How Successful is World Bank Lending for Structural Adjustment?

Patrick Conway

For a sample of 75 countries during the period 1976-86, there is a significant association between participation in a World Bank adjustment lending program and more rapid economic growth, a more positive current account as a percentage of gross national product (GNP), and a higher rate of domestic inflation.
This paper — a product of the Trade Policy Division, Country Economics Department — is part of a larger effort in PRE to measure the effectiveness of structural adjustment efforts, especially trade reform, in developing countries. It includes both this empirical analysis and other research identifying possible causal links between policy and performance. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Sheila Fallon, room N10-035, extension 37947 (31 pages).

To measure the effectiveness of the World Bank's structural adjustment programs, Conway examines the data on actual economic performance for 75 countries for the period 1976-86.

He finds a clear association between participation in a World Bank adjustment lending program and cross-country differences in economic performance and policy. Countries that participated in adjustment lending programs tended to have the following characteristics, compared with countries that did not participate in such programs:

- More rapid economic growth
- More rapid inflation
- A less negative current account balance as a percentage of GNP
- Deeper financial sectors
- A lower ratio of current government spending to GNP
- Depreciation of the real exchange rate.

The first three indicators reflect differing performance; the second three, different policy mixes. In other words, the countries have not benefited merely by increased financing at the margin but have also undertaken significantly different economic policies.

Conway speaks of the association and correlation, not causes. No components of adjustment lending programs are singled out for praise or blame. The atheoretic methodology he uses does not identify causal links between bank adjustment programs and these measures, and provides no means of separating the effects of Bank lending from other factors. The adjustment lending programs were often concurrent, for example, with IMF stabilization policies, so to that extent the correlations are measures of the joint impact of the two.
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by

Patrick Conway*

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The World Bank has played a major role in encouraging countries to implement structural adjustment policies. Its Structural Adjustment Lending (SAL) programs are designed to "increase efficiency economy-wide through changes in pricing and trade policies, in the size and structure of government expenditure, and in the extent of the government's controls on productive activity" [Nicholas (1989, p. vii)]. Sectoral Adjustment Lending (SECAL) programs are designed to "support more narrowly focused programs of reform and restructuring, ranging from major changes in macroeconomic policy in a sector such as trade or agriculture to the establishment of an appropriate framework for investments in a sector such as energy or education" [Nicholas (1989, p. vii)]. The World Bank has made a large number of these loans since 1980, with 52 countries being recipients of one or more of either of these. [Nicholas (1989, pp. 42-45)]. I will refer to the two together as Adjustment Lending (AL) programs.

There is some controversy as to the impact of AL programs. Nicholas (1989) provides the World Bank view: although there have been some difficulties in implementation and oversight, they have on the whole been effective instruments for structural adjustment. World Bank (1988, 1990) provide statistics that support that view. Critics include Berg and Batchelder (1985) and Sachs (1986) who suggest that these programs have much less of an impact than the World Bank claims for them. Mosley (1987) takes the agnostic middle ground in saying:

...by the end of 1985 countries that had adhered to SAL conditions had done better than those that had not, and [...] not all of the difference was due to underlying disparities in the capabilities of their economies. But this encouraging short-term result cannot be used to make a definitive assessment of a medium-term reform program; some of the success [...] may have been due to luck rather than judgement. [Mosley (1987, p. 29); emphasis added]
The effectiveness of AL programs must in the end be investigated empirically. There are two parts to any such investigation. First, the performance of recipient countries must be compared to that of non-recipient countries: this requires a methodology for correcting for the external environment that I will explain below. Second, if a significant difference in behavior is found it could be due to the policy reform or to the additional funding linked to the AL program; to differentiate between these it is useful to investigate whether policy in recipient countries differed significantly from that of non-recipient countries.\(^1\) In this paper I outline a methodology for assessing the success of World Bank adjustment lending and implement it for a 75-country panel of data for the period 1976-1986. The evidence suggests that there is a significant association between participation in a World Bank adjustment lending program and more rapid real economic growth, an improved current account as a percentage of gross national product (GNP), and higher inflation. The first two are positive features of a structural adjustment package, but the third calls into question the long-run sustainability of the efforts. This association does not appear to be "luck" or simply a response to added financing; similar statistical analyses indicate that participation in a SAL program is significantly correlated with both real depreciation of the country's exchange rate, reduction in current government expenditure as a share of GNP and financial deepening in domestic capital markets.

\(^1\) AL programs represent a small proportion of the total international indebtedness of most recipients. However, AL disbursements represent a larger percentage of total international disbursements: for all recipient countries AL flows represented over five percent of total international flows on average during the period 1986-1988, while for Sub-Saharan Africa the comparable figure is over 12 percent. These and other figures on the magnitude of AL financing are found in World Bank (1990).
Section I defines structural adjustment and describes different philosophies for its measure. Section II presents the decomposition by which observed economic behavior is decomposed into those parts attributable to policy, the hospitality of the external environment and participation in an adjustment lending program. Section III presents the empirical results, and in Section IV I summarize the results of the paper and suggest extensions to this research.

I. Measuring Structural Adjustment.

Structural adjustment programs are based upon the need in the medium and long run to maintain external balance but to sustain positive economic growth and development. Structural adjustment is thus a reallocation of resources to best compete in and take advantage of the world environment. Such reallocations are necessary because the world economy has changed greatly for developing countries since the mid-1970s. Prices of crude oil have quadrupled and then halved in real terms; real interest rates have varied from substantially negative values to substantially positive values; international credit availability for many of these countries has gone from ample to non-existent.

Despite the importance of structural adjustment, there is little agreement on how best to measure it. One method is to examine the policies undertaken by the developing-country governments. If these policies accord with the observer's theory for how structural adjustment is to be fostered, then there is a presumption of structural adjustment. For an inwardly

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2 This is the approach followed, for example, by Michalopoulos (1987) and Yagci, Kamin and Rosenbaum (1985).
oriented economy, for example, reduction of tariffs and non-tariff barriers would in this method be an indicator of structural adjustment. A second method uses actual economic performance as a gauge for the success of structural adjustment. In the example above, the announcement of trade liberalization would not be the indicator of structural adjustment: rather, the improvement of the current account or an increase in economic growth would be.

