

AID AND PERFORMANCE: A REASSESSMENT

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«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 and 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 as reassuring. However it raises two basic 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 instability, climatic shocks, etc...): the worse environment, the higher aid needs and the higher productivity of aid, we suppose.

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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). And it is presently the case, but to some limited extent. That suggests an alternative aid paradigm, which relies on the principle of aid as compensation for negative shocks as well as a support for good policies. To put it another way, aid can be viewed as insurance as well as a reward.

Indeed the two paradigms are not exclusive. They can be combined as far as aid effectiveness may depend on both policies and environment. The principle of an aid allocation based on « performance » (and of a 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 where growth depends together on three categories of factors: i) structural or initial factors, ii) shocks or environment and iii) policy factors. Aid is added to these factors and so two other interactive variables, reflecting that aid marginal contribution to growth depends positively on policies, as expected by Burnside and Dollar, and negatively on environment, as we expect. Leaving aside either environment or policy variables leads to two special models, with specific implications which are discussed.

The model is then estimated on a sample of developing countries on two pooled twelve-year periods (section 3). We find that aid contribution to growth actually depends significantly on environment, with the expected sign, but not on policy (at least with the expected sign), which is tentatively explained. The model is estimated first by OLS, then through a TSLS procedure, with aid simultaneously estimated and assumed to depend both on environment (shocks) and policy. It also appears that aid is negatively related to the quality of environment, in other words it comes to countries suffering the more from external shocks.

Finally (section 4) we comment the implications of the results for aid allocation and conditionality. We argue in favour of an aid allocated according to « performances », and define performance as the growth outcome adjusted for the total impact of the environment (noticeably of shocks), i.e. its direct impact and its impact through policy: so defined, growth

performance, compared to growth outcome, is increased both by a bad quality of environment and by a good policy. These are precisely the two kinds of factors which are assumed to increase the aid effectiveness, but the environment more clearly than policy, according to our results. Due to analytical doubts about the possibility of adequately capturing the main components of a good policy, through an index, and due to political doubts about the effectiveness of a conditionality only related to policy instruments, we suggest to measure « 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?

Brief look on 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 the binding constraints (successively absorptive capacity, savings foreign exchange). In line with this paper the popular two-gap view (savings gap and foreign exchange gap) assumed that the effects of aid on growth were depending on the nature of the main gap or need faced by a country. Moreover the now pretty old literature on absorptive capacity of aid, before and after the Chenery-Strout paper, illustrated the reliance of aid effectiveness on specific factors, mainly human resources (cf for instance Millikan and Rostow 1957, Rosenstein-Rodan 1961, Adler 1965, Guillaumont 1971). (Other analyses of aid 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, actually the results were hardly significant (see Mosley 1987, White 1992)¹.

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...).

So, in further cross-sectional investigations, Burnside and Dollar (1997) have made a significant step forward in considering that aid 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 of growth only when policy is good enough. But the aid contribution to growth may also depend on other factors than policy, namely the external or environment factors, an alternative assumption which here is considered. Forgotten the two-gap model, notably too rigid, we can remember its main lesson on the relativity of aid effects to specific country conditions². We then need a two-pole or a two-target approach to aid effects, both policy and environment focused.

Basic assumptions on aid effectiveness

In a neo-classical framework, as indicated by Burnside and Dollar, aid is expected to accelerate the transition to the 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 black market of foreign exchange, import quotas, etc., as is the return of other projects. Second, due to the possible fungibility of the public resources (cf evidenced by Devarajan and alii 1998, Feyzioglu and alii 1998, Pack and Pack 1993), a good allocation of public expenditures makes at the margin the efficiency of aid financed expenditure higher. These two reasons, which do not consider aid is a financial flow really different from others, face some limitations.

First if aid, through conditionality, is likely to lead or to allow a country to adopt a better policy, 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 that the policy has to be reformed. If the policy is fair, adjustment aid has little chance to be very efficient in leading to real improvement: it may be a problem for the countries needing this kind of aid only for debt servicing.

² Another assumption, tested by Chauvet (1998), was that aid effectiveness depends (negatively) on socio-political instability.

Second the thesis of a 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 the 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 an old justification given to project aid, see for instance Hirschman 1967, de Vries 1967, Guillaumont 1985).

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

Besides good policies, other factors can be assumed to influence aid effectiveness. We here suppose 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 equal. The reason is that these more vulnerable countries need some kind of insurance to avoid growth interruption or collapse (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 terms of trade (or 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. Said in 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 on humanitarian matter, it may also be a factor of growth sustainability.

