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THE IMPACT OF AID ON ECONOMIC GROWTH IN TRANSITION ECONOMIES: AN EMPIRICAL STUDY

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Summary. This paper assesses econometrically the contribution of aid to output growth in a panel of twenty transition countries over nine years (1989-1997). The study finds a positive and statistically significant relationship between foreign aid and growth. A second result is that the positive effect of aid seems to be stronger when associated with economic liberalisation. The above findings are important, particularly in light of recent scepticism on the role of aid on developing country economic growth and the recent declining trend in aid commitments from industrialized countries.

IEL classification numbers: C23, F35

Key words: economic transition, empirical study, foreign aid, growth, reform.

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THE IMPACT OF AID ON ECONOMIC GROWTH IN TRANSITION ECONOMIES: AN EMPIRICAL STUDY

1. INTRODUCTION

This paper presents an empirical analysis of the impact of the foreign development aid on output performance in economies in transition (ETs)[1].

The debate over the economic impact of public capital, including aid, has grown in significance over the past few years, both in terms of the extensive literature to which it has given rise as well as its importance in policy-making. However, the question of whether development aid has actually served a good purpose by contributing to better economic performance in transition countries, remains largely an empirical question, which has not been explored as yet in the literature.

In the development economics literature, the foreign aid is typically thought of as a means of raising scarce financial capital[2]. By alleviating the recipient's resource constraint aid causes an increase in GDP. Moreover, besides augmenting the country's stock of physical capital, aid may help upgrade the stock of human capital and facilitate technological transfers. In addition, some spillover effects might be associated with the provision of external finance when the involvement of international aid organisations promotes the recipient's credibility, helps build up confidence and improves the business climate in the recipient country.

However, the international trade literature argues that inflows of foreign development assistance may also have a negative impact on the recipient' s economic performance. The argument is that, in the presence of distortions, aid can be donor enriching and recipient immisering - the so-called transfer paradox[3]. The key factor behind this unconventional result is the effect of aid on the international terms of trade (Djajic, Lahiri and Raimondos-Moller, 1996).

Empirically, the relationship between aid and growth is often found to be weak, ranging

from positive (Hansen and Tarp, 2001; Lensink, 1993; Levy, 1988; Papanek, 1973), to non-existent (Boone, 1994; Mosley, Hudson and Horrell, 1987), or negative (Mosley *et al*, 1987), depending on the country (or region) and period under analysis. Explanations for these inconclusive results have focused on the shaky analytical foundations and statistical shortcoming present in some empirical studies (White, 1992; Mosley *et al*, 1987; Papanek, 1972). First, many of the early studies have failed to address the issue of the non-stationarity of the output series that could lead to spurious correlation. Secondly, many have used Ordinary Least Squares (OLS) to estimate a single regression that might be prone to endogeneity bias. Third, studies have, predominantly, used an unlagged measure of aid what is inadequate given the nature of aid and the time required for its implementation[4]. However, recent inquiries have attempted to tackle these problems as new and more sophisticated empirical techniques became available (Hansen and Tarp, 2001; Burnside and Dollar, 2000).

An interesting and highly publicised study of developing countries by Burnside and Dollar (2000) found that, conditional on the right policy environment, aid stimulates growth[5]. Since it first began circulating as a World Bank Research Department working paper in 1996, their work has incited considerable interest in academic circles, aid organisations, and field practitioners, contributing to a meaningful revival of the debate on the effectiveness of development aid.

Despite the growing interest in the topic, for economies in transition, the question has not been explored by empirical research. Coinciding with the initiation of the market reforms and political liberalisation in most former communist countries, total aid to ETs increased significantly in 1991. However, after relative stability experienced between 1992 and 1995, year 1996 marked a sharp decline in net funding, a trend which continued during 1997 (see figure 1).

FIGURE 1 HERE

For the period 1989-1997, the average annual aid to transition countries varied between 0.10 and three percent of the recipient's GDP with the exception of Albania that received an exceptional 15 percent of its GDP in aid (see table 1).

TABLE 1 HERE

The impact on economic growth in transition countries is not, however, obvious. Throughout the region, reforms were followed by strong contraction in output. Further, while in the Central and Eastern European countries (CEECs) recovery already started in 1993, output continued to decline over the entire 1989-1997 period in most of the countries in the Former Soviet Union (FSUs) (see figure 2) [6].

FIGURE 2 HERE

This paper uses the Burnside and Dollar framework to estimate the effect of aid on output growth during transition using a panel of 20 transition countries over nine years (1989-1997) with countries and the period selected to maximize the number of observations for a balanced panel. Further, we test whether the relationship between aid and growth is influenced by policy reforms affecting economic liberalisation. Our empirical results indicate a positive and statistically significant relationship between aid and growth. Furthermore, our findings support the hypothesis that aid works better when executed in a low-distortion policy environment.

The paper is organized as follows: section two provides a conceptual framework and describes the empirical model; section three discusses the variables and data sources employed in this study; section four presents and analyses the results; and section five concludes by discussing some qualifications and implications for the results presented in this study.

2. A CONCEPTUAL FRAMEWORK AND THE EMPIRICAL MODEL

As noted earlier, the empirical analysis for this paper is based on Burnside and Dollar (2000). Our present work, however, departs from theirs in that it focuses on the importance of economic liberalisation policies for the relationship between aid and growth rather than interactions between aid and macroeconomic policies (see Burnside and Dollar, 2000). In addition, it attempts to fill a gap in the ETs' literature using a new dataset for analysing transition.

