Forthcoming, World Bank Economic Review

When Is External Debt Sustainable?

Aart Kraay and Vikram Nehru
The World Bank
First Draft: January 2004
This Draft: March 2006

Abstract: We empirically examine the determinants of 'debt distress", which we define as periods in which countries resort to any of three forms of exceptional finance: (i) significant arrears on external debt, (ii) Paris Club resecheduling, and (iii) non-concessional IMF lending. Using probit regressions, we find that three factors explain a substantial fraction of the cross-country and time-series variation in the incidence of debt distress: the debt burden, the quality of policies and institutions, and shocks. The relative importance of these variables varies with the level of development. We show that these results are robust to a variety of alternative specifications, and we show that our core specifications have substantial out-of-sample predictive power. We also explore the quantitative implications of these results for the lending strategies of official creditors.

1818 H Street N.W., Washington, DC 20433, akraay@worldbank.org, vnehru@worldbank.org. We would like to thank Nancy Birdsall, Christina Daseking, Gershon Feder, Alan Gelb, Indermit Gill, Rex Ghosh, Nicholas Hope, Sona Varma, and seminar participants at the Center for Global Development, International Monetary Fund, and World Bank, for very helpful comments, Carmen Reinhart for kindly sharing historical data on default episodes, and Sunyoung Lee for superb research assistance. The opinions expressed here are the authors', and do not necessarily reflect the official views of the World Bank, its Executive Directors, or the countries they represent.

1. Introduction

This paper empirically analyzes the probability of debt distress in developing countries and examines the implications of these results for the lending policies of official creditors. We define debt distress episodes as periods in which countries resort to any of three forms of exceptional finance: (i) substantial arrears on their external debt, (ii) debt relief from the Paris Club of creditors, and (iii) non-concessional balance of payments support from the International Monetary Fund. We find that three factors—the debt burden, the quality of institutions and policies, and shocks that affect real GDP growth—are highly significant predictors of debt distress, and that their relative importance differs between low-income countries (LICs) and middle-income countries (MICs).

Three features of this paper distinguish it from much of the large empirical literature on debt sustainability. First, one of our main interests is in understanding the determinants of debt distress among LICs that have been at the center of recent debt relief efforts such as the 1996 Heavily-Indebted Poor Countries Initiative (HIPC) and the 2005 Multilateral Debt Relief Initiative (MDRI). In contrast much of the existing empirical literature focuses on debt crises in MICs that borrow primarily from private creditors. As we will see below, both the features of distress episodes, and also their determinants, are quite different in LICs and MICs.

Second, we find that non-financial variables, especially the quality of policies and institutions, are key determinants of debt distress in LICs. The idea that policies and institutions matter for debt sustainability is not novel. But it has received relatively little attention in the empirical literature so far. A notable exception is Reinhart, Rogoff, and Savastano (2003), who document the importance of countries' history of non-repayment and macroeconomic instability in driving market perceptions of the likelihood of default. Our evidence complements theirs by showing that not only does the history of non-repayment and weak policy matter for the likelihood of debt distress, but contemporaneous policies and institutions also matter. Moreover, we find that the

contemporaneous effect of improvements in policies and institutions on the probability of debt distress is quantitatively large, and is roughly of the same order of magnitude as reductions in debt burdens. We also find that the role of policies and institutions is much more important in LICs than in MICs.

Third, we emphasize the implications of our findings for the lending strategies of multilateral concessional creditors such as the World Bank and the IMF. In these organizations, notions of debt sustainability have until recently focused almost exclusively on simple projections of debt burden indicators and their comparison with fairly arbitrary benchmarks. For example, debt relief under the HIPC initiative was calibrated to ensure that countries emerge from the process with a present value of debt to exports of 150 percent, irrespective of other country characteristics. Our results indicate that a common single debt sustainability threshold is not very appropriate because it does not recognize the role of institutions and policies that matter for the likelihood of debt distress. In particular, our estimates allow us to summarize striking tradeoffs between debt indicators, policies, and shocks for a given probability of debt distress. For example, our benchmark results suggest that countries at the 75th percentile of our measure of policies and institutions can have a present value of debt to exports that is two to three times higher than countries at the 25th percentile of this indicator, without increasing the probability of debt distress. These tradeoffs suggest that the targeted level of "sustainable" debt of a country should vary substantially with the quality of its policies and institutions.