So we have two main kinds of factors likely to influence aid effectiveness, and what we may call two corresponding aid paradigms. The first is that of an 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.

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 an objective of recipients growth maximisation, the answer would depend on the preceding issue about which of these two kinds of factors, policy and environment, more influence aid effectiveness. So we have to test together their respective influence on aid effectiveness and on aid allocation.

Thus we can provisionally oppose to views on aid, underlining respectively two factors of aid effectiveness, good policies and vulnerability, and two corresponding aid targets, supporting policies and facing vulnerability. Aid is then respectively designed as an incentive and as a (macro) insurance, or in extreme cases as a simple reward or an emergency compensation. Possible shortcomings are moralising advice in one case, moral hazard in the other one.

Of course there may be other factors of aid effectiveness, in particular those underlined in the earlier literature on aid and gathered within the absorptive capacity concept, in fact mainly human resources (these important factors were once considered also as a criterion, debatable indeed, for aid allocation).

The empirical model: the aid vulnerability relationship

The general model corresponding to the previous assumptions can be written as follows, with some notations similar to those 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

$$g_{it} = \beta_0 + \beta_x X_{it} + \beta_e E_{it} + \beta_p P_{it} + \beta_a A_{it} + \beta_{ap} \cdot A_{it} \cdot P_{it} + \beta_{ae} \cdot A_{it} \cdot E_{it} + \varepsilon_{igt} \quad (1)$$

Note that this equation simply adds the two variables, E_{it} and $A_{it} \cdot E_{it}$, 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

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

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 growth residual.

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 make less easy a sound macroeconomic policy and even to induce wrong policy choices: for instance terms of trade instability often lead to over investment and/or to public deficit. It may be also that

policy choices are influenced by some initial conditions such as the level of human capital. Finally, it 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 Burnside-Dollar's, see also Boone 1996, World Bank 1998 for the diversity of relationships between aid and reform). So we can write:

$$P_{it} = \pi_0 + \pi_e E_{it} + \pi_x X_{it} + \pi_a A_{it} + \varepsilon_{ipt} \quad (2)$$

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: indeed instrumentation of policies in a growth equation is a difficult task
- 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 the eq. 2 the vector X_{it} by a single variable h_{it} representing the initial level of human capital³
- leaving the variable A_{it} is debatable because its effect is ambiguous and it has been proven to be insignificant in previous studies (Burnside and Dollar) and it is so in our estimations (see below).

So we can rewrite equation (2) as following:

$$P_{it} = \pi'_0 + \pi'_e E_{it} + \pi'_h h_{it} + \varepsilon'_{ipt} \quad (\pi_e > 0, \pi_h > 0) \quad (2bis)$$

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 well known, on some initial conditions and structural variables, such as the GDP per capita and the population size. Finally it could be influenced by policy, as it is hoped to be, according to the new aid paradigm; but in that direction also the relation between policy and the total amount of aid is still questionable. However we can write

$$A_{it} = \alpha_0 + \alpha_e E_{it} + \alpha_x X_{it} + \alpha_\pi P_{it} + \varepsilon_{iat} \quad (\alpha_e < 0, \alpha_\pi > 0) \quad (3)$$

³ Note that other variables X'_{it} will have to be found for the instrumentation of policy in the growth regressions.

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 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 following:

$$A_{it} = \alpha'_o + \alpha'_e E'_{it} + \alpha'_s S_{it} + \alpha'_x X'_{it} + \alpha'_\pi P_{it} + \varepsilon'_{iat} \quad (3bis)$$

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 the aid 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, supposing no relation between aid and policy, the omission of E_{it} leads 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.

So in order to estimate our model, we shall have of course to use a two-stage least squares procedure, the growth equation being simultaneously estimated with instrumentation of aid and policy, but we also shall have to look to specific instruments not likely to be correlated with growth, what will be tested by over-identifying tests.