For an idea of how aid affects output changes consider a simple specification of the recipient country's production function:

$$Y = y(K, H, T) \tag{1.1}$$

where Y is output and K, H, T are physical capital, labour augmenting human capital, and state of technology, respectively[7].

Differentiating, the following expression is obtained:

$$dY = \frac{\partial y}{\partial K} dK + \frac{\partial y}{\partial H} dH + \frac{\partial y}{\partial T} dT \tag{1.2}$$

Note that aid, *A*, can in turn affect each one of the above growth components. This is represented by[8]:

$$dY = \frac{\partial y}{\partial K} \cdot \frac{\partial K}{\partial A} dA + \frac{\partial y}{\partial H} \cdot \frac{\partial H}{\partial A} dA + \frac{\partial y}{\partial T} \cdot \frac{\partial T}{\partial A} dA \qquad (1.3)$$

This interpretation of the growth effect of aid is intuitively appealing and has often been supported in the literature (see Hansen and Tarp, 2001; Burnside and Dollar, 2000)[9].

Dividing both sides by *dA* gives the overall effect of aid on output growth as:

$$\frac{dY}{dA} = \frac{\partial y}{\partial K} \cdot \frac{\partial K}{\partial A} + \frac{\partial y}{\partial H} \cdot \frac{\partial H}{\partial A} + \frac{\partial y}{\partial T} \frac{\partial T}{\partial A} = \gamma_K \alpha_K + \gamma_H \alpha_H + \gamma_T \alpha_T \qquad (1.4)$$

where $\gamma_K, \gamma_H, \gamma_T$ denote the partial derivatives of the output function with respect to factor inputs, and $\alpha_K = \frac{\partial K}{\partial A}, \alpha_H = \frac{\partial H}{\partial A}$, and $\alpha_T = \frac{\partial T}{\partial A}$ indicate the marginal effects of aid on physical capital, human capital, and technology, respectively.

We now turn to the empirical model. Following Burnside and Dollar (2000) and given our variables of interest, the following general specification is used as the basis for the statistical analyses in this paper:

$$GRO_{it} = \beta_0 + \beta_a AID_{it} + \beta_p' POL_{it}' + \beta_x' X_{it}' + u_{it}, \quad i = 1, \ldots, N; t = 1, \ldots, T \qquad (1.5)$$

where GRO_{it} is GDP growth for country *i* at time *t*, β_0 is a 1 x 1 scalar representing the base

level of growth when the effect of all the independent variables is zero, AID_{it} is aid received by country *i* at time *t*, POL'_{it} is a *1xh* vector of variables measuring economic policies $POL'_{it} = (POL_{1it},...,POL_{hit})$, X'_{it} represents a *1xk* vector of additional exogenous explanatory variables $X'_{it} = (X_{1it},...,X_{kit})$ included as controls, and u_{it} is an error term identically and independently distributed, with zero mean and constant variance $\sigma_u^2 : u_{it} \sim i.i.d.(0,\sigma_u^2)$.

Investment, human capital, and technology *per se* do not enter the growth equation. The following reasons explain this choice:

(i) Because of representing the actual channels through which aid works on output changes, the inclusion of these variables would almost certainly cause aid to be insignificant. This intuition is confirmed by the results in Hansen and Tarp (2001) who find aid to be insignificantly associated with growth when investment is included as a regressor. Yet, their analysis finds a positive relationship between increased aid and increased investment indicating that aid affects output growth via investment.

(ii) Related to the above is also the difficulty of interpreting the effect of aid and policy variables in a growth regression that has investment as an independent variable[10]. In Fischer's words "it is hard to conceive of variables that would not affect growth through their effect on investment as well as through other routes mostly the rate of productivity increase" (Fischer, 1993).

(iii) Finally, we attempted to verify the robustness of our results by accounting for the effect of a variable for foreign direct investment (*FDI*), one for investment, and a proxy for human capital in order to avoid allocating their effects to the aid variable. First, the *FDI* variable representing inflows as percent of a country's GDP, as published online by UNCTAD (*http://stats.unctad.org/fdi/eng/TableViewer/wdsview/dispviewp.asp*), was found to be

highly insignificant. This is possibly due to most countries having received very little or no foreign investment in the first years of transition and to data quality. For instance, important inconsistencies were found across various sources we consulted (see also, CEER, 1998; Meyer, 1994, EIU, various issues). Secondly, the proxy for human capital was also insignificant. This variable was defined as the gross rates of general secondary education in percent of the relevant population aged between 15 and 18, as reported by UNICEF, International Child Development Centre, TransMONEE database (*http://www.unicef-icdc.org/resources/*). This is consistent with results from other similar studies (see Hansen and Tarp, 2001; Burnside and Dollar, 2000). Finally, the variable for gross fixed investment also exhibited insignificant results. The variable was expressed as percent of the country's GDP using information from EBRD's *Transition Reports* (various issues), the United Nations' *National Account Statistics: Main Aggregates and Detailed Tables 1995* published in 1999 (for Azerbaijan, 1989-1992), and Asian Development Bank (for Tajikistan, 1996 – 1998). This result is very puzzling. The investment variable seems to be correlated with aid, FDI, and proxy for education. However, investment is insignificant even in equations where aid, FDI and education are excluded[11]. Alternative data for investment was not available to test results for this variable.