Our work is premised on the view that avoiding debt distress is desirable. There are several reasons for this. Resolving debt distress imposes direct costs in terms of the time that debtors and creditors must spend coordinating and renegotiating claims. Excessive debt can also undercut support for policy reforms by political and civil society groups in debtor countries if they perceive that benefits from reforms will be directed to high debt service rather than delivering needed public services to the poor. The pressure to meet external debt service payments may also tempt debtor country governments to seek short-term solutions at the expense of fundamental, longer-term reforms. Creditors,

as well, may be tempted to allocate resources according to resource needs rather than policy performance.[1] Finally, non-repayment of loans to multilateral lenders can have perverse distributional effects among borrowing countries. Absent new resources from donors, the failure to repay concessional loans reduces the ability of multilateral creditors to provide new loans to other developing countries. Moreover, to the extent that new lending is intended for countries with sound policies and institutions, but countries with poor policies and institutions are more likely to fail to service their past debts, this can result in a transfer of resources from countries with good policies to countries with bad policies.[2]

We are obviously not the first to empirically investigate the determinants of debt servicing difficulties. The debt crisis of the early 1980s prompted a surge of empirical work. An early contribution is McFadden et. al. (1985). They construct an indicator of debt servicing difficulties based on arrears, rescheduling, and IMF support much like the one we use here, for 93 countries over the period 1971-1982. They find that the debt burden, the level of per capita income, real GDP growth, and liquidity measures such as non-gold reserves are significant predictors of debt distress, while real exchange rate changes are not. They also investigate the importance of state dependence and country effects and conclude that both matter, while in our updated sample we do not find comparable evidence of state dependence. Other papers in this early literature include Cline (1984), who focuses primarily on financial variables such as determinants of debt servicing difficulties, and Berg and Sachs (1988) who in contrast emphasize "deep" structural factors such as income inequality (which they argue proxies for political

[1] For example, Birdsall, Claessens, and Diwan (2003) argue that the correlation between aid and policy performance is weak in highly-indebted countries in Sub-Saharan Africa.

[2] The amounts at stake are non-trivial. Consider for example the World Bank-administered International Development Association (IDA), which provides very substantial resources to the world's poorest countries. As of 2003, IDA's portfolio consists of highly concessional loans with a face value of roughly $110 billion. During the 2003 fiscal year, it disbursed $7 billion in new loans, of which only $1.4 billion was financed by repayments on existing loans, with most of the balance coming from infusions from rich countries. However, given the long grace periods in IDA lending, this flow of repayments is anticipated to increase sharply in the future, averaging $2.3 billion per year over 2003-2008, $3.3 billion per year over the next five years, and $4.2 billion in the five years after that (World Bank (2003)). Holding constant future donor contributions to IDA, it is clear that any disruption in this flow of future repayment resulting from episodes of debt distress will have significant implications for IDA's ability to provide new lending to the poorest countries.

pressures for excessive borrowing) and a lack of trade openness as determinants of debt servicing difficulties among middle-income countries. In addition, Lloyd-Ellis et. al. (1990) model both the probability of debt reschedulings and their magnitude, again emphasizing financial variables. Interestingly, none of these papers focus on direct measures of the quality of policies and institutions as we do here.[3]

Several more recent papers are also related to our current work. Aylward and Thorne (1998) empirically investigate countries' repayment performance vis-a-vis the IMF, emphasizing the importance of countries' repayment histories and IMF-specific financial variables in predicting the likelihood of arrears to the IMF. McKenzie (2004) studies the determinants of default on World Bank loans. Detragiache and Spilimbergo (2001) study the importance of liquidity factors such as short-term debt, debt service, and the level of international reserves in predicting debt crises. Reinhart, Rogoff, and Savastano (2003) study the historical determinants of "debt intolerance", a term used to describe the extreme duress which many emerging markets experience at debt levels that seem quite manageable by industrial country standards. Their key finding most relevant to our work is that the Institutional Investor magazine's sovereign risk ratings can be explained by a very small number of variables measuring the country's repayment history, its external debt burden, and its history of macroeconomic stability. However, there are three key differences between our paper and this one. First, their dependent variable, the Institutional Investor rating, measures *perceptions* of the probability of debt distress, whereas we attempt to explain the incidence of *actual* episodes of debt distress.[4] Second, their sample consists mostly of middle- and upper-income countries, in contrast with our particular interest in LICs. Third, as we will show in more detail below, we find

[3] Another strand of this early literature tried to find a discontinuity in the relationship between debt burden indicators (usually the external debt-to-export ratio) and the incidence of default or market-based indicators of risk (such as the premium over benchmark interest rates on debt securities traded in the secondary market), for example, Underwood (1991) and Cohen (1996) These papers found that above a threshold range of about 200-250 percent of the present value of debt-to-export ratio, the likelihood of debt default climbed rapidly. This range then became the benchmark adopted by the original HIPC Initiative in 1996, and was subsequently lowered in 1999 under the Enhanced HIPC framework.