I follow the second method in this paper. Measures of economic performance include the growth rate in real gross domestic product (GDP), the inflation rate in the GDP deflator, the ratio of the current account balance to gross national product (GNP) and the ratio of domestic investment to GNP. The first two provide an indication of the internal balance of the economy, while the remaining are indicators of external and intertemporal balance, respectively. Performance is measured over the period 1975-1986. As mentioned above, any investigation must both control for the severity of the external environment and evaluate the degree to which policies can be found to respond to receiving an AL program. The severity of the external environment is controlled for with the econometric methodology outlined in the next section. I impose no theoretical linkage between policy and performance variables, but examine three commonly discussed policy instruments: the real exchange rate, the ratio of government current expenditure to GNP, and the degree of financial deepening of the economy. Significant differences of policies in recipient countries from non-recipient countries will provide an indication that AL programs are not just financing additional expenditure, but are working on the policy level to alter government behavior. These policies are also examined while controlling for the external environment.
There are a number of notable antecedents to this work. Goldstein and Montiel (1986) stress the importance of controlling for differences in environment and present an analytical blueprint for doing so. World Bank (1988) provides preliminary empirical evidence on the success of AL programs, but does not provide statistical tests. Among contemporary papers, World Bank (1990) [as revised in Corbo and Rojas (1990)] applies the Goldstein/Montiel blueprint to evaluating AL programs. The latter paper differs from this one in a number of methodological and statistical ways; its results when comparable are similar to those of this paper.


Measures of economic performance will respond systematically to four sets of determinants: external incentives, secular economic development trends, economic policy choices and country-specific structural factors. The observed historical performance will be attributable to all of these factors, and thus observed success could be due either to the reforms associated with adjustment lending or to the serendipity of a favorable external environment. From the country's point of view, of course, either is welcome. However, for purposes of measuring the success of adjustment lending it is important to decompose performance into that part attributable to the policies and that part due to external incentives or secular trends.

The "fixed-effect" statistical methodology provides this decomposition. The decomposition is derived rigorously in the appendix, but the gist of the method can be presented in Figure 1. Suppose that the economic performance measure of interest is the current account/GNP ratio (C), and that Countries A and B have observed (negative) ratios of \( C_A \) and \( C_B \), respectively, in this
period. The two countries have observed terms-of-trade in that period of $T_A$ and $T_B$, respectively, and otherwise face an identical external environment. $C_A$ is less than $C_B$, so that an initial examination of the evidence suggests that $B$ has a more successful external-account performance than $A$. However, there is a "normal" relationship between the terms of trade for a country and its current account: as the terms of trade improve ($T$ rises) so also will the current account. This "normal" relationship is illustrated in Figure 1 by the slope of the line $C(T)$.

To adjust for the external environment, both countries' performance should be evaluated as if they faced the same terms of trade. By doing this, the comparison is corrected for external differences and focuses on policy and structural differences between the economies. In Figure 1 this comparison is made by projecting points $A$ and $B$ onto the vertical axis using the slope of the "normal" relationship. The adjusted current account performance for $A$ and $B$ is defined relative to $C_0$ and is given by the measures $\alpha_A$ and $\alpha_B$. The choice of $C_0$ is not of importance in comparisons of adjusted performance. The ranking of adjusted performance for countries $A$ and $B$ is reversed from the historical ranking -- country $A$ was more successful than the norm in dealing with a deteriorated terms of trade, while country $B$ was less successful given its elevated terms of trade. As the performance measures $\alpha_A$ and $\alpha_B$ control for the external environment, a measure of successful structural adjustment

3 Use of the current-account ratio provides a comparable index of performance across countries. Similar difficulties arise in deriving comparable indices of the terms of trade across countries. In the empirical sector of this study I use a normalization of the terms of trade and real exchange rate indices to ensure this comparability.

4 This projection could be done to any common terms of trade -- in the empirical section of this study I derive a "normal" value of $T$ for this evaluation.
will be the degree to which these are shifted upward by introduction of an AL program.

The norm is derived in this study through regression analysis. The fixed-effect econometric methodology used here permits simultaneous estimation of the normal response to the external environment (the slope of \( C(T) \) in Figure 1), the country-specific economic performance (the \( \alpha_A \) and \( \alpha_B \)) and the average contribution to recipient countries of AL programs.

III. Estimation of the Impact of Adjustment Lending

I have assembled data for 76 countries from the 1989 World Tables and World Debt Tables of the World Bank; the characteristics and precise definitions of these data and countries are given in the appendix. Economic growth (YGR) and the rate of domestic inflation (DINF) are indicators of internal balance: success in structural adjustment occurs when resources are being allocated efficiently and with little excess demand. The current account surplus or deficit (CAR) measures performance in attaining external balance. Structural adjustment has most recently required adjustment to limited access to international credit, and this variable measures relative success in that. The investment ratio (IR) is a measure of intertemporal balance: even though policies and external events may stimulate growth and adjustment, this will not be sustainable without a concomitant expansion in productive capacity.

I have collected as well comparable data on economic policy choices in these countries. The ratio of government current expenditure to GNP (GOV) is a measure of fiscal policy stance. The ratio of money, broadly defined, to nominal GNP (MON) is an indicator of the monetization and financial deepening
Figure 1
Comparisons of Historical and Adjusted Current-Account Performance
of the economy. The real exchange rate index (RERA, RERB) illustrates
government's short- and medium-term efforts to maintain competitiveness in
international trade.