To test whether the policy environment affects the relationship between aid and growth we also estimate the following model[12]:

$$GRO_{it} = \beta_0 + \beta_a AID_{it} + \beta_p POL_{it} + \beta_{ap} AID_{it} * POL_{it} + \beta_{a^2p} AID_{it}^2 * POL_{it} + \beta_x' X_{it}' + u_{it} \quad (1.6)$$

The specification includes an interaction term to measure the impact of policies on the

contribution of aid to growth. Since it could be argued that there might be non-linearities in the interaction term and that the marginal impact of aid would depend on the amount of aid received by a particular country, we also included a quadratic interaction term in the regressions. Nonlinearities in the aid term *per se* are also explored by including aid squared (see results in section 4).

The underlying relationships are tested in panel regressions what addresses the issue of spurious correlations[13]. All series were tested against non-stationarity using the Levin-Lin test for balanced panels. All series resulted stationary even when we allow for autocorrelation in the errors of order 1, 2 and 3. Both pooled and fixed-effects regressions are explored thought the restriction of a common intercept parameter imposed by the pooling of the data may not hold for the problem at hand. Intuitively, one would expect the base level of growth once a number of the important systematic influences are controlled for, to differ across countries due to factors which are country-specific. Such factors might concern culture, the availability of natural resources, the constitutional organisation of the state and legal framework, social arrangements and institutional set up, religion, etc. Therefore, we account for these country-specific effects that reflect missing or unobserved variables by allowing for a non-stochastic intercept to vary by country (the fixed-effects model). In addition, time dummies for 1989-1991 and 1992-1994, respectively, were also included to capture any purely time-variant effects.

Note that fixed effects eliminate the impact of any time-invariant factors relating to initial conditions and donor strategic interests, which are typically thought of as explaining aid. Those omissions might cause aid to be correlated with the error terms if, in addition to determining aid, they also belong in the growth equation. Assuming that donor interests do not change (or change very little) over the relatively short period of time covered by the sample, their effect is captured by the use of the country-specific dummies.

The initial model specification treats aid and policy as exogenous. However, the estimations based on OLS are misleading if there are endogenous variables included in the right hand side (RHS) of the equation. The empirical literature for developing countries shows different and contradicting results on the exogeneity of aid and of economic policies in a growth regression (Burnside and Dollar, 2000; Boone, 1996; Fischer, 1993; Lensink, 1993; White, 1992; Mosley *et al*, 1987). Intuitively, it seems reasonable to assume that aid is not contemporaneously affected by growth[14]. Nevertheless, a one-period lagged measure of aid is used to capture the idea that the relationship between aid and growth is to be found with time lags. The lag structure used in this study does not necessarily capture the full effect of the executed funding but it seems a more reasonable assumption than an instantaneous effect of aid on growth. By doing so, aid is formally modelled as weakly exogenous in which case OLS produces consistent estimates.

The case for treating policy as endogenous in our model is stronger. Therefore, we test the robustness of the OLS results by allowing for endogenous policies. If appropriate instruments can be found for policies, then a Two Stage Least Squares (TSLS) procedure with instrumental variables yields results that, in small samples, are superior on most criteria to all other estimators[15].

All regressions are reported with White heteroskedasticity-consistent statistics. Additionally, possible residual autocorrelation is controlled for by means of a first-order autoregressive correction, or AR(1) term. Fixed-effects (both country and time dummies) are expected to absorb part of the residual autocorrelation caused by omitted country and/or time-specific characteristics or by spatially autocorrelated errors, e.g., due to characteristics associated with geographical vicinity, etc. However, it might be the case that autocorrelation is caused by an omitted variable which is not country-specific or time-variant in nature in which case it cannot be ruled out.

Finally, various functional forms were explored to capture potential non-linearities. The variables were first plotted each against the dependent variable to see if any patterns would emerge that point to possible functional forms for the variables entering the growth regressions. Final specifications are reported in table 2.1 and 2.2.

3. VARIABLES AND DATA

The dependent variable is the growth in aid recipient's real GDP, expressed as the annual percentage change from previous year, taken from the EBRD, *Transition Report* (various issues).

The aid variable reflects net disbursements of Official Assistance (OA) from the OECD, Development Assistance Committee (DAC) database, normalized with respect to the recipients' real GDP (OECD, 1999 and 2000)[16] . It includes any disbursements that have at least a 25 percent grant component and are conducted through official channels. The raw data is reported by the OECD in millions of current US$ and was then converted into millions of constant 1996 US$ by using the appropriate conversion coefficients expressed as weighted averages of yearly GDP deflators for all DAC countries (also from the OECD database).

The vector of policy variables (POL'_{it}) contains four variables. First, an index for economic liberalisation constructed by the World Bank is used as an indicator of policy-induced economic liberalisation. The index takes into account three dimensions of liberalisation: internal markets, external trade and payments, and the facilitation of private sector entry. First, the countries are ranked according to the depth of these policy reforms in each of the years from 1989 to 1997. Then, the index is calculated as a weighted average of the rankings of liberalisation in each of the three component areas. The index ranges from one to zero with zero representing an unreformed country and one representing an extensively reformed country. The most recent

updates for the liberalisation index are obtained from the World Bank, Policy Research Department database.

Second, the natural logarithm of annual average monthly inflation, the government budget surplus/(deficit), and the trade balance are all used as indicators of the macroeconomic environment. The data for inflation and the government surplus are taken from the EBRD, *Transition Reports* (various issues); the Economist Intelligence Unit (EIU), *Country reports* (various issues); and the International Monetary Fund (IMF), *World Economic Outlook* (1998). Data on the trade balance (in millions of US$) comes from the EBRD, *Transition Reports* (various years); the United Nations (UN), *Handbook of International Trade and Development Statistics* (1995a); the IMF, *Annual Report* (1997a); the EIU, *Country Reports* (various issues); the OECD, *Short-Term Economic Indicators for Transition Economies* (various issues); and the IMF, *Direction of Trade Statistics Yearbook* (1997b). For Armenia, Azerbaijan, Estonia, Latvia and Turkmenistan, the mean of the series has been used for two consecutive years (1989-1990). The trade balance and government surplus are expressed as percentages of the recipient country's real GDP.