[4] As documented in Reinhart et. al. (2003), country risk ratings such as these are only imperfect predictors of actual default episodes.

that *contemporaneous* policy, and only to a lesser extent a *history* of bad policy and non-repayment, matters for the incidence of debt distress.

Finally, Manasse, Roubini and Schimmelpfennig (2003) is the recent paper most closely related to the analysis contained in this paper. They define a country being in a debt crisis if it is classified as being in default by Standard & Poor's or if it has access to non-concessional IMF financing in excess of 100 percent of quota. They then use logit and binary recursive tree analysis to identify macroeconomic variables reflecting solvency and liquidity factors that predict a debt crisis episode one year in advance. Once again, the key difference with the analysis contained in this paper is that Manasse et. al. restrict their analysis to a sample of emerging market developing countries for which such data is available (especially the Standard & Poor's data), whereas a special focus of this paper is the factors affecting debt distress in low income countries. Several of their key results, however, are broadly consistent with ours. They find that debt burden indicators and GDP growth, as well as a somewhat different set of measures of policies and institutions, significantly influence the likelihood of debt crises.

The remainder of the paper proceeds as follows. We describe in detail our methodology for identifying debt distress episodes in Section 2. Section 3 contains our main results, where we document the relative importance of debt burdens, a measure of policies and institutions, and shocks in driving debt distress. We show that these three variables have substantial out-of-sample forecasting power for debt distress events. We also show the results survive a number of robustness checks. In Section 4 we conclude with a discussion of the policy implications of our results.

2. Empirical Framework

2.1 Identifying Debt Distress Episodes

Our sample consists of all 132 low- and middle-income countries that report debt data in the World Bank's Global Development Finance publication, and covers the all

years during period 1970-2002 for which necessary data are available. Appendix A provides a description of the data sources on which we rely. We define episodes of debt distress as periods in which any one or more of the three following conditions hold: (a) the sum of interest and principal arrears is large relative to the stock of debt outstanding, (b) a country receives debt relief in the form of rescheduling and/or debt reduction from the Paris Club of bilateral creditors, or (c) the country receives substantial balance of payments support from the IMF under its non-concessional Standby Arrangements or Extended Fund Facilities (SBA/EFF). The first condition is the most basic measure of debt distress: the failure to service external obligations resulting in an accumulation of arrears. But countries that are unable to service their external debt need not fall into arrears; they can also obtain balance of payments support from the IMF and/or seek debt relief from the Paris Club.[5] This is why we complement the arrears criterion for debt distress with the Paris Club and IMF program criteria. As a complement to debt distress episodes, we define non-distress episodes, or "normal times", to use as a control group. We define "normal times" as non-overlapping periods of five consecutive years in which *none* of our three indicators of debt distress are observed.[6]

To implement our rule for identifying debt distress eposides, we need to identify thresholds for "large" values of arrears and "substantial" levels of IMF support. Our threshold for arrears is 5 percent of total debt outstanding, and for IMF programs we look only at those for which committments are greater than 50 percent of the country's IMF quota. While any threshold for defining debt distress episodes would be somewhat arbitrary, we note that these values are quite high relative to the experience of the typical developing country. Pooling all country-years since 1970, the median value of arrears as a fraction of debt outstanding is 0.4 percent, and we are choosing a threshold that is roughly ten times greater. Similarly pooling all country-year observations, the median value of IMF committments relative to quota is zero, reflecting the fact that less than half the country-years in the sample correspond to an IMF program including access to non-

[5] This paper does not define debt reductions under the HIPC Initiative as a separate indicator of debt distress, because all debt relief under the Initiative requires parallel debt reduction by the Paris Club.
[6] These episodes begin in the first year for which it is possible to find five consecutive years with no distress.

concessional IMF facilities. When such programs are in place, the median committment is 52 percent of quota. This means that our threshold identifies only the top half (in terms of committments relative to quota) of all SBA/EFF programs.[7] Finally, for Paris Club agreements we identify the year of the agreement, and the two subsequent years, as distress episodes. This is because most Paris Club agreements provide relief with respect to debt service payments falling due during a fairly short period, typically lasting three years.