The environment within which structural adjustment policies are made and
economic performance is attained is characterized by country-specific
realizations of external variables. The real international interest rate (RR)
is defined *ex post* by subtracting the US inflation rate from the country's
average nominal rate on international borrowing. International debt is total
debt, including private, public and publicly guaranteed, deflated to billions
of 1980 US dollars. It is stated in *per capita* form, and is divided into a
longer-term component (LTDPC) and a short-term component (STDPC).\(^5\) The terms
of trade (TOTA, TOTB) is the ratio of average export to average import prices.
The share of total output produced in the agricultural sector (YASHR) is a
proxy inversely related to the country's secular stage of economic
development. It is likely that there are other common international
influences on economic performance in these countries as well, and to measure
the impact of these I introduce a series of year-specific dummy variables (D7
for 1977 through D5 for 1985) as explanatory variables. These will register,
for example, the average annual impact of the restrictions on international
credit that as Sachs (1989b) documents were imposed in the post-1982 period.\(^6\)

These data were adjusted to address two conceptual problems. First, the
terms of trade and real exchange rate variables must be adjusted to provide

\(^5\) The long-term/short-term distinction is made as in World Bank (1987).
Long-term refers to debt with original maturity of one year or more.

\(^6\) There is also a strong common element to movements in the terms of trade
and the real interest rate across countries. Introduction of the year-specific
dummy variables will thus lower the significance of TOTB and RR variables in
least-squares regression but will not bias the estimation of fixed-effect terms.
cross-country comparability. They are originally presented as indices with a base year 1980=100, but it is certainly true that the underlying real exchange rate was not identical for all countries in that year. I thus constructed two comparable variants of each series based upon the country-specific distributions of the series over a long time horizon.\(^7\) Second, I assume that the external environment variables in period \(t\) are exogenous to the country's economic performance in that year. For TOTB and RR this is equivalent to asserting that each sample country is small in its goods and capital markets. For the debt variables I define the long- and short-term debt for period \(t\) to be that amount realized at the end of period \(t-1\). If contemporaneous debt were used, it could well be positively associated with performance in that an increase in the debt burden would finance an increased current account deficit and perhaps increased investment and economic growth. Use of the lagged value avoids that simultaneity issue and investigates in isolation the impact of the existing debt burden on present performance.

Participation in an AL program is measured through the use of the variable DAL. It is defined to be unity during years in which countries are participating in a SAL or SECAL program as documented by Nicholas (1988, Annex 1). In the year that a country first participated, the value of DAL is equal to the percentage of the year remaining after the AL programs had been approved. Use of DAL in regression on performance and policy measures would introduce a selection bias; to avoid this pitfall I construct the instrumental variable IAL equal to DAL but becoming unity 12 months later for each

\(^7\) Details of these calculations are provided in the appendix.
Least-squares estimation is used to calculate the normal response of performance and policy measures to the external environment and to derive the appropriate country-specific adjusted measures. The intercept is set so that at panel averages of the external factors the equation generates the average, or norm, of the dependent variable. The fixed-effect coefficients in the regression results then represent the deviation of country-specific performance from that normal performance. The coefficient of IAL represents the average annual increase in country-specific performance associated with participation in an AL program.

Given the cross-country and time-series nature of the panel data, it is reasonable to expect elements of both heteroskedasticity and country-specific serial correlation in the errors. Use of least-squares estimation techniques will assure unbiased estimates of the parameters even in the presence of these elements. However, the variance-covariance matrix of coefficient estimates must be corrected to test hypotheses about these estimates. The results

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8 Use of a SAL/SECAL lending decision contemporaneous with the economic performance measure would introduce sample selection bias as the decision by the World Bank and by the recipient country to enter an AL program would depend in part on the contemporaneous realization of economic performance. Mosley (1987) discusses explicit modeling of this participation process.

The variable IAL is an appropriate instrumental variable for this decision because it is highly correlated with DAL (correlation coefficient of .89) and because its variation is uncorrelated with the error in the period the AL program was actually introduced. Other instrumental variables are possible: for example, Corbo and Rojas (1990) use one that can be interpreted as the prior probability that a country will enter the program based on information available in the previous period. Their estimates of AL program effects are quite similar on economic growth, but the measurement of effects on domestic investment differ as discussed below.

There are to date no reported incidents of countries renouncing or graduating from AL programs. The treatment of AL programs in DAL as in place through the end of the time period under consideration is thus acceptable, but should be reconsidered once evidence to the contrary exists.
presented below are derived from a generalized least-squares process correcting for country-specific heteroskedasticity and autocorrelation of errors. Right-hand side variables are YASHR, TOTB, RR, LTDPC, STDPC, country-specific dummy variables, year-specific dummy variables and IAL. I report here the coefficients of the external environment variables and IAL. The results of the country-specific effects are of independent interest and are examined in Conway (1990).

The coefficients of IAL in Table 1 represent the amount by which the dependent variable rises on average during years when a SAL or SECAL is in force. Adjustment lending programs are correlated with an increase of real GDP growth of 1.98 percent per year and with an increase in the annual inflation rate of 10 percentage points. Countries with adjustment lending programs had current-account deficit ratios to GNP that were roughly 2.1 percentage points more positive than those without. The investment ratio is positively but insignificantly correlated with participation in an adjustment lending program: there is a rise in the ratio of on average .56 percentage point annually for those economies participating in the programs. All of these correlations are significantly different from zero at the 95-percent level of confidence except for that of the investment ratio.
Table 1

THE SIZE AND SIGNIFICANCE OF AL PROGRAM EFFECTS

**76-country sample**

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>IAL Coefficient</th>
<th>T-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance measures:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YGR</td>
<td>1.98</td>
<td>3.94</td>
</tr>
<tr>
<td>DINF</td>
<td>10.04</td>
<td>3.84</td>
</tr>
<tr>
<td>CAR</td>
<td>2.10</td>
<td>3.58</td>
</tr>
<tr>
<td>IR</td>
<td>0.56</td>
<td>1.08</td>
</tr>
<tr>
<td><strong>Policy realizations:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MON</td>
<td>1.91</td>
<td>3.72</td>
</tr>
<tr>
<td>GOV</td>
<td>-0.48</td>
<td>2.80</td>
</tr>
<tr>
<td>RERA</td>
<td>-7.15</td>
<td>5.23</td>
</tr>
<tr>
<td>RERB</td>
<td>-0.27</td>
<td>4.32</td>
</tr>
</tbody>
</table>