We can make a step further towards a simpler model which allows 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 (2bis), we obtain:

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

We note that

$$\begin{aligned} \beta'_e &= \beta_e + \beta_p \pi'_e \\ &\quad + \quad + \quad + \\ \beta'_a &= \beta_a + \beta_{ap} \pi'_o \\ &\quad + \quad ? \quad ? \\ \beta'_{ae} &= \beta_{ae} + \beta_{ap} \pi'_e \\ &\quad - \quad ? \quad ? \end{aligned}$$

Note that using eq. 2bis, we have assumed that A_{it} has no significant impact on policy ($\pi_a \approx 0$). We have a new interactive variable ($A_{it} \cdot h_{it}$) 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 needs preliminary choices to be made on the measurement of aid and on the length of period covered. Once these choices explained, we present the nature and sources of the variables used in the model, then the results of growth regressions obtained with OLS and with TSLS. Specific results for aid and policy regressions are finally given.

Aid measurement

ODA (Official Development Assistance), as defined and having been measured for many years on a large extent by OECD, how useful it is, is indeed a somewhat arbitrary concept (due to the criterion of 25% grant element calculated with an unchanging discount rate of 10%). So the effort made by the World Bank (Chang, Fernandez-Arias and Serven 1998) to measure «true » aid flows according 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 in taking into account the level of interest rates in lending countries. It may be an appropriate procedure 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 during this period: 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. Then macro-economic effects of aid can reasonably be assessed in taking actual disbursements as the explanatory variable⁴. In regressions, the aid variable is the ratio of net ODA disbursements to GDP, as directly calculated by OECD⁵.

Length of the observation period

We are interested in an assessment of effects of aid on growth over a long period of time. We can of course cover a long period by empiling observations on a number of

⁴ Of course, it would be interesting to test the sensibility of the results with the two different measures of aid and the same model.

⁵ 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.

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. But considering vulnerability, it may be measurable only over a longer period, and its effects on growth as well. The aid effects themselves, as they are related to institution, infrastructures, human capital and even structural policy may be delayed over a number of years. They are so even when the aid aims to support imports, since it can avoid collapses with lasting effects.

So in order to keep a balance between a shorter period likely to capture the reversibility of policy stances, and a rather long period appropriate to the meaning of the concept of vulnerability, and to some over lagging effects of aid, we have chosen to analyse (growth) effects of aid over two pooled twelve-year periods (1970-1981 and 1982-1993), allowing 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 exogeneous factors (corresponding to the X_{it} vector of previous equation (1)) to explain the growth of real per capita GDP : the initial per capita GDP (source Summers and Heston, 1993) to capture the convergence effect, 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, the financial depth, measured by the ratio of M2 to GDP (source WDI), as a proxy of the initial distortions in the financial system, a measure of the previous political instability (a weighted sum of the number of revolutions per year and of the number of assassinations per million population per year) (source Barro and Lee, 1993). The last two variables are one period lagged to avoid any causality problem. 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).⁶

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 on a "bad environment" indicator we use a "good environment" one to

⁶ 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.

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 from regression (1) in Table 1.

The structural vulnerability of a country is supposed to result from the size of the shocks it faces and from the 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 added value; weighting this instability index by the ratio of agricultural value added to GDP allows to take into account the exposure of the economies to this kind of shocks (Guillaumont and Guillaumont, 1988). Another major kind of shocks is trade shocks : we here 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 (actually deflated by the unit value of imports, what means instability of the income terms of trade). Finally we use the logarithm of population, as a proxy for the structural exposure to these two last kinds of shocks : indeed large countries are 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 built 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 aid to GDP ratio (A_{it}) as an explanatory variable, and the aid interactive variables as well⁷. 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 $\hat{E}_{it}, \hat{P}_{it}, A_{it}$ are highly significant: growth seems positively influenced by a good environment (low vulnerability), a good macro-economic policy, and a high level of aid. Moreover, what is our main concern, aid effectiveness is higher when the vulnerability is high (ie lower when the environment is good), as it was expected to be. But, contrary to the Burnside-Dollar findings, the better the macro policy, the lower aid effectiveness. We have presented above in section 2 some reasons why it could be so, mainly the higher policy improvement effect which could be associated with aid when the initial quality of policy is weak.

Of course we can have some doubts about 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

We can first suspect aid and policy variables to be 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 the 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 the aid allocation functions (initial GDP per capita,

⁷ 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.

infant mortality, population size). The variables assumed to represent "donors interests" in some other studies here are not significant⁸. Concerning our two composite indicators, it appears that the environment / vulnerability indicator is highly significant⁹: 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: so there would be a large room for improving aid allocation on that side. That may due to the longer period of observation we have chosen, not allowing to capture the short-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 more difficult to implement good policies (and so has a negative effect on growth, not only directly but also through policy). One aspect of the economic vulnerability to shocks is precisely that it results in a lower quality in policies.