While recognizing the importance of macroeconomic policies for growth, we are primarily concerned with the effect of interactions between aid and economic liberalisation on output growth. Thus, only the liberalisation index is used in the interaction terms.

Finally, two additional control variables are included which can be viewed as components of the X'_{it} vector. The *GNP per capita* (PPP-adjusted) for year 1989 is used as a measure of the initial conditions making use of information available in de Melo, Denizer and Gelb (1996). In addition, a dummy for conflicts, set to one when countries suffered wars, civil unrest or other conflict-related losses such as blockades, is used as an indicator of exogenous shocks. The

construction of this variable is based on information from the Institute for War and Peace Reporting (IWPR), *War Report: bulletin of the institute of war and peace reporting*, (February-March 1998).

4. THE EMPIRICAL RESULTS

The estimation results are presented in table 2.1 and 2.2. Regressions (1) to (4) report results from the pooled data. A first conclusion is that aid has no effect on growth when used contemporaneously. A squared measure of aid is also insignificant (see regression (1) and (2)). However, with a one-period lag, aid is positively and significantly associated with growth (regression (3)).

TABLE 2.1 HERE

In the pools, the effect of the liberalisation index is not robust. In regression (1) and (2), the coefficient for liberalisation is barely significant (at 10 percent) but soon looses its statistical validity as aid lagged is used in regression (3) and (4). Such result seems to be caused by the inclusion of the autoregressive error. In fact, when the AR(1) term is excluded, results show the liberalisation index to be positively and significantly correlated with growth, at five and one percent significance levels. The Durbin-Watson statistic also improves. We choose to report results with the AR(1) so that the reader does not wonder about their comparability across regressions.

In interpreting the results for the liberalisation variable, note that the annual liberalisation data do not capture the depth of a country's economic openness. Such effect can be better conveyed by a cumulated measure of the liberalisation index. All of the regressions reported in

this paper were also run with the cumulated index instead of the contemporaneous one. Results unfailingly find liberalisation to be positively and significantly correlated with growth. All other findings remain unaffected except for the quadratic interaction term which, in fixed effects regressions, shows up insignificantly. However, regressions using the cumulated measure of liberalisation should be interpreted with care as the index is upward trended, by construction. Given the sample dimensions, i.e., the case of small *N* and small *T*, it is unclear if this poses a problem for the empirical results. Monte Carlo studies would be required to determine this[17].

Other variables are generally insignificant except for inflation confirming findings from other studies of transition where countries exhibiting more stable macroeconomic environments (lower rates of inflation), experience higher growth levels (de Melo, Denizer, Gelb and Tenev, 1997; de Melo and Gelb, 1996; de Melo *et al*, 1996).

The fact that in the pooled regressions there is still a good portion of growth which is unexplained as well as some degree of autocorrelation, as indicated by the AR(1) term, suggest possible missing variables. Estimating a dummy variables model to account for missing country-specific effects and pure time-shocks is a way to address this[18].

Results for the OLS fixed-effects models are reported in regressions (5) to (8). The findings are generally consistent with those obtained from the pools. Regression (5) and (6) confirm that contemporaneous aid is insignificant for growth while the effect of lagged aid is even stronger than in the pooled data. As expected, the AR(1) term is now highly insignificant. Moreover, its inclusion causes the Durbin-Watson statistic to deteriorate and inflates the coefficients on the time dummies. Importantly, however, the main results remain unaffected with or without the AR(1) term. Again, for reasons of consistency and comparability of the results, we report regressions with the AR(1) term throughout.

Regression (7) tests the hypothesis related to whether the impact of aid on growth is

affected by liberalisation policies. The results show lagged aid to be insignificant but the interaction term has a positive and significant effect on growth. The quadratic term is also significant with the negative coefficient indicating diminishing returns to aid. These findings suggest that the positive impact of aid on growth is reinforced when economic liberalisation is more advanced.

The exogeneity of variables for macroeconomic policies is not clear. Therefore, regression (8) verifies the results obtained in (7) using one period lagged measures for inflation, the trade balance, and government surplus, to control for the possible endogeneity of those variables. Results for our variables of interest, i.e., aid, liberalisation, and the interaction terms, are similar to those from regression (7). For the rest, the variable for government surplus now exhibits a negative and significant coefficient.

Regressions (9) and (10) in table 2.2, report results from the TSLS procedure testing the robustness of the OLS results against the endogeneity of the liberalisation index. The TSLS uses instrumented/fitted values of the liberalisation index instead of the observed ones both directly as well as interacted with aid. The fitted values are calculated regressing liberalisation on all the exogenous variables in the growth regression (6), and on valid identifying instruments. The list of the instrumental variables used is provided at the bottom of table 2.2[19]. Finally, the standard errors obtained from the second-stage regression are appropriately corrected to reflect the Generalized Instrumental Variables Estimation procedure (GIVE)[20]. Only the corrected statistics have been reported in here.

The TSLS results are consistent with key results from model (7) and (8). In addition, the findings in here indicate that, when aid disbursements are lagged to allow some time for the executed funding to have an impact, aid has a positive and statistically significant effect on growth. Note that this is not the case when aid is used contemporaneously (regression (11) and

(12)). Second, the impact of aid appears stronger in an environment of lower economic distortions, i.e., where economic liberalisation is stronger as indicated by results for the interaction terms.