Critical T values for both samples at:
- 95 percent level = 1.96
- 90 percent level = 1.64

The reported T statistics include a correction to the sum of squared errors from the instrumental-variable equation appropriate to obtain an unbiased estimate of the variance. This necessary adjustment differed by equation but was in all cases no larger than 1.4 percent of the size of the variance.
There were also significant differences in policies implemented by AL program and non-AL program countries. Government current expenditure is lower by .48 percentage points of GNP in SAL recipients, while financial deepening is increased by 1.9 percentage points. Those countries with AL programs, finally, experienced depreciated real exchange rates relative to those countries that did not participate. All of these correlations are significantly different from zero at the 95-percent level of confidence.

The comparative picture thus exhibits significant differences across countries that provide clear responses to the two questions relevant to assessment of AL programs. First, there are significant differences between the performance of recipients of AL programs and of those who did not: economic growth is more rapid and the current account closer to balance on average for recipient countries, while inflation is also significantly higher in those countries. The sign of the effect on domestic investment is encouraging, although the coefficient is insignificant. Second, these effects are contemporaneous with a significant policy shift among recipient

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9 This positive effect on investment is the opposite of what was recorded in Corbo and Rojas (1990), although there as well the analogous coefficient was insignificant. The change in sign may be in part due to selection bias; when these equations are estimated using DAL rather than its instrument the coefficient is negative and insignificant. These biased coefficients are as follows for all equations:

<table>
<thead>
<tr>
<th>Equation</th>
<th>DAL coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>YGR</td>
<td>1.94</td>
</tr>
<tr>
<td>DINF</td>
<td>10.00</td>
</tr>
<tr>
<td>CAR</td>
<td>2.01</td>
</tr>
<tr>
<td>IR</td>
<td>-0.48</td>
</tr>
<tr>
<td>MON</td>
<td>0.08</td>
</tr>
<tr>
<td>GOV</td>
<td>-0.67</td>
</tr>
<tr>
<td>RERA</td>
<td>-9.11</td>
</tr>
<tr>
<td>RERB</td>
<td>-0.46</td>
</tr>
</tbody>
</table>

The differences are minor except for the IR and MON equations.
countries. Government current expenditure as a share of GNP is lower, financial deepening is more pronounced, and the real exchange rate is depreciated on average when compared with non-recipient countries. All these differences are statistically significant. In sum, recipient countries have not been merely relying upon international lending at the margin but have also been restructuring their economies along the lines of economic liberalization advocated in the AL agreements.

These results are simultaneously determined with the "normal" response to the economic environment, and any implausibility in the latter will call them into question. Table 2 presents statistics and coefficients on external variables from the underlying generalized least-squares regressions that provide strong intuitive support to the notion of a normal response.¹⁰

The explanatory equation for economic growth provides quite plausible and significant relations between the external environment and growth performance. Each standard-deviation improvement in the terms of trade is associated with an additional 1.07 percentage points in growth, while each percentage point increase in the real interest rate facing a country is correlated with a .22 percentage point fall in economic growth. Both long- and short-term debt burdens reduce economic growth significantly; each $1 increase in per capita debt is associated with a fall on average of 2.5 and 8.0 percentage points in the growth rate. All of these effects are significantly different from zero at the 95 percent level of confidence.

The DINF equation suggests a number of significant common features of the inflation experience in the sample countries. Less-developed countries

¹⁰ Excluded from Table 2 are the coefficients on the 75 country-specific dummy variables and the year-specific dummy variables. These are available from the author on request, and are summarized in Conway (1990).
Table 2
Normal Response to the External Environment
Various Performance and Policy Measures

Dependent variable: YGR

F value of regression: 13.11
Probability given the null (all coefficients insignificant): 0.0001

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T value</th>
</tr>
</thead>
<tbody>
<tr>
<td>YASHR</td>
<td>0.019</td>
<td>0.045</td>
<td>0.426</td>
</tr>
<tr>
<td>TOTB</td>
<td>1.069</td>
<td>0.200</td>
<td>5.348</td>
</tr>
<tr>
<td>RR</td>
<td>-0.224</td>
<td>0.037</td>
<td>-6.061</td>
</tr>
<tr>
<td>LTDPC</td>
<td>-2.590</td>
<td>1.387</td>
<td>-1.867</td>
</tr>
<tr>
<td>STDPC</td>
<td>-7.952</td>
<td>2.231</td>
<td>-3.564</td>
</tr>
</tbody>
</table>

Dependent variable: DINF

F value of regression: 6.50
Probability given the null (all coefficients insignificant): 0.0001

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T value</th>
</tr>
</thead>
<tbody>
<tr>
<td>USINF</td>
<td>-0.037</td>
<td>0.288</td>
<td>-0.128</td>
</tr>
<tr>
<td>YASHR</td>
<td>0.602</td>
<td>0.311</td>
<td>1.936</td>
</tr>
<tr>
<td>TOTB</td>
<td>1.166</td>
<td>0.834</td>
<td>1.398</td>
</tr>
<tr>
<td>RR</td>
<td>-0.569</td>
<td>0.271</td>
<td>-2.099</td>
</tr>
<tr>
<td>LTDPC</td>
<td>12.346</td>
<td>5.598</td>
<td>2.205</td>
</tr>
<tr>
<td>STDPC</td>
<td>2.507</td>
<td>7.512</td>
<td>0.334</td>
</tr>
</tbody>
</table>

Dependent variable: CAR

F value of regression: 15.22
Probability given the null (all coefficients insignificant): 0.0001