Figure 1 illustrates how we identify normal and debt distress episodes, for the case of Kenya. We show SBA/EFF committments (solid black line), arrears (dashed line), and Paris Club relief (gray line). During the 1970s and 1980s, Kenya received balance of payments support in excess of 50 percent of its quota for a total of ten years, while during the 1990s it had four years in which arrears were more than 5 percent of debt outstanding. Finally, it also received substantial Paris Club relief in 1994, and again in 2000. This means that in total, between 1970 and 2000, Kenya experienced 17 years of debt distress, indicated with triangles. In contrast, it managed only one five-year period of normal times, beginning in 1970, in which there were no arrears, debt relief, or IMF support. These years are labelled with squares.

In Kenya, and in many other countries, debt distress episodes are often quite short, and are also often immediately preceded by other distress episodes. In order to be sure that we are identifying episodes of prolonged debt distress rather than sporadic fluctuations in our distress indicator, we begin by eliminating all short distress episodes that are less than three years long. We also eliminate all distress episodes that are preceded by periods of distress in any of the three previous years, in order to ensure that we are identifying distinct episodes of distress, as opposed to episodes that are in effect continuations of previous episodes. This procedure identifies a total of 100 episodes of

[7] Note that we do not include access to the Poverty Reduction and Growth Facility of the IMF as a debt distress indicator, since, in many cases, financing from this facility is no longer to meet temporary payments imbalances but has become a source of long term development finance. See a report by the IMF's Independent Evaluation Office on "The Prolonged Use of IMF Resources."

debt distress and 309 normal times episodes over the period 1970-2002. [8] In the case of Kenya, this leaves us with two distress episodes, 1992-1996, and 2000-2002. In our regression analysis which follows, we will work with a subset of 58 distress episodes and 142 normal times episodes over the period 1978-2002 for which data on our core explanatory variables is available. The key constraint here is our preferred measure of policy, the World Bank's Country Policy and Institutional Assessment (CPIA) ratings, which begin in 1978.

These 58 distress episodes are listed in the top panel of Table 1, and the bottom panel reports means of key variables in distress and normal times events. This list contains many familiar episodes, including many Latin American countries during the debt crisis of the 1980s. Thailand and Indonesia during the more recent East Asian financial crisis. There are also many lengthy episodes of debt distress in Sub-Saharan Africa.[9] A striking feature of the debt distress episodes is that they are long. In our regression sample, the mean length of a distress episode is 10.8 years. The longest distress episode is for the Central African Republic, which has been continuously in debt distress according to our definition during the whole sample period, primarily because of high arrears. There are also very sharp differences in the values of the debt distress indicators between distress episodes and normal times. In distress episodes, average arrears are 9.4 percent of debt outstanding, while average arrears in normal times episodes are 0.5 percent. During distress episodes, SBA/EFF support averages 98 percent of quota, while during normal times it is only 3 percent of quota. While by construction Paris Club relief is zero in normal times, it averages 1.7 percent of debt outstanding during distress episodes.

[8] Our criteria for defining events imply that not all country-year observations will belong to either a distress episode or a non-distress episode. We begin with 3553 country-year observations for which our indicators of distress are available. We observe at least one indicator of distress in 1540 of these country-years, with the remainder corresponding to non-distress years. After discarding short distress episodes, distress episodes preceded by other episodes, and non-distress episodes shorter than five years as described above we are left with 2630 country-years, of which 1085 correspond to distress episodes. Our regression sample is smaller still because of limits on the availability of explanatory variables, and covers 1339 country-years of which 629 are classified as distress.

[9] One anomalous observation is Vietnam, which we identify as being in continuous debt distress since the late 1980s. This reflects continuous high levels of arrears relative to non-bilateral, non-Paris Club creditors, much of which is ruble-denominated. In the vast majority of our episodes of debt distress based on arrears primarily vis-a-vis multilateral and bilateral Paris Club creditors.