Table 3 presents the calculated marginal impact of aid on growth as measured by the derivative of growth with respect to aid, based on results from regression (10). The derivative is calculated at the observed levels of the liberalisation index, its mean value, and at one standard deviation above the mean of the index. Given the negative coefficient on the quadratic interaction term, two counteracting effects are at play. However, note that the marginal effect increases slightly as the level of policy distortions decreases, i.e., as the value of the liberalisation index increases, thanks to the higher coefficient on the $Aid_{(-1)}$ *x Liberalisation* term. Calculations indicate that a one percent increase in aid has a growth effect of around 1.25 percent when the marginal effect is estimated at the observed and the mean levels of the liberalisation index. When measured at one standard deviation above the mean liberalisation, the marginal effect of aid on growth is between 1.27 and 1.29 percent, i.e., around 3 percentage point higher than before.

TABLE 3 HERE

Finally, an interpretation of the estimated effect of aid on output growth in the sample at hand, both in terms of the potential vehicles of growth as well as the persistency of such effects, is due.

First, however interesting, the results in this study are not certain to reflect any long-term properties for the aid estimator, given the time dimension of the sample. Indeed, fluctuations rather than long-term output trends can dominate output changes seen in here.

Second, in disequilibrium, output changes might reflect changes in factors' accumulation as well as technological progress, and aid can be a part of these processes. However, according to

widely accepted theoretical arguments, any positive effect of aid on recipients' savings rates as well as on higher spending for education and training are likely to have a transitory effect on growth. Higher saving rates lead to growth rates that are higher than the steady state level for some time but, because of decreasing returns to capital, these cannot be sustained indefinitely. Sustained growth requires technological progress. As such, aid will have served the recipient countries in transition a permanent value to the extent that it has positively affected their "stock" of technology. These arguments are consistent with historical patterns and facts about worldwide growth observed over the last two centuries or so (see Blanchard, 2000; and Easterly and Levine, 2001).

5. DISCUSSION AND CONCLUSIONS

Our analysis found that development assistance to ETs has contributed to output growth, though the effect emerges with lags. The lag structure used in this study does not necessarily capture the full effect of the executed funding but, on intuitive grounds, it appears more reasonable than assuming instantaneous effects.

An important finding of this study is that the impact of aid on growth seems to be stronger when associated with economic liberalisation, though there seem to be diminishing returns to aid.

In interpreting our results some qualifications need to be born in mind. First, this work does not rely on a formally derived model. It does not identify growth determinants or claim a complete account of what amounts for growth in economies in transition. Rather, we have investigated data patterns and empirical regularities focusing on the robustness of the estimates.

Secondly, it is only prudent to consider the potential bias that might be introduced by data imperfections, the use of proxies, and possible omitted variables. As pointed out by a number of authors, any analysis on transition is complicated by poor data quality (Breton, Gros and Vandille, 1997; de Melo and Gelb, 1996).

Despite these qualifications, the results of our analysis remain robust to different estimation procedures and changes in the set of factors controlled for in the regressions, with and without the outlier, i.e., Albania, and the findings are remarkable.

A positive effect for aid in a setting which, by its very nature, only captures the short- to medium-term effects on growth, is an important result *per se*. This is because one would expect that the effect of a part of aid funding, such as support for human development programmes and social services including health care, education, training etc., will only become known in the longer run, down the road of the recipients' development.

The findings in this paper suggest that, regardless of its special nature and arrangements, development assistance as a source of financing in transition economies is more effective when economic liberalisation has progressed further. This suggests that aid and liberalisation reforms are mutually reinforcing.

A number of factors might combine to explain such a result. First, in a transparent low-distortion economy, incentives work to ensure the efficiency of resource use. Such a setting allows a more accurate identification of the real needs of the economy opening the way for well-targeted interventions and, therefore, a better use of public resources, of which aid is an integral part. Second, the usual arguments in favour of economic liberalisation apply here. A more liberal economy facilitates exchange and technological spillovers and, therefore, it absorbs better what aid is trying to convey. Third, the role of aid in upgrading human capital has a larger effect when the new knowledge is put to use and newly trained people are given better opportunities to employ their skills. A more liberal economy with, presumably, a more dynamic private sector and less restrictive entry regulations is better positioned to take advantage of the human assets and provide windows of opportunity for skilled people[21].

Finally, the results in this study may underestimate long-term effects of aid on output

growth in ETs because of the relatively small time dimension of the sample. During the years of transition covered by this study, aid might have contributed to faster capital accumulation, both physical and human, as well as technological progress. However, aid will have contributed also to the recipient countries in transition a permanent value to the extent that it has positively affected their "stock" of technology.

NOTES

[1] Aid is the Official Assistance (OA) for economies in transition, as defined by the OECD (OECD, 1999).

[2] See White (1992) for a survey of the literature.

[3] See Hatzipanayotou and Michael (1995) for a theoretical discussion of the transfer paradox.

[4] The exception to this is Mosley *et al* (1987) who use both unlagged as well as lagged data.

[5] They refer to sound economic policies meaning "measures that have been shown in a wide range of studies to promote growth: open trade regimes, fiscal discipline, and avoidance of high inflation" (Burnside and Dollar, 2000).

[6] In this study, CEECs include Albania, Bulgaria, the Czech Republic, Hungary, Poland, Romania, and the Slovak Republic. FSUs include Armenia, Azerbaijan, Belarus, Estonia, Kazakhstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

[7] Technology is usually modelled as the residual growth determining the form of the function *f*, i.e., how much output can a country produce for a given quantity of inputs. In here, however, the state of technology is assumed as one of the factor inputs. Admittedly, this is an overly simplified

representation of how the state of technology enters the production function but a good enough one for the purposes of this paper.

[8] Equation (1.3) represents factor inputs as functions of aid alone. Note, however, that the aim in here is to provide an expression for how aid might relate to growth, not to explain output changes.

[9] For simplicity, Burnside and Dollar (2000) model aid as mainly augmenting the recipient's stock of physical capital.

[10] See Fischer (1993) for a discussion of such issues in the framework of empirical growth equations.

[11] Results for regressions with *FDI*, investment, and the proxy for human capital can be obtained from the authors, on request.

[12] For simplicity and without loss of generalisation, it is assumed that the vector POL'_{it} consists of a single measure of the policy environment.

[13] The output series in our sample does not exhibit any particular trends. Nevertheless, the use of panel data would be a valid remedy for trended output series if the time dimension of the sample is small relative to the cross-sectional units and provided that we are not interested in long-term properties of the estimators.

[14] Except when, under exceptional circumstances, emergency aid is mobilised and disbursed quickly in response to natural and economic disaster, wars etc. Even then, however, it is more likely that, at least initially, humanitarian concerns would prompt the mobilisation of aid resources. Presumably, in subsequent periods, potential productivity declines and adverse growth conditions in the country, which is been affected by disasters, would induce more aid. In any case, this remains speculative thinking and it is important for the validity of the empirical results

that the possibility of endogenous aid is controlled for.

[15] Monte Carlo studies have shown that the TSLS estimates are fairly robust: their desirable small sample properties are relatively insensitive to the presence of multicollinearity and specification errors (Challen and Hagger, 1983).

[16] Real GDP (in millions of US$ at constant 1990 prices) is from the UN, *Statistical Yearbook* (1995b) for years 1989-1994. For 1995-1997, the data has been extrapolated using figures for the growth in real GDP, from the EBRD, *Transition Reports*.

[17] The results from regressions using the cumulated liberalisation index can be provided by the authors, if the reader is interested.

[18] An alternative way of doing this is by differencing the data in pooled regressions. This procedure is not preferable, however, because it yields substantial bias in presence of measurement errors (Hsiao, 1986). As will be discussed in section five, there are important data problems for ETs.

[19] Data on population (in millions) is obtained from the CEER (1998) and the EBRD, *Transition Report* (various issues). Data on the index for political freedoms is from the Freedom House (FH), *Freedom in The World: The Annual Survey of Political Rights and Civil Liberties* (1995-1996 and 1997-1998 issues). This is composed of two seven-point Gastil indexes, one for civil liberties and the other for political freedoms. Since the two are highly correlated with each other, they are added together to form a composite index ranging from two to 14 with the low values indicating countries where lack of political freedom or political violence is lowest. For ease of comparison, a reversed measure of the index is used here.

[20] A discussion of the rationale for such correction as well as the actual calculations involved is provided in Gujarati (1985). It is thus omitted here.

[21] As noted earlier, the index takes account of internal market, external trade and payments, and

the facilitation of the private sector entry.

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Table 1. ***Annual Growth and Aid by Country, 1989-1997 (Period Averages)***

Country	Growth GDP (% change from previous year)	Aid (% GDP)	Country	Growth GDP (% change from previous year)	Aid (% GDP)
Albania	-0.57	15.12	Lithuania	-6.87	1.3
Armenia	-5.88	2.97	Moldova	-8.60	0.85
Azerbaijan	-7.93	1.27	Poland	1.47	2.82
Belarus	-2.59	0.45	Romania	-2.58	0.84
Bulgaria	-4.97	1.14	Russia	-5.60	0.20
Czech Rep.	0.31	0.60	Slovakia	-0.11	0.97
Estonia	-1.64	0.1	Tajikistan	-9.52	2.22
Hungary	-0.92	0.67	Turkmenistan	-7.11	1.13
Kazakhstan	-4.53	0.30	Ukraine	-9.42	0.28
Latvia	-4.53	0.82	Uzbekistan	-1.51	0.28
Sample Mean:				*-4.16*	*1.72*
STDEV:				*3.42*	*3.26*

Source: OECD, 1999.

Table 2.1. *Estimation Results*

Dependent Variable: Growth of GDP (160 observations)