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T value</th>
</tr>
</thead>
<tbody>
<tr>
<td>YASHR</td>
<td>0.077</td>
<td>0.061</td>
<td>1.270</td>
</tr>
<tr>
<td>TOTB</td>
<td>1.797</td>
<td>0.228</td>
<td>7.896</td>
</tr>
<tr>
<td>RR</td>
<td>0.067</td>
<td>0.076</td>
<td>0.875</td>
</tr>
<tr>
<td>LTDPC</td>
<td>8.333</td>
<td>1.716</td>
<td>4.855</td>
</tr>
<tr>
<td>STDPC</td>
<td>1.820</td>
<td>2.728</td>
<td>0.667</td>
</tr>
</tbody>
</table>
Table 2 (continued)

Dependent variable: IR

F value of regression: 78.23
Probability given the null (all coefficients insignificant): 0.0001

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T value</th>
</tr>
</thead>
<tbody>
<tr>
<td>YASHP</td>
<td>-0.221</td>
<td>0.048</td>
<td>-4.628</td>
</tr>
<tr>
<td>TOTB</td>
<td>0.399</td>
<td>0.182</td>
<td>2.191</td>
</tr>
<tr>
<td>RR</td>
<td>-0.103</td>
<td>0.060</td>
<td>-1.712</td>
</tr>
<tr>
<td>LTDPC</td>
<td>-8.365</td>
<td>1.560</td>
<td>-5.361</td>
</tr>
<tr>
<td>STDPC</td>
<td>-3.534</td>
<td>2.331</td>
<td>-1.516</td>
</tr>
</tbody>
</table>

Dependent variable: MON

F value of regression: 82.47
Probability given the null (all coefficients insignificant): 0.0001

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T value</th>
</tr>
</thead>
<tbody>
<tr>
<td>YASHR</td>
<td>0.018</td>
<td>0.044</td>
<td>0.413</td>
</tr>
<tr>
<td>TOTB</td>
<td>-0.422</td>
<td>0.193</td>
<td>-2.184</td>
</tr>
<tr>
<td>RR</td>
<td>0.320</td>
<td>0.059</td>
<td>5.418</td>
</tr>
<tr>
<td>LTDPC</td>
<td>7.856</td>
<td>1.906</td>
<td>4.122</td>
</tr>
<tr>
<td>STDPC</td>
<td>8.017</td>
<td>2.790</td>
<td>2.874</td>
</tr>
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</table>

Dependent variable: GOV

F value of regression: 192.09
Probability given the null (all coefficients insignificant): 0.0001

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<tr>
<th>Explanatory Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T value</th>
</tr>
</thead>
<tbody>
<tr>
<td>YASHR</td>
<td>-0.146</td>
<td>0.018</td>
<td>-8.062</td>
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<tr>
<td>TOTB</td>
<td>-0.397</td>
<td>0.067</td>
<td>-5.914</td>
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<tr>
<td>RR</td>
<td>0.076</td>
<td>0.012</td>
<td>6.444</td>
</tr>
<tr>
<td>LTDPC</td>
<td>-0.677</td>
<td>0.406</td>
<td>-1.666</td>
</tr>
<tr>
<td>STDPC</td>
<td>0.814</td>
<td>0.712</td>
<td>1.144</td>
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</table>
### Table 2 (continued)

**Dependent variable: RERA**

<table>
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<td>YASHR</td>
<td>0.757</td>
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<td>TOTB</td>
<td>-1.479</td>
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<td>RR</td>
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<td>0.178</td>
<td>0.583</td>
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<td>LTDPC</td>
<td>-4.090</td>
<td>6.009</td>
<td>-0.681</td>
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<tr>
<td>STDPC</td>
<td>11.570</td>
<td>8.884</td>
<td>1.302</td>
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**Dependent variable: RERB**

<table>
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<th>Coefficient</th>
<th>Standard Error</th>
<th>T value</th>
</tr>
</thead>
<tbody>
<tr>
<td>YASHR</td>
<td>0.029</td>
<td>0.008</td>
<td>3.460</td>
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<tr>
<td>TOTB</td>
<td>-0.085</td>
<td>0.034</td>
<td>-2.468</td>
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<tr>
<td>RR</td>
<td>0.006</td>
<td>0.008</td>
<td>0.712</td>
</tr>
<tr>
<td>LTDPC</td>
<td>-0.529</td>
<td>0.252</td>
<td>-2.099</td>
</tr>
<tr>
<td>STDPC</td>
<td>1.118</td>
<td>0.464</td>
<td>2.412</td>
</tr>
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</table>

The coefficients reported in this table are a subset of those actually derived in the regressions. Also included as explanatory variables in all cases were country-specific dummy variables for the 76 countries in the data set, the IAL variable (whose coefficient is reported in Table 1), and year-specific dummy variables in equations where they contributed significantly as a group (CAR, IR, MON, RERA, RERB, MOR).

Regressions include both autoregressive and heteroskedastic corrections so that both coefficient and standard error estimates are consistent. Reported standard errors include correction for use of instrumental variables.
tended to have higher inflation as indicated by the positive coefficient on the YASHR variable. Per capita debt contributes positively to the inflation rate, while increases in the real international interest rate are negatively correlated. As interesting are the effects not significantly correlated: there is no evidence of pass-through from world inflation (as proxied by USINF) and only an insignificant positive correlation of terms of trade improvements with inflation.

The CAR regression results do not accord well with the predictions of the balance of payments constraint and thus throw doubt on the AL lending coefficient in Table 1. As expected, an improvement in the terms of trade is correlated with a significant improvement in the current account. However, the real interest rate and per capita debt variables have positive coefficients; the balance of payments identity suggests that these should be negative. This may be due to the investment uses of that debt generating exportable or import-competing product. The year-specific dummy variables (not reported in Table 2) indicate a sample-wide ability to sustain larger negative current-account ratios in years previous to 1986 than in 1986 itself. This ability was most pronounced in the period 1980-1982; in 1982 the sample average current-account ratio was ceteris paribus 1.8 percentage points more negative than in 1986.