There are also interesting differences between LICs and MICs. In LICs, distress episodes tend to be longer (12.6 years versus 8.7 years) and associated with higher levels of arrears (13.3 percent versus 4.6 percent of debt outstanding). Net transfers on debt fall during distress episodes, but proportionately much less in LICs where they decline from 3.1 percent to 2.1 percent of GDP on average, while in MICs they decline from 0.5 to -1.4 percent of GDP. This highlights a key feature of distress episodes in LICs -- despite experiencing severe debt servicing difficulties, these countries on average continue to benefit from positive, and only somewhat reduced, net transfers on debt.

2.2 Modelling the Probability of Debt Distress

We will model the probability of debt distress using the following probit specification:[10]

$$(1) \qquad P[y_{ct} = 1] = \Phi(\beta' X_{ct})$$

where y_{ct} is an indicator value taking on the value of one for debt distress episodes, and zero for normal times episodes, each beginning in country c at time t; $\Phi(.)$ denotes the normal distribution function; X_{ct} denotes a vector of determinants of debt distress; and β is a vector of parameters to be estimated. Our sample consists of an unbalanced and irregularly spaced sample of observations of distress and normal times. In our core specification, we will consider a very parsimonious set of potential determinants of debt

[10] Since our interest is primarily in the incidence of distress episodes, rather than their precise timing, we rely on this very simple probit specification. Collins (2003) shows how the timing of currency crises can be modeled explicitly as the first-passage-time of a latent variable to a threshold, of which the simple probit specification here is a special case. Manasse, Roubini and Schimmelpfenning (2003) suggest that binary recursive tree analysis better captures the nonlinearities in the relationship between debt crises and their determinants, in a sample of middle-income countries. We have not yet investigated whether similar nonlinearities are important in our sample.

distress. As a first step to alleviating concerns about potential endogeneity biases, we measure each of these variables in the year prior to the beginning of the episode.[11]

In our core specifications we consider three explanatory variables. The first is the present value of debt (i.e. the present value of future debt service obligations), expressed as a share of current exports.[12] This is a useful summary of the overall debt burden of a country, and in particular reflects cross-country differences in the concessionality of debt. The second is the World Bank's Country Policy and Institutional Assessment (CPIA) ratings, which we use as our preferred measure of the policy environment. These are available on an annual basis since 1978, and reflect the perceptions of World Bank country economists. Our third variable is real GDP growth, which we include as a crude way of capturing the various shocks, both exogenous and endogenous, that countries experience. The bottom panel of Table 1 reports means of these variables in the year prior to distress and normal times events. There are substantial differences in the means of these variables before distress and normal times events. The present value of debt as a share of exports is more than twice as high before distress events (1.7 versus 0.8), policy is substantially worse (CPIA score of 3.1 versus 3.8), and growth is considerably lower (1.2 versus 4.7 percent).

Figure 2 illustrates the strong bivariate relationships between our core explanatory variables and the distress indicator. In each panel, we divide the sample of observations by deciles of the explanatory variable of interest. We then compute the mean value of the explanatory variable by deciles, and plot it against the mean of the distress indicator variable by decile. Thus, for example, in the first panel of Figure 3, the mean value of the present value of debt to exports in the top decile of this variable is 3.4, and 65 percent of the observations in this decile correspond to distress. In contrast, in the

[11] For example, one might expect that debt burdens increase and policy performance deteriorates during distress episodes. This would create a spurious correlation between these variables measured during the episode and the value of the outcome variable.

[12] In the working paper version of this paper, we also considered several other debt burden indicators, including total debt service as a share of exports, the face value of debt relative to exports, debt service relative to current government revenues, and debt service relative to non-gold reserves. Results for these measures were qualitatively similar, with the flow debt service measures providing slightly greater predictive power for debt distress.

bottom decile the mean value of debt relative to exports is 13 percent, and only 11 percent of the observations in this decile correspond to distress. A key feature of the data is the strong relationship between debt distress and policy performance. In the lowest decile of policy performance, we find that fully 80 percent of observations correspond to distress, while in the top three deciles of policy performance the likelihood of debt distress is only about 10 percent.