TSLS growth results

We finally 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: $\hat{E}_{it}, \hat{P}_{it}, A_{it}, A_{it} \cdot \hat{E}_{it}, A_{it} \hat{P}_{it}$. Instruments are the independent variables of the aid regression and the lagged values of the policy variables, plus some multiplicative variables¹⁰.

The results in this regression 6.1 are the same as those obtained in 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. Actually,

⁸ 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.

⁹ 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 added value and income terms of trade instabilities.

¹⁰ The full list of the instruments is : aid lagged (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

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

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

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 allows 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 test¹¹ (Hausman, 1983). The results of this test are given in the last rows of Table 5 and suggest that the instruments chosen are appropriated and that the model is well-specified.

squared, log population x infant mortality, variables likely to represent donors own interests, and the lagged values of the inflation rate, the surplus and the openness dummy, (1966-1969; 1978-1981).

¹¹ The hypothesis tested is : $H_0 : g = \alpha X + \varepsilon$ versus $g = \alpha X + \beta Z + \varepsilon$ where X are exogeneous and endogeneous variables and Z are the instruments. We test whether $\beta = 0$ (ie the instruments and specification of the model are appropriated). We cannot reject H_0 if the calculated chi squared is less than the chi squared statistic.

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 provisionally 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 $\beta'_{ah} \equiv 0$.

The marginal contribution of aid to growth is:

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

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 obtain¹², another reduced equation:

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

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

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 \bar{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

¹² For simplicity we delete the interactive term $E_{it} \times P_{it}$ 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.

$$g_{it}^I = g_{it} - \beta'_e (E_{it} - \bar{E}_t) = \beta'_o + \beta'_e \bar{E}_t + \beta'_p P_{it} + \varepsilon'_{it} \quad (7)$$

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 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:

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

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

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:

$$g_{it}^{II} = g_{it} - \beta''_e (E_{it} - \bar{E}_t) \\ = \beta''_o + \beta''_e \bar{E}_t + \varepsilon''_{it} \quad (9)$$

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.

$$g_{it}^I - g_{it}^{II} = -(\beta'_e - \beta''_e) (E_{it} - \bar{E}_t) \quad (10)$$

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

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 ¹³

$$\begin{aligned} g_{it}^{III} &= \beta'_o + \beta'_e \bar{E}_t + \beta'_p P_{it} \\ &= g_{it} - \beta'_e (E_{it} - \bar{E}_t) - \varepsilon'_{it} \end{aligned} \quad (11)$$

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 ¹⁴.

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

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

¹³ we don't indicate here for simplicity the time period dummies.

- 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

$$\begin{aligned} g_{it}^{II} - g_{it}^{III} &= (g_{it}^I - g_{it}^{III}) - (g_{it}^I - g_{it}^{II}) = (\beta'_e - \beta''_e) (E_{it} - \bar{E}_t) + \varepsilon'_{it} \\ &= (\beta''_o - \beta'_o) + (\beta''_e - \beta'_e) \bar{E}_t - \beta'_p P_{it} + \varepsilon'_{it} \end{aligned} \quad (12)$$

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.

¹⁴ 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)"

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 policy¹⁵.

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

¹⁵ Policy itself is positively influenced by the environment, and by human capital.

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 (unfortunately limited, as in other studies, by a lack of data).

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**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
<i>Structural or initial variables (Xit)</i>		
constant	3.21 (0,34)	-0.65 (0,81)
dummy70	1.55 (0,0021)	4.67 (0)
Log of initial GDP per capita	-1.46 (0,0005)	-0.3 (0,41)
Av. years of sec. schooling (initial)	2.66 (0,006)	-0.16 (0,79)
Rate of population growth	-0.69 (0,049)	-0.7 (0,076)
Financial depth (M2/GDP) (lagged)	0.035 (0,081)	0.021 (0,38)
Political instability (lagged)	-3.77 (0,012)	-0.36 (0,79)
Ethnolinguistic fragmentation	-1.01 (0,26)	-0.608 (0,509)
<i>Environment or vulnerability variables (Eit)</i>		
Stability of agricultural added value	0.032 (0,017)	
Stability of income terms of trade	0.02 (0,0048)	
Trend of terms of trade	0.032 (0,0003)	
Log of initial population	0.05 (0,0011)	
<i>Macro-economic policy variables (Pit)</i>		
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 error and covariance