} vectors (including now all the factors influencing either growth or aid) and on policy factors (the P_{it} vector). Since we have no longer variables interactive with aid, we have no reason to now consider differently the initial conditions (X_{it}), such as human capital, and the external environment/vulnerability variable (E_{it}) (the impact of which on aid effectiveness is likely to differ). So, assuming all structural, initial, environment variables are included in E_{it}, we obtain [13], another reduced equation:

$$g_{it} = \beta'_o + \beta'_e E_{it} + \beta'_p P_{it} + \varepsilon_{it} \qquad (6)$$

Note that here $\beta'_e = \beta_e + \beta_a . \alpha_e < \beta_e$ and $\beta'_p = \beta_p + \beta_a . \alpha_\pi > \beta_p$

A first way to define performance of country i is to adjust its observed rate of growth g_{it} for the fact that exogeneous (including initial and external environment) factors in this country differ from the average of the other developing countries (let call $\overline{E_t}$ this average during period t). According to this method, used by Collier, Guillaumont, Guillaumont Jeanneney and Gunning 1997, we measure a performance (I) as

$$g^I_{it} = g_{it} - \beta'_e (E_{it} - \overline{E_t}) = \beta'_o + \beta'_e \overline{E_t} + \beta'_p P_{it} + \varepsilon'_{it} \qquad (7)$$

Performance I indicates what would have been the rate of growth of country i if its structural characteristics and environment had been the same as the average of other

[13] For simplicity we delete the interactive term E_{it} x P_{it} as well as the squared values of E_{it} and P_{it} which only change the functional form of the model but not the line of reasoning.

countries. Different performances between countries in time t result from the impact of different level of policy variables, and from those not identified factors captured by the residual.

But, as we have seen, policy is itself partially the result of these exogeneous factors represented in the vector E_{it} . Actually it appeared to significantly depend on human capital and vulnerability. So we can substitute in eq (6) P_{it} by its value such as determined by eq (2) –assuming again $\pi_a = 0$ and obtain a new reduced growth equation:

$$g_{it} = \beta''_o + \beta''_e E_{it} + \varepsilon''_{it} \qquad (8)$$

$$= (\beta'_o + \beta'_p \pi_o) + (\beta'_e + \beta'_p \pi_e) E_{it} + \varepsilon''_{it} \qquad (8bis)$$

In this equation β''_e captures both the direct effect of the variables E_{it} and their normal effect through policy. It results in another and here preferred definition of performance, let us say performance II. It is the rate of growth a country i would have achieved with environment variables similar to the average, taking into account the normal effect of these variables on policy:

$$g^{II}_{it} = g_{it} - \beta''_e (E_{it} - \overline{Et})$$

$$= \beta''_o + \beta''_e \overline{Et} + \varepsilon''i_t \qquad (9)$$

So with performance II the differences between countries in period t are given by the residual of a growth equation including as explanatory variables only factors likely to be independent from policy. It is the growth rate adjusted for the total effect of “exogeneous” factors (either initial or related to the environment) (see a previous presentation of a similar concept performance and the problems it raises in Guillaumont and Guillaumont 1988, Guillaumont, Guillaumont and Plane 1988, Guillaumont 1994).

The difference between Performance I and Performance II appears to result from the treatment of the indirect impact of the environment variables, i.e. their impact through policy, taken into account in Performance II but not in Performance I. In other words, performance I does not take into account the fact that a good policy is made more difficult by a bad environment, as it seems to be according to the results of our policy regressions.

$$g^{I}_{it} - g^{II}_{it} = - (\beta'_e - \beta''_e) (E_{it} - \overline{Et}) \quad (10)$$

$$= (\beta'_o - \beta''_o) + (\beta'_e - \beta''_e) \overline{Et} + \beta'_p P_{it} + \varepsilon'_{it} - \varepsilon''_{it} \quad (10bis)$$

So the quality of the assessment of Performance II depends only on the identification of all the factors independent from policy. That of performance I depends on the same and on the identification of policy factors.