3 Empirical Results

3.1 Results from Core Specification

Table 2 reports our core specifications. In the first column we combine observations for all countries. We find that debt burdens, policies, and shocks as proxied by real per capita GDP growth are all highly significant predictors of debt distress. Countries with high debt burdens, low CPIA scores, and low growth in a given year are significantly more likely to experience a debt distress episode beginning in the next year. The magnitude of the effects of debt and policy are economically significant as well. Moving from the 25th percentile of indebtedness to the 75th percentile raises the probability of distress from 15 percent to 35 percent (holding constant the other variables at the median). Similarly, moving from the 25th percentile of policy to the 75th percentile lowers the probability of distress from 27 percent to 12 percent. The effect of growth, although significant, is not as large. Raising growth from the first to the third quartile lowers the probability of distress from 24 percent to 17 percent.

In the next two columns of Table 2 we re-estimate our core specification separately for LICs and MICs. In both groups of countries, we find that higher debt burdens lead to significantly higher likelihood of debt distress. Interestingly, however, the magnitude of this effect is different in the two groups. To facilitate comparison of magnitudes, in these two columns we report estimated marginal effects, i.e. the derivative of the probability of distress with respect to the variable of interest, rather than the slope

coefficients, β. This marginal effect is nearly twice as large for MICs than for LICs. In contrast, the marginal effect of policy is much larger among LICs than for MICs, and in the latter group it is not significantly different from zero. The effect of shocks, as proxied by real GDP growth, is much larger for MICs than for LICs, and is insignificant for LICs. We also report the intercepts from the probit regressions in the two groups, and find that it is much larger for LICs than for MICs, suggesting that there are factors other than debt, policy, and growth that contribute to a higher rate of debt distress in low-income countries. All of these differences between LICs and MICs are statistically significant at the five percent level, with the exception of the effect of growth where the difference just falls short of significance at the 10 percent level.

Since our ultimate interest is in predicting debt distress episodes based on a parsimonious set of variables, it is useful to also examine the out-of-sample predictive power of each of these first three specifications. To do this, we re-estimate each regression using data through 1989. We then use the use the estimated coefficients, together with the observed right-hand-side variables to predict the outcome of each of our observations in the 1990s. In particular, we predict that a debt distress episode will occur if the predicted probability conditional on the observed data included in each regression is greater than the unconditional probability of distress in the pre-1990 sample. This unconditional probability is 0.38 in the full sample, and 0.45 and 0.30 for the LIC and MIC subsamples. We summarize the predictive power of the forecasts by reporting the fraction of all observations after 1990 that are correctly predicted, as well as the success rate for distress episodes and normal times separately.

The overall success rates are quite respectable, at 75 percent among LICs and 78 percent among MICs. To put these success rates in perspective, note that if we used only the historic unconditional rate of debt distress to predict future debt distress, we would have a success rate of 50 percent among LICs and 58 percent among MICs.[13] The

[13] Suppose that the fraction of distress events observed in the past is p, and we randomly predict distress for a fraction p of future events no distress for the remaining fraction 1-p. Then the success rate of such a forecast based only on the unconditional historical rate of distress would be $p^2+(1-p)^2$. Since the historical

additional information in our three right-hand-side variables therefore increases the success rate relative to this naive forecast by 20 to 25 percent. Note also that the success rate for predicting normal times events is higher than the success rate for predicting distress events.

Overall, these results suggest that a quite parsimonious empirical model can do a reasonable job of accounting for patterns of debt distress over the past 25 years. Moreover, the out-of-sample forecasting power of the model is quite good. Before turning to the policy implications of this finding in the last section of this paper, we first subject this basic specification to a number of robustness checks.

3.2 Robustness of Core Specification: Does the Type of Debt Matter?

In Table 3 we investigate the extent to which debt distress is affected by the type of external debt of a country. We distinguish external debt along three dimensions. We first construct a variable measuring the share of external debt that is public- and publicly-guaranteed. We also construct a variable measuring the share of external debt that is owed to official creditors, consisting of bilateral loans by governments as well as loans from multilateral organizations. Finally we measure the concessionality of external debt as one minus the ratio of the present value of debt to the nominal value of debt. We add each of these variables in turn to our core specification, for all countries, and for LICs alone.[14]

Interestingly, we find that all three characteristics of debt are significantly associated with the risk of debt distress. In particular, we find that the greater the share of debt that is public or publicly-guaranteed, and the greater is the share of debt owed to official creditors, the lower is the risk of debt distress. We also find that the risk of debt distress is lower the greater is the concessionality of debt. This last result is perhaps not