Coefficients in the investment-ratio equation accord quite well with theoretical predictions. A smaller agricultural sector (as a proxy for the level of economic development of the economy) is significantly correlated with a larger investment ratio; so also is an improved terms of trade. Higher real interest rates, short-term and long-term debt burdens are all significantly
associated with reduced investment ratios.\textsuperscript{11} An increase of one percentage point in the real interest rate is correlated with a fall of .10 percentage points in the investment ratio, while $1 increases in per capita debt are associated with reductions of the investment ratio of roughly 3.5 to 8.4 percentage points.\textsuperscript{12} The year-specific dummy variables indicate a sample-wide tendency toward higher investment ratios during the pre-debt crisis period. In 1978 through 1981 the average investment ratio was \textit{ceteris paribus} over 2 percentage points higher than in 1986, while in the 1983-1985 period investment ratios were on average slightly below that of 1986.

It is also instructive to examine the "normal" impact of the external environment on the policy structure of economies. The second half of Table 2 examines these common impacts for current government expenditure (GOV) and money broadly defined (MON) as percentages of GNP as well as for two measures of the real exchange rate (RERA and RERB).

I consider MON an indicator of financial deepening in the economy.\textsuperscript{13} As McKinnon (1973) suggested, non-inflationary monetization of the economy may increase efficiency in allocation of goods while increased use of other financial instruments may improve efficiency in allocation of saving. This ratio will register both, but will exclude monetization leading only to

\textsuperscript{11} Note the importance here of considering lagged per capita debt as the explanatory variable.

\textsuperscript{12} In the IR and CAR regressions the coefficients of RR are insignificantly different from zero at the 95 percent level of confidence. This insignificance can be explained by the presence of the year-specific dummy variables; these variables are picking up some of the effect properly due to the real-interest-rate variables.

\textsuperscript{13} Use of quasimoney alone as an alternative measure of financial deepening yields qualitatively results.
inflation. The regression results suggest that financial deepening is significantly associated with greater levels of development, with higher world real interest rates and with higher per capita international debt. There has been as well a sample-wide tendency toward financial deepening, with ratios in 1986 being on average nearly 3 percentage points higher than in 1977.

Government current expenditure as a share of GNP is rising with level of development. It is falling with improvements in terms of trade, perhaps because social expenditures need increase less rapidly than GNP as the terms of trade improve. Higher real interest rates and increased short-term international debt are associated with an increase in GOV, while higher long-term debt is negatively correlated: only the real interest rate coefficient is significantly different from zero.

The two measures of the real exchange rate have identical patterns of responses to the external environment. The coefficient on YASHR indicates that the less developed the country, the more appreciated (more positive) real exchange rate. Improvements in the terms of trade are significantly associated with depreciations in the real exchange rate; this suggests that nominal exchange rate choice is not the dominant determinant of the real exchange rate, since real depreciation due to nominal depreciation should also be correlated with terms-of-trade deterioration. Increased short-term debt per capita is associated with an appreciation of the real exchange rate. There is evidence of sample-wide real appreciation as well during the period 1981-1985 after other factors have been controlled for, with a sharp average real depreciation in 1986. The real appreciation of 1981-1985 is the backdrop against which the real depreciations of those under AL programs stand out so sharply in Table 1.
IV. Conclusions.

There is a clear association in the data of developing countries between participation in a World Bank adjustment lending program and significant differences in economic performance and policy. These differences include

- more rapid economic growth;
- more rapid inflation;
- improved current account/GNP ratio;
- deepening of financial markets;
- lower ratio of government current expenditure to GNP; and
- depreciation of the real exchange rate

compared with those countries not participating in such programs. The first three points stress the performance differential for those recipients of AL programs. The last three stress that these countries have employed significantly different policy mixes during the AL program period -- they have not merely benefited through increased financing at the margin.

I have been careful throughout to speak of association and correlation rather than causation. The atheoretic methodology of this study does not identify the linkages between Bank adjustment programs and these measures, and does not provide a means of separating the effects of Bank lending from other concurrent factors. For example, the AL programs in many cases were concurrent with IMF stabilization policies; to that extent, then, the coefficient is a measure of the joint impact of the two. Further research would be useful in making more precise this and other concurrent relationships.
Bibliography


----------: World Debt Tables 1989-90.


Appendix

A. The Statistical Technique.

Regression results are obtained using an iterated generalized least squares (GLS) methodology. Country-specific dummy variables are included to capture the fixed-effect coefficient. The regression is constrained in its intercept so that when evaluated at the panel means of the non country-specific independent variables the equations return the panel mean of the dependent variable. The country-specific fixed effect terms measure country-specific deviation from that norm.

The regressions also include year-specific dummy variables D7 through D5 when an F test indicates their joint significance. These control for common movements in performance indicators in each year and thus reflect the influence of external factors not proxied by the regressors. For example, Sachs (1989a) provides evidence that credit rationing after 1982 had an effect on debtor performance separate from that of increased real interest rates. The year-specific dummy variables should reflect the extent that this "credit crunch" applied across countries.

The results of the complete estimating equation and copies of the estimating programs are available from the author on request.

B. The Theoretical Basis.

Measures of economic performance will respond systematically to four sets of determinants: external incentives, secular economic development trends, economic policy choices and country-specific structural factors. Suppose that this systematic relationship can be represented in reduced form for country i in period t (t = 1, 2, ..., T) as:

\[
Y_{it} = a_i^* + X_{it}b_i + S_{it}c_i + P_{it}g_i + \epsilon^*_{it}
\]

\(a_i^*\) is a measure of systematic country-specific contribution to economic performance. The three data matrices -- \(X_{it}\), \(S_{it}\) and \(P_{it}\) -- include time series of variables measuring incentives (and disincentives) to economic performance. The external incentives in \(X_{it}\) can be either price-based (e.g., terms of trade, real interest rate) or macroeconomic (e.g., world demand, debt burden) in nature. The columns of \(S_{it}\) and \(P_{it}\) measure secular economic trends and policy choice respectively. \(\epsilon^*_{it}\) is the random component and is assumed independently distributed across time periods. \(b_i^*, c_i^*\) and \(g_i^*\) are conformable vectors measuring country-specific responses to these incentives.