We can also compare these two concepts of performance with the index of economic policy used by Burnside and Dollar. Indeed, this index has not been built precisely to assess performance, but rather to avoid the juxtaposition of several interactive variables with aid corresponding to the different components of policy. However it may be considered as an indicator of performance, itself adjusted for the impact of environment factors. Keeping our notations, it can be defined as [14]

$$g^{III}_{it} = \beta'_o + \beta'_e \overline{Et} + \beta'_p P_{it}$$

$$= g_{it} - \beta'_e (E_{it} - \overline{Et}) - \varepsilon'_{it} \quad (11)$$

As noted by the authors it can be interpreted as a country's predicted growth rate, given its budget, inflation and trade policies (here P_t) , assuming that environment variables had the mean values of other countries [15].

The difference between this macro policy indicator with the two previous concepts of performance is as follows :

- it differs from Performance I in that the residual of the growth regression ε'_{it}, which captures the effects of all the policy instruments others than the three macro policy indicators listed above, is not included in the regression

$$g^{I}_{it} - g^{III}_{it} = \varepsilon'_{it}$$

- it differs even more from Performance II, since moreover it does not take into account the indirect impact of environment through policy. In Performance II policy indicators do no longer appear as they do in Performance I and II

$$g^{II}_{it} - g^{III}_{it} = (g^{I}_{it} - g^{III}_{it}) - (g^{I}_{it} - g^{II}_{it}) = (\beta'_e - \beta''_e) (E_{it} - \overline{Et}) + \varepsilon'_{it}$$

[14] we don't indicate here for simplicity the time period dummies.

[15] They add "since the time dummies have been excluded it is the predicted growth rate in the world economic conditions of 1990-1993 (the bench mark period)"

$$= (\beta''_o - \beta'_o) + (\beta''_e - \beta'_e)\ \overline{Et} - \beta'_p\ P_{it} + \varepsilon_{it}'' \qquad (12)$$

Considering that the two first terms of the last equation are constant in period t, the difference between the measures of Performance II and III comes from the difference between the residual of the eq. (8) supposed to capture all the effects of policy choices, and the estimation of the direct impact of the policy variable of eq. (6).

This presentation of the three methods of performance (or policy) measurement is of course over simplified. In particular a special attention should be given to the treatment of aid in the three cases, which, as noted, is determined by both the environment and the policy factors. In order to assess performance after taking into account the amount of aid received, which may be the point of view of donors, we can modify the three previous, and consider aid as a specific exogeneous factor. So coming back to the eq. (1), with interactive variables (aid x environment and possibly aid x policy), it means that performance is then assessed with regard to a normal or average aid effectiveness.

Anyway these simplified measures of growth performance can serve to illustrate the difficulty and implications of the methodological choices in that matter of performance assessment.

Conclusion

Aid effects are a complex matter. And selectivity in aid allocation is a difficult task, not without a risk. The risk is to design selectivity from a fragile assessment of aid effects.

Here we endorse the idea that aid effects on growth are not necessarily positive and that they depend on specific conditions in each recipient country. We find that the effects are all the more positive a country faces a bad environment : aid seems to have accelerated growth only in the more vulnerable countries. In other words, it has significantly dampened the negative effects of a bad environment. But we do not find that aid effectiveness (in growth terms) has been increased by a better policy. Of course a better policy is an important factor of growth, but the impact of which, it seems, is not increased by aid. Simultaneously we find

that aid allocation has been influenced by the environment (aid reacts positively to the vulnerability), but not by policy[16].

If our results are robust, it does not follow that policy improvement is not to be encouraged by aid. It is rather the opposite, as far it has not been enough the case. But it can be looked for and may be obtained even if aid effectiveness does not depend on policy.

Defining growth performances as that part of growth which is not explained by exogeneous factors (initial structures, external or climatic environment), we suggest that a performance based aid allocation may together increase the aid effectiveness and incent developing countries to promote better policies by their own. It means that countries will receive more aid when they face a difficult environment and when they implement policies leading to better performances, whatever the chosen instruments.

Now caveats are needed. Cross-sectional econometric tests of assumed relationships between aid, vulnerability, policies and growth are to be considered with caution and are always open to debate. The policy implications of the topic makes the debate (with similar data) all the more needed. In the case of the present study, the results of which significantly differ of some previous ones, we need to test their sensitivity to the definition of aid, to the length of the observations period, to the size and the composition of the sample (unfortunatly limited, as in other studies, by a lack of data).

[16] Policy itself is positively influenced by the environment, and by human capital.

References

Adler, J.H. (1965), *Absorptive Capacity, the Concepts and its Determinants*, Brookings Institution.

Arcand, J.L., P. Guillaumont and S. Guillaumont-Jeanneney (1999), Ethnicity, Communication and Growth, CERDI Etudes et Documents.

Barro, R. and J.W. Lee (1993), International Comparisons of Educational Attainement, *Journal of Monetary Economics,* 32(3).

Barro, R. and J.W. Lee (1993), International Measures of Schooling Years and Schooling Quality, *American Economic Review, Papers and Proceedings,* 86(may).

Berg, E. (1997a), Dilemmes dans les Stratégies d'aide, *Revue d'Economie du Développement,* (4).

Berg, E. (1997b), Dilemmas in donors strategies in Gwin C. and J.K. Nelson *Perspectives on Aid and Development*, Policy Essay 22, Overseas Development Council, The John Hopkins University Press.

Boone, P. (1996), Politics Effectiveness of Foreign Aid, *European Economic Review,* 40.

Burnside, C. and D. Dollar (1997), Aid, Policies and Growth, *World Bank Policy Research Paper,* n°1777.

Cassen, R. (1986), *Does Aid Work?* Oxford University Press.

Chang, C., E. Fernandez-Arias and L. Serven (1998), Measuring Aid Flows : A New Approach, World Bank, Development Research Group, Washington D.C.

Chauvet, L. (1998), Les Liens entre Aide Internationale, Croissance et Instabilité Sociopolitique, Preliminary work, CERDI.

Chenery, H.B. and A. Strout (1966), Foreign Assistance and Economic Development, *American Economic Review,* 56.

Chenery, H.B., J. Lewis, J. de Melo, S. Robinson (1986), Alternative Routes to Development, in Chenery, H.B. and alii editors, *Industrialisation and Growth : a Comparative Study*.

Collier, P., P. Guillaumont, S. Guillaumont Jeanneney, J. Gunning (1997), Redesigning Conditionality, *World Development,* 25(9).

Collier, P. and J. Gunning (1997), *Trade Shocks in Developing Countries : Theory and Evidence*, Oxford : Clarendon Press.

Dawe, D. (1996), A New Look at the effects of Export Instability on Investment and Growth, *World Development,* 24(12).

Devarajan, S., A.S. Rajkumar, V. Swaroop (1998), What Does Aid to Africa Finance ?, World Bank, Development Research Group, Washington D.C.

Easterly, W. and R. Levine (1997), Africa's Growth Tragedy : a Retrospective, 1960-1989, *Quaterly Journal of Economics*, Nov.

Feyzioglu, T., V. Swaroop, M. Zhu (1998), A Panel Data Analysis of the Fungibility of Foreign Aid, *World Bank Economic Review*, 12(1).

Guillaumont, P. (1971), *L'Absorption du Capital*, Ed. Cujas, Paris.

Guillaumont, P. (1985*), Economie du Développement, t.III Dynamique Internationale du Développement*, Collection Thémis, Presses Universitaires de France.

Guillaumont, P. (1994), Une Evaluation Transversale des Performances : le Rôle de la Politique Economique, in (sous la direction de P. et S. Guillaumont*), Ajustement et Développement, l'Expérience des Pays ACP : Afrique, Caraïbes, Pacifique*, chap. 4, Economica.

Guillaumont, P. (1998), How to Include an Index of Vulnerability in the Criteria for Identifying the LDC's ?, Draft document prepared for the U.N. expert group meeting on vulnerability and LDC's identification criteria, U.N.

Guillaumont, P., S. Guillaumont-Jeanenney, J.F. Brun (1999), How Instability Lowers African Growth, *Journal of African Economies*, 8(1).

Guillaumont, P. and S. Guillaumont (1988*), Stratégies de Développement Comparées, Zone Franc et Hors Zone Franc* (direction de l'ouvrage avec Sylviane Guillaumont), Economica.

Guillaumont, P., S. Guillaumont and P. Plane (1988), Participating in African Monetary Unions : an Alternative Evaluation, *World Development*, 16(5).

Hirschman, A.O. (1967), *Development Projects Observed*, The Brookings Institution, Washington.

Hausman, J.A (1983), Specification and Estimation of Simultaneous Equation Models, *Handbook of Econometrics*, vol. I chap.7, eds Griliches Z. and Intriligator M.D, North Holland Amsterdam.

Mauro, P. (1995), Corruption and Growth, *Quaterly Journal of Economics*, 110.

Millikan, M.F. and W.W. Rostow (1957), *A Proposal : Key to an Effective Foreign Policy*, Harper and Brothers.

Mosley, P. (1987), *Overseas Aid : Its Defence and Reform*, Brighton, England : Wheatsheaf.

Pack, H. and J. Pack (1993), Foreign Aid and the Question of Fungibility, *Review of Economics and Statistics*, 72(2).

Ramey, G. and V. Ramey (1995), Cross Country Evidence on the Link Between Volatility and Growth, *The American Economic Review*, 85(5).

Rodrick, D., (1998), Where Did all the Growth Go ? External Shocks, Social Conflicts, and Growth Collapses, *NBER Working Paper*, n° 6350.

Rosenstein-Rodan, P.N. (1961), International Aid for Underdeveloped Countries, *Review of Economics and Statistics.*

Sachs, J. and A. Warner (1995), Economic Reform and the Process of Global Integration, *Brookings Papers on Economic Activity*, 1.

Summers, R. and A. Heston (1993), The Penn World Tables 5.5, Cambridge MA : NBER.

Vries (de), R. (1967), External Aid to Plans or Projects : an Alternative Approach, *The Economic Journal*, Sept.

White, H. (1992), The Macroeconomic Impact of Development Aid : a Critical Survey, *Journal of Development Studies*, 28.

White, H. and J. Luttick (1994), The Countrywide Effects of Aid, *World Bank Policy Research Working Paper*, n°1337.

World Bank (1998), *Assessing Aid : What Works, What Doesn't and Why*, Oxford University Press.

Table 1 - Initial growth regressions, without aid, used for the weighting of environment and policy indicators

Regression No	1.1	1.2
dependent variable	Per capita GDP growth	Per capita GDP growth
Structural or initial variables (Xit)		
constant	3,21	-0,65
	(0,34)	(0,81)
dummy70	1,55	4,67
	(0,0021)	(0)
Log of initial GDP per capita	-1,46	-0,3
	(0,0005)	(0,41)
Av. years of sec. schooling (initial)	2,66	-0,16
	(0,006)	(0,79)
Rate of population growth	-0,69	-0,7
	(0,049)	(0,076)
Financial depth (M2/GDP) (lagged)	0,035	0,021
	(0,081)	(0,38)
Political instability (lagged)	-3,77	-0,36
	(0,012)	(0,79)
Ethnolinguistic fragmentation	-1,01	-0,608
	(0,26)	(0,509)
Environment or vulnerability variables (Eit)		
Stability of agricultural value added	0,032	
	(0,017)	
Stability of real value of exports	0,02	
	(0,0048)	
Trend of terms of trade	0,032	
	(0,0003)	
Log of initial population	0,05	
	(0,0011)	
Macro-economic policy variables (Pit)		
inflation		-0,022
		(0,048)
surplus		0,0706
		(0.00)
openness		0,031
		(0,00)
observations	95	105
Adjusted R2	0,5	0,47