Regression No.	Pooled Regression				OLS Fixed Effects (FEs)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) [a]
Constant	5.08 (1.11)	3.71 (.78)	10.79* (1.99)	10.73* (1.73)	Country-specific intercept term			
Aid	-.18 (.46)	.41 (.58)	---	---	-.06 (.17)	---	---	---
Aid^2 (squared)	---	-.02 (.95)	---	---	---	---	---	---
$Aid_{(-1)}$	---	---	.55*** (2.54)	.56 (1.22)	---	.90*** (4.75)	.28 (.32)	-.08 (.09)
$Aid^2_{(-1)}$	---	---	---	-.0006 (.05)	---	---	---	---
$Aid_{(-1)}$ x Liberal.	---	---	---	---	---	---	.28** (2.22)	.38*** (2.79)
$Aid^2_{(-1)}$ x Liberal	---	---	---	---	---	---	-.005** (2.48)	-.006*** (2.77)
Liberalisation Index	.52* (1.84)	.47* (1.71)	.004 (.01)	.005 (.01)	.54* (1.79)	.79** (2.02)	.37 (.89)	.21 (.44)
Ln(inflation) [a]	-2.20*** (3.78)	-2.21*** (3.95)	-3.18*** (4.94)	-3.18*** (4.76)	-2.17*** (4.35)	-3.25*** (4.75)	-3.06*** (4.59)	-1.61*** (3.55)
Trade Balance [a]	-.26* (1.79)	-.24 (1.64)	.01 (.09)	.02 (.10)	-.50*** (2.76)	-.24 (1.61)	-.21 (1.52)	-.06 (.41)
Government Surplus [a]	.19 (1.02)	.18 (1.03)	.24 (1.04)	.24 (1.03)	.30* (1.76)	.13 (.86)	.11 (.84)	-.37*** (2.77)
GNP(89) per Capita	-.0005 (1.02)	-.0003 (.62)	-.0001 (.02)	-.0001 (.01)	---	---	---	---
War Dummy	-6.27** (2.15)	-6.31** (2.25)	-3.72 (1.11)	-3.73 (1.12)	-7.33** (2.46)	-3.05 (.90)	-2.68 (.85)	-6.89** (2.41)
Time Dummy (89-91)	---	---	---	---	-4.92*** (3.36)	-4.70*** (3.22)	-4.00** (2.46)	-8.31*** (3.69)
Time Dummy (92-94)	---	---	---	---	-3.01** (2.27)	-1.92 (1.46)	-2.07 (1.51)	-8.02*** (5.22)
AR(1) term	.30*** (2.94)	.27*** (2.66)	.35** (3.02)	.35** (3.01)	-.03 (.22)	.10 (.76)	.02 (.16)	.003 (.04)
R2	.46	.47	.53	.53	.56	.59	.62	.63
Adjusted R2	.44	.44	.50	.49	.46	.49	.51	.53
D-W statistic	1.95	1.96	2.21	2.21	1.85	2.18	2.24	2.17

***, **, *, denote significance at 1, 5, and 10 percent, respectively. t-statistics are in parentheses.

[a] In regression (8), the variables for inflation, trade balance, and government surplus are lagged once period to control for the possible endogeneity of the macroeconomic variables.

Table 2.2. ***Two Stage Least Squares Estimation Results***

Dependent Variable: Growth of GDP (160 observations)

Regression No.	TSLS (FEs) [a]			
	(9)	(10) [b]	(11)	(12) [b]
Constant	Country-specific intercept term			
$Aid_{(-1)}$	1.12*** (3.02)	1.20*** (3.00)	---	---
$Aid_{(-1)}$ x Liberal.	.18*** (2.88)	.14 (1.55)	---	---
$Aid^2_{(-1)}$ x Liberal	-.006*** (2.66)	-.005** (2.14)	---	---
Aid	---	---	.54 (.83)	-.03 (.06)
Aid x Liberal.	---	---	.23 (1.40)	.09 (.62)
Aid^2 x Liberal	---	---	.-004 (.50)	.002 (.41)
Liberalisation Index	1.35*** (2.97)	1.96*** (3.39)	1.37*** (2.96)	2.01*** (3.39)
Ln(inflation) [b]	-2.98*** (4.36)	-1.31*** (2.56)	-2.99*** (4.77)	-1.04** (1.99)
Trade Balance [b]	-.13 (.87)	.11 (.57)	-.18 (1.02)	.10 (.46)
Government Surplus [b]	.21 (1.23)	-.42*** (3.10)	.25 (1.45)	-.42*** (3.34)
War Dummy	-3.67 (1.06)	-8.58*** (2.69)	-4.00 (1.13)	-10.39*** (3.34)
Time Dummy (89-91)	-2.38 (1.23)	-4.22 (1.48)	-3.05* (1.75)	-4.87* (1.85)
Time Dummy (92-94)	-2.24* (1.70)	-8.49*** (5.26)	-2.62* (1.93)	-9.11*** (5.34)
AR(1) term	-.04 (.32)	.09 (.91)	-.02 (.14)	.12 (1.23)
R2	.67	.65	.66	.63
Adjusted R2	.58	.55	.57	.52
D-W statistic	2.22	2.10	2.08	2.02

***, **, *, denote significance at 1, 5, and 10 percent, respectively. t-statistics are in parentheses.

[a] Instruments: Annual liberalisation index lagged one period, $LI_{(-1)}$, $LI_{(-1)}$ squared, population, $LI_{(-1)}$ interacted with population, index for political freedoms lagged one period, $PF_{(-1)}$, $PF_{(-1)}$ interacted with a regional dummy (set to one for CEECs and zero for FSUs). These instruments, together with the exogenous variables in the growth regression, the country-specific effects and time dummies, explain about 85% of the cross-country variation in economic liberalisation over 1989-1997. The R2 statistic has been reported in (9) to (12) though it can only be given its usual interpretation when the estimation method is the OLS.