There are three important elements of country-specific behavior that can be decomposed in this analysis. First, a large \(a_i^*\) in comparison with other countries indicates country-specific success given a stable international environment. Second, the country's economic structure as captured in \((b_i^*, c_i^*, g_i^*)\) can be relatively more or less successful in responding to changes in the environment. Third, government policy \((P_{it})\) can be more or less
flexible in responding to changes in the environment.

I illustrate the first two elements by transforming equation (1) to introduce a "normal" structural response to changes in the environment denoted by the vectors b, c and g for T periods. I will return to the treatment of an endogenous government policy.

\[
Y_{it} = a_i + X_{it}b + S_{it}c + P_{it}g + \epsilon_{it}
\]

with \(a_i = a_i^* + [X_i(b_i-b) + S_i(c_i-c) + P_i(g_i-g)]\)

\[
\epsilon_{it} = \epsilon_{it}^* + (X_{it}-X_i)(b_i-b) + (S_{it}-S_i)(c_i-c) + (P_{it}-P_i)(g_i-g)
\]

and \(W_i = [\Sigma W_{it}] / T\) for all variables \(W_{it}\).

The intercept \(a_i\) includes two types of effects. The first, given by \(a_i^*\), represents idiosyncratic country performance abilities. The second, given by the terms in \(X_i, S_i\) and \(P_i\), indicate the country's structural flexibility in adjustment to external, secular and policy shocks compared with the "normal" response. The terms in \(b, c\) and \(g\) are the "normal" responses to country \(i\)'s economic environment. The error term \(\epsilon_{it}\) incorporates the random error and the cross-period variability in country-specific response. Given the definitions of the time-series means the error term \(\epsilon_{it}\) has an expected value of zero; however, it may exhibit cross-period autocorrelation.

The term "normal" is used in a descriptive rather than normative sense as in the seminal work of Chenery and Syrquin (1975). A normal response can be defined as an average structural and policy response to the external environment. Least-squares regression is used to derive this average response. Suppose that there are \(M\) countries \((i = 1, 2, ..., M)\). Stack the vectors \(Y_{it}\) into the \((MT \times 1)\) column vector \(Y_t = [Y_{1t} \ Y_{2t} \ ... \ Y_{Mt}]'\). Stack the vector \(\epsilon_{it}\) and the matrices \(X_{it}, Z_{it}\) and \(P_{it}\) similarly. Define a block-diagonal intercept matrix \(A_i\) with dimension \((MT \times M)\) and the \(m\)th block consisting of a \((T \times 1)\) vector of \(a_m\) in the \(m\)th column. Least-squares regression can be used to derive estimates of \(b, c, g\) and the country-specific \(a_i\) as in equation (3).\(^{14}\)

\(^{14}\) Maddala (1987) provides an introduction to this technique. Judge, et al. (1980) refer to this specification as the dummy variable model, as opposed to the error-components or random-effects model in which \(a_i\) is a random variable with distribution parameters to be estimated. The fixed-effect specification is attractive in that it does not introduce the omitted-variables biases of random effects approaches. Given that our statistical specification will of necessity not include all important determinants of economic performance, the possibility
Although the technique introduces some econometric complexities, it allows identification of economic performance by country corrected for the hospitality (or lack thereof) of the external and policy environment. This measure of economic performance will serve as the basis of cross-country comparisons of success in structural adjustment.

The government policy choice \( P_{it} \) is a third component of country-specific economic performance. It is also an endogenous decision, and can be represented by a reaction function. Observed policy will then have the characteristics in equation (4), with an autonomous (and country-specific) component \( G_i \), a component induced by external and secular variables \( X_{it}P_{ix} + S_{it}P_{is} \) and a random component \( \nu^*_{it} \).

This can be rewritten using a decomposition as above to highlight the "normal" and country-specific aspects of this policy choice. \( q_i \) is the country-specific component of policy choice that is of interest, while \( \nu_{it} \) is the random component. \( P_x \) and \( P_s \) represent "normal" policy reactions to external and secular shocks, respectively.

When equation (5) is substituted into (1), the fixed-effect estimation equation can be rederived in substantially the same form as in (2).
\[(6) \quad y_{it} = a_i + x_{it} + s_{it} + \eta_{it}\]

with

\[a_i = a_i + q_i\]
\[\beta = b + \rho_x\]
\[\gamma = c + \rho_y\]
\[\eta_{it} = \epsilon_{it} + \nu_{it}\]

These matrices can be stacked as in preparation of equation (3) to allow fixed-effect estimation of \(a_i, \beta, \text{ and } \gamma\). \(a_i\) will thus capture all three components of country-specific economic performance outlined above.

There is no a priori reason to expect \(\epsilon_{it}\) to be identically and independently distributed. I therefore consider its general form to be

\[\eta_{it} = \rho_{it} \epsilon_{it} + u_{it}\]

This allows both for the random error of each country to have a different variance and for a country-specific autoregressive error structure. These are in fact significant features of the data set; Conway (1990) presents the test statistics that demonstrate this.

Since external shocks are controlled for in the estimation procedure, the \(\omega_i\) and \(\rho_i\) can be thought of as country-specific characteristics just as the fixed-effect terms can. \(\omega_i\) indicates the variability of observed performance relative to the "normal" level \(\sigma^2\), and could be due to stop-go policy-making or perhaps to decisions to eschew use of government policy for stabilization (in the spirit of economic liberalization, for example).\(^{16}\)

\(\rho_i\) will indicate the persistence of deviations from "normal" levels. Country \(i\) may through policy innovation achieve improved performance relative to the norm, but may through subsequent inaction slowly revert toward normal levels. If this complete scenario occurred within the sample period the fixed-effect measure for country \(i\) would be positive while \(\rho_i\) would also be positive. Avoiding this reversion will be a positive feature in performance of above-norm countries.\(^{17}\)

The GLS methodology employed here is designed to ensure that equation errors are drawn from a constant-variance random normal sample. Sample estimates of \(\omega_i\) and \(\rho_i\) are calculated through an initial OLS regression; these are denoted \(\hat{\omega}_i\) and \(\hat{\rho}_i\) and are used in the second-stage GLS regression

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\(^{16}\) In the finance jargon, a country policy that would generate this increased variability would be called a "high-beta" policy.