White-heteroskedasticity-consistent standard errors
P-values in parentheses

Table 2 - OLS growth regressions

Regression No Dependent variable	2.1 Per capita GDP growth	2.2 Per capita GDP growth	2.3 Per capita GDP growth	2.4 Per capita GDP growth
Structural or initial variables (Xit)				
constant	-0,21	2,55	-0,79	5,80
	(0,95)	(0,53)	(0,844)	(0,15)
dummy70	3,89	3,64	3,92	1,57
	(0.00)	(0.00)	(0.00)	(0,0036)
Log of initial GDP per capita	-1,25	-1,406	-1,04	-1,86
	(0,0027)	(0,0009)	(0,0073)	(0,00)
Av. years of sec. schooling (initial)	1,42	1,52	1,36	2,66
	(0,0788)	(0,065)	(0,1065)	(0,0027)
Rate of population growth	-0,79	-0,8806	-0,866	-0,66
	(0,0093)	(0,0066)	(0,0078)	(0,047)
Financial depth (M2/GDP) (lagged)	0,0323	0,0336	0,026	0,043
	(0,0722)	(0,0771)	(0,207)	(0,027)
Political instability (lagged)	-3,406	-3,154	-3,6	-3,28
	(0,0081)	(0,0146)	(0,0041)	(0,036)
Ethnolinguistic fragmentation	-1,055	-1,036	-1,0035	-1,109
	(0,15)	(0,174)	(0,18)	(0,211)
Environment or low vulnerability indicator (Eit)	0,81	0,74	0,71	1,0707
	(0.00)	(0.00)	(0.00)	(0,00)
Policy indicator (Pit)	0,92	0,75	0,92	
	(0.00)	(0.00)	(0.00)	
Official Development Assistance (Ait)	0,38	0,14	0,092	0,303
	(0,0143)	(0,13)	(0,23)	(0,0029)
Ait x Eit	-0,039	-0,024		-0,05
	(0,0503)	(0,168)		(0,0042)
Ait x Pit	-0,026		-0,017	
	(0,027)		(0,12)	
observations	85	85	85	95
Adjusted R2	0,67	0,66	0,66	0,53

White-heteroskedasticity-consistent standard errors
P-values in parentheses

Table 3 - Aid regressions

Regression No Dependent variable	3.1 ODA / GNP OLS	3.2 ODA / GNP TSLS
Structural variables		
constant	48.53	51,62
	(0,000)	(0,000)
dummy70	-2,84	-4,99
	(0,0967)	(0,0052)
Log of initial GDP per capita	-3,56	-3,89
	(0,0008)	(0,0003)
Infant Mortality	0,0404	0,032
	(0,0402)	(0,0779)
Log of initial population	-0,167	-0,187
	(0,0001)	(0,0002)
Donors' interests		
Central America	-0,29	-0,709
	(0,80)	(0,6005)
Franc Zone	0,48	-0,627
	(0,75)	(0,797)
Sub-Saharan Africa	-1,29	-1,946
	(0,4)	(0,182)
Environment or low vulnerability (Eit)	-1,56	-1,018
	(0,013)	(0,023)
Policy indicator (Pit)	0,021	-0,327
	(0,96)	(0,441)
Over-id. test : calculated chi squared		3,68
chi squared statistics		5,99
observations	105	80
Adjusted R2	0,57	0,56

White-heteroskedasticity-consistent standard errors
P-values in parentheses

Table 4 - Policy regressions

Regression No Dependent variable	4.1 Policy indicator OLS	4.3 Policy indicator TSLS
Structural or initial variables (Xit)		
constant	2,47	1,86
	(0,44)	(0,63)
dummy70	-2,79	-2,87
	(0.00)	(0.00)
Log of initial GDP per capita	-0,29	-0,21
	(0,41)	(0,56)
Av. years of sec. schooling (initial)	1,67	1,63
	(0,0031)	(0,0043)
Rate of population growth	0,36	0,3
	(0,17)	(0,28)
Financial depth (M2/GDP) (lagged)	0,012	0,0075
	(0,507)	(0,69)
Political instability (lagged)	-1,05	-1,2
	(0,45)	(0,41)
Ethnolinguistic fragmentation	0,11	0,25
	(0,85)	(0,68)
Environment or low vulnerability indicator (Eit)	0,32	0,35
	(0,0609)	(0,097)
Official Development Assistance (Ait)	-0,0046	0,0049
	(0,92)	(0,93)
Over-id. test : calculated chi squared		14,62
chi squared statistics		15,5
observations	87	86
Adjusted R2	0,48	0,49

White-heteroskedasticity-consistent standard errors
P-values in parentheses

Table 5 - TSLS growth regressions

Regression No	5.1	5.2	5.3	5.4	5.5
Dependent variable	Per capita GDP growth	Per capita GDP growth	Per capita GDP growth	Per capita GDP growth	Per capita GDP growth
Structural or initial variables (Xit)					
constant	9,42	12,03	2,305	7,21	2,51
	(0,18)	(0,082)	(0,7)	(0,1162)	(0,39)
dummy70	3,91	3,8	4,25	1,59	4,42
	(0,00)	(0,00)	(0,00)	(0,0028)	(0,00)
Log of initial GDP per capita	-2,21	-2,41	-1,16	-2,11	-1,13
	(0,0053)	(0,0024)	(0,0307)	(0,00)	(0,001)
Av. years of sec. schooling (initial)	0,89	0,88	0,84	2,65	0,61
	(0,25)	(0,26)	(0,32)	(0,002)	(0,47)
Rate of population growth	-0,81	-0,87	-0,92	-0,65	-1,23
	(0,0053)	(0,0042)	(0,0004)	(0,048)	(0,0003)
Financial depth (M2/GDP) (lagged)	0,062	0,067	0,026	0,048	0,027
	(0,019)	(0,0104)	(0,25)	(0,0167)	(0,25)
Political instability (lagged)	-2,56	-2,14	-3,84	-2,97	-3,026
	(0,17)	(0,24)	(0,0095)	(0,078)	(0,0228)
Ethnolinguistic fragmentation	-2,07	-2,18	-1,38	-1,17	-1,55
	(0,039)	(0,038)	(0,0971)	(0,18)	(0,049)
Environment or low vulnerability indicator (Eit)	0,066	0,61	0,46	1,13	0,52
	(0,0021)	(0,0053)	(0,0304)	(0,00)	(0,001)
Policy indicator (Pit)	0,94	0,85	1,103		1,022
	(0,0001)	(0,00)	(0,00)		(0,00)
Official Development Assistance (Ait)	0,84	0,76	0,12	0,51	
	(0,065)	(0,11)	(0,53)	(0,08)	
Ait x Eit	-0,13	-0,14		-0,08	
	(0,059)	(0,0748)		(0,052)	
Ait x Pit	-0,018		-0,036		
	(0,56)		(0,28)		
Over-id. test : calculated chi squared	1,577	1,95	11,51	7,26	0,061
chi squared statistics	15,5	16,9	16,9	14,06	5,99
observations	68	68	68	95	68
Adjusted R2	0,63	0,58	0,71	0,52	0,71

White-heteroskedasticity-consistent standard errors
P-values in parentheses

Countries included in the data set

Benin
Burkina Faso
Cameroon
Central African Republic
Congo
Cote d'Ivoire
Ethiopia
Gabon
Gambia, The
Ghana
Kenya
Madagascar
Malawi
Mali
Mauritius
Niger
Nigeria
Uganda
Rwanda
Senegal
Sierra Leone
Somalia
Sudan
Chad
Togo
Zaire
Zambia
Bangladesh
Myanmar
India
Indonesia
Malaysia
Pakistan
Philippines
Korea, Rep.
Sri Lanka
Thailand

Algeria
Egypt, Arab Rep.
Iran, Islamic Rep.
Jordan
Morocco
Syrian Arab Republic
Tunisia
Yemen, Rep.
Cyprus
Argentina
Bolivia
Brazil
Chile
Colombia
Costa Rica
El Salvador
Ecuador
Guatemala
Guyana
Honduras
Jamaica
Mexico
Nicaragua
Panama
Paraguay
Dominican Republic
Trinidad and Tobago
Uruguay
Venezuela