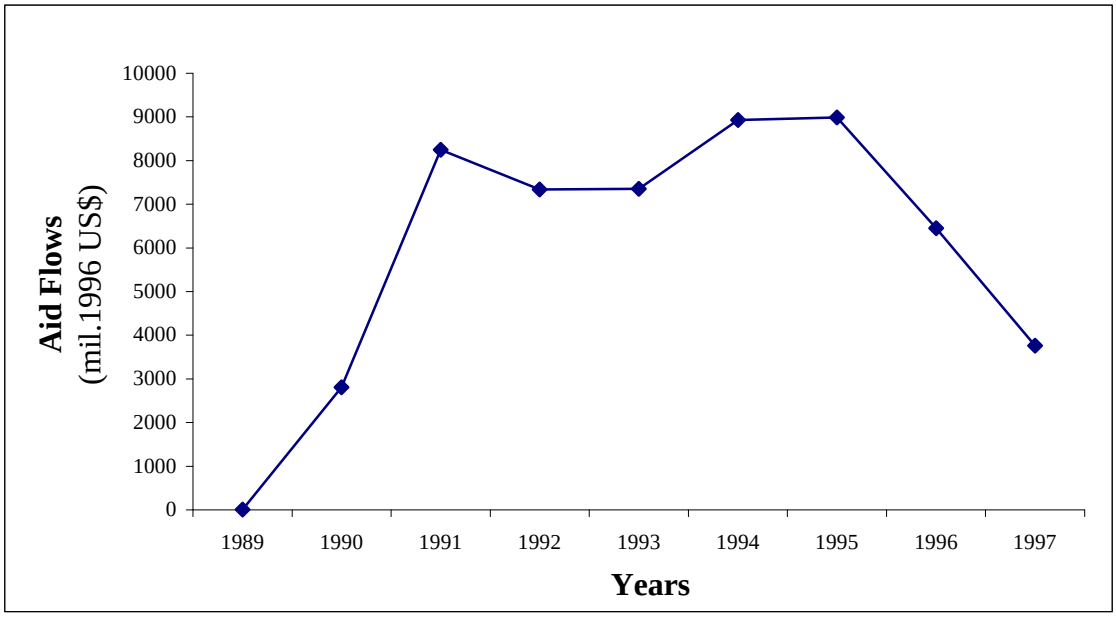
[b] Regressions (10) and (12) use one period lagged measures of the macroeconomic variables as explanatory instead of the contemporaneous ones. The lagged variables are also used in calculating the fitted values for the liberalisation index.

Table 3. ***The Impact of Aid on Growth***[a]

	Mean derivative[b]	Standard Deviation
Derivative of growth with respect to aid: (10) $\beta_a + 2 * \beta_{a(-1)2p} * Aid_{(-1)it} * LIB_{it} + \beta_{a(-1)p} * LIB_{it}$	(1.27 – 1.24)	.03
Derivative of growth with respect to aid evaluated at the mean of the liberalisation index: (10) $\beta_a + 2 * \beta_{a(-1)2p} * Aid_{(-1)it} * LIB_{it} + \beta_{a(-1)p} * LIB_{it}$	(1.27 – 1.25)	.02
Derivative of growth with respect to aid evaluated at one standard deviation above the mean of the liberalisation index: (10) $\beta_a + 2 * \beta_{a(-1)2p} * Aid_{(-1)it} * LIB_{it} + \beta_{a(-1)p} * LIB_{it}$	(1.29 – 1.27)	.02

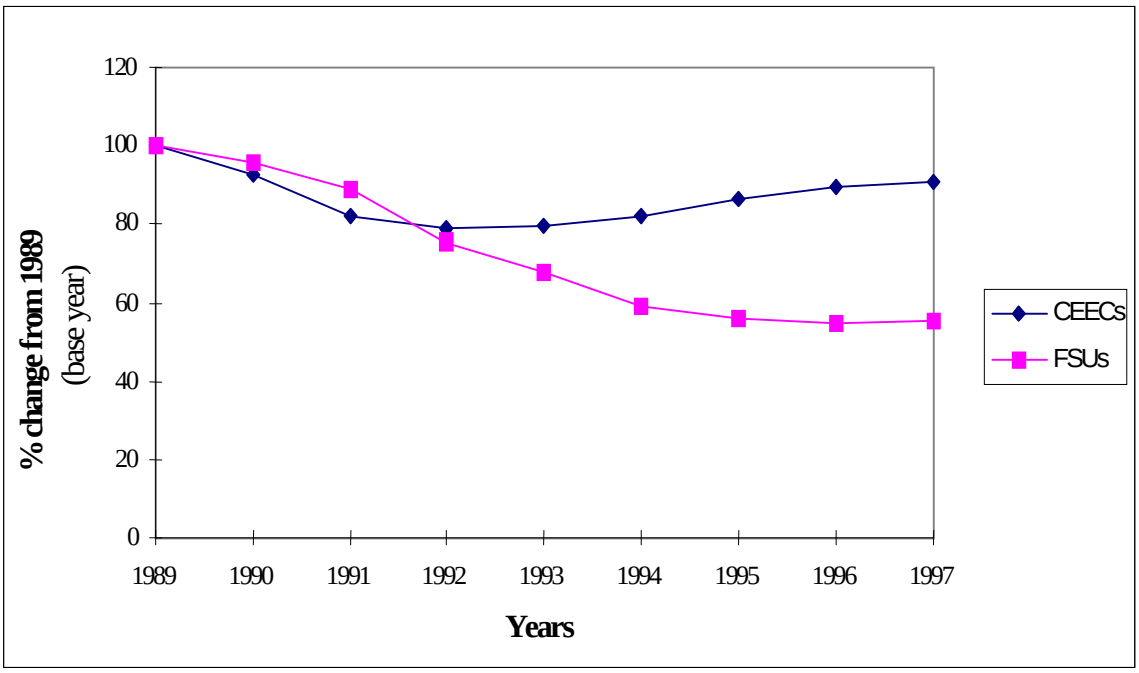
[a] The derivatives are calculated using averaged data for aid and the liberalisation index over the time dimension of the sample.
[b] Reports the .99 % confidence interval for the mean of the derivatives calculated from regression (10).

Figure 1. ***Total Net OA Flows to ETs, 1989-1997.***



Source: OECD (DAC) database

Figure 2. ***Output Evolution in Transition, 1989-1997.***



Source: OECD, 1999.