\(^{17}\) It will not be enough to examine the value of \(\rho_i\). There are many circumstances in which large and positive \(\rho_i\) could be considered favorable to performance: one example would be an under-performing country that slowly raises its performance towards the norm.
\[ w_i(y_{it} - r_i y_{it-1}) = w_i[(1-r_i)(\alpha_i + \alpha_0) + (X_{it} - r_i X_{it-1})\beta + \alpha_t] + \nu_{it}, \]

on a panel restricted to exclude the first period. A country-by-country test of \( \nu_{it} \) does not reject the null hypothesis of normality in the large majority of cases.

C. The Data Set.

The data set includes the following variables for 76 countries.\(^{18}\) Although the data have a time horizon of 1974-1989, in practice missing observations led to a restriction for estimation purposes to the period 1976-1986.

YGR: Economic growth is measured by percentage change in real GDP at factor cost.

IR: Data on real domestic investment are drawn from the World Tables and are scaled by real GNP to provide a ratio insensitive to country size.

CAR: Data on the current account balance denominated in US dollars are drawn from the World Tables and multiplied by the average exchange rate with the US dollar, also from that source. This product is divided by nominal GNP to provide a country-insensitive scaling.

RR: The international interest rate is defined by subtracting the US CPI inflation rate from the average nominal rate on all borrowing by that country taken from the World Debt Tables. It is thus an ex post measure of the real interest rate.

LTDPC, STDPC: International debt is total debt, including private, public and publicly guaranteed, deflated by the US CPI to billions of 1980 US dollars. It is stated in per capita form for each country.\(^{19}\) It is

\(^{18}\) The countries are Algeria, Argentina, Bangladesh, Barbados, Benin, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Cameroon, Central African Republic, Chile, Congo, Colombia, Côte d'Ivoire, Costa Rica, Cyprus, Dominica, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, Gabon, Gambia, Ghana, Greece, Guyana, Honduras, Haiti, Haute Volta, India, Indonesia, Jamaica, Jordan, Kenya, South Korea, Liberia, Lesotho, Madagascar, Malaysia, Malawi, Mali, Mauritania, Mauritius, Mexico, Morocco, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Peru, Philippines, Papua New Guinea, Portugal, Paraguay, Rwanda, Senegal, Sierra Leone, Singapore, Sri Lanka, Sudan, Syria, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Uruguay, Venezuela, Yemen, Yugoslavia, Zambia and Zimbabwe.

\(^{19}\) The data are presented in per capita form to provide a country-insensitive scaling. Initially I used a scaling in terms of GNP similar to that for the current account, but the valuation effects of nominal depreciation differing from domestic inflation led to extreme swings in the variable for some Latin American countries. I judged that these swings unrealistically magnified the varying effect of external debt on performance, and chose the alternative
subdivided into a longer-term component and a short-term component. The debt is lagged in estimation: i.e., the debt of period $t$ is defined as the debt existing at the end of period $t-1$.

TOT: The terms of trade statistics are drawn from the World Tables, and are rescaled as discussed below. An upward movement is an improvement in the terms of trade.

RER: The real exchange rate data are drawn from a sample of multilateral exchange rate series constructed by the CECTP Division of the World Bank. These are available for a 19-country subset of the data: Botswana and Singapore are excluded. It is normalized as discussed in the following section. A depreciation is an downward movement in the ratio. These are available for only 66 of the countries.

YASHR: The share of total output coming from the agricultural sector is used as a proxy for the secular stage of economic development.

DAL: This variable is constructed from information on recipients of Structural Adjustment Loans (SAL) and Sectoral Adjustment Loans (SECAL) by the World Bank reported in Nicholas (1988, Annex 1). If the country received a SAL or SECAL in a previous year, then the value of DSAL is 1 for that year and all following years. In the year that the AL program was put in place then DAL becomes the percentage of months remaining in the year after approval. Otherwise the variable is zero.

IAL: This instrumental variable is constructed from DAL with the addition that it is unity as well for the 12-month period before DAL becomes unity.

USINF: The rate of inflation in the US GNP deflator. This is drawn from the Economic Report to the President.

GOV: The ratio of nominal government current expenditures to nominal GNP, taken from the World Tables.

MON: The ratio of "money broadly defined" to nominal GNP, taken from the World Tables.

D. Normalization of real exchange rate and terms of trade.

The data on the TOT from the World Tables are normalized for each country at the common year: TOT for all countries equals 100 in 1980. When making cross-country comparisons this can be misleading, for the TOT in 1980 may have been more favorable to one country than to another. This will introduce a bias into estimates of fixed-effect coefficients.
I deal with this by forming standardized versions of TOT. I follow three steps:

(a) calculate the mean and standard deviation of TOT for each country in the data base over the period 1967-1986.

(b) calculate a normalized TOT series called TOTA by subtracting the mean derived in (a) from each value of TOT.

(c) calculate a normalized TOT series called TOTB by subtracting the mean and then dividing by the standard deviation for each value of TOT. This becomes a standard normal approximation to the TOT that can be compared across countries.

The real exchange rate data from CECTP of the World Bank are scaled similarly to the terms of trade: for each country, the real exchange rate is equal to 100 in 1980. For identical reasons a cross-country comparison should normalize this variable. RERA and RERB are defined analogously to TOTA and TOTB, using the means and standard deviations computed over the period 1965-1988.
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