---

rate of distress during the period before 1989 is p=0.5 for LICs and p=0.3 for MICs this gives the success rates given in the text.

very surprising because more concessional debt generally has lower immediate debt service obligations than less concessional debt. To the extent that debt distress is triggered by difficulties in meeting immediate debt service obligations, more concessional debt will be less likely to lead to debt distress. The finding that countries that owe more to official creditors are less likely to experience debt distress is more interesting. One interpretation of this finding is that official creditors are more likely to engage in "defensive lending", i.e. providing new loans in order to ensure that old loans are repaid. Another interpretation is that loans from official creditors tend to be more concessional, and for reasons just given are therefore easier to service. One crude way to disentangle these two hypotheses is to put both the share owed to official creditors, and the concessionality rate, in the same regression, as we have done in unreported results. When we do this we find that concessionality is significant while the official creditor share is not. This is suggestive -- but hardly conclusive -- evidence against the "defensive lending" hypothesis.

3.3 Policy Endogeneity and the Role of Shocks

A potential concern with the results is that the CPIA measure of policy could be endogenous, in one of two ways. One possibility is that the CPIA is simply proxying for the indicators of debt distress themselves. For example, it could be that World Bank country economists assign poor CPIA scores to countries that are running arrears or are negotiating a Paris Club agreement. Our first defense against this possibility is that we have been using lags of the CPIA, i.e. we measure the CPIA in the year before the distress or normal times episode begins. Nevertheless, it could be that lagging the CPIA just one year is not sufficient, if for example the CPIA scores are based on information that a Paris Club deal is likely to happen soon. To deal with this possibility we have experimented with longer lags of the CPIA. In columns (1) and (4) of Table 4 we report results using a three-year lag of the CPIA. That is, we measure the CPIA variable three years prior to the start of the episode, as opposed to the year before the start of the

[14] Ideally we would like to estimate the partial effects of these three characteristics of debt. Unfortunately, all three are quite strongly correlated at about 0.6 across observations. Given our small sample multicollinearity problems prevent us from precisely pinning down the partial effects.

episode as in our base specification.[15] By doing so we eliminate the possibility that there is a mechanical correlation between distress and CPIA scores due to CPIA scores capturing actual or iminent distress. We find that this further lagged measure of policy remains a highly significant predictor of debt distress. As we lengthen the lags, we unsurprisingly find that the CPIA score becomes less significant (results not reported for reasons of space). However, we believe that the significance of the lagged and also thrice-lagged CPIA scores in predicting debt distress is unlikely to primarily reflect reverse causation from future distress outcomes to current CPIA scores, simply because it would require quite impressive foresight on the part of World Bank staff who produce CPIA scores.

The second potential endogeneity problem is that the CPIA is simply proxying for other omitted country characteristics that also matter for debt distress. These might be deep institutional characteristics such as the protection of property rights, or alternatively macroeconomic instability in the country. Another possibility comes from the findings of Reinhart, Rogoff, and Savastano (2003) that a country's history of default and bad policy is a robust predictor of investors' perceptions of the likelihood of sovereign default. Countries with weak property rights, or high macroeconomic instability, or a history of default might both be more likely to experience debt distress and might also receive worse CPIA scores. To the extent that such factors are time-invariant, the usual strategy would be to difference them away and focus on the within-country variation in debt distress, debt burdens, policies, and growth. As we discuss in more detail below, this simple differencing strategy is not an option in the nonlinear probit specification that we use, and in the next section we use a dynamic panel probit estimator that allows for unobserved country-specific sources of heterogeneity that will help to address this problem.

For now, we introduce direct controls for some of these country characterstics. We measure property rights protection using the "Rule of Law" indicator constructed by

[15] The CPIA variable itself is quite persistent over time. By sheer coincidence the correlation between the first and second lag of the CPIA in our sample of events is one, and so we do not separately report results using the second lag. The correlation between the first and third lag of the CPIA in our sample is 0.90.

Kaufmann, Kraay, and Mastruzzi (2004). We measure macroeconomic instability as the proportion of years in our sample period where inflation was greater than 40 percent per year. In columns (2)-(3) and (5)-(6) we add these control variables to our core specification for all countries, and for LICs. We find that including these variables does reduce the magnitude of the effect of policy somewhat compared with the results reported in Table 2. However, the direct effect of the CPIA remains highly significant. Third, we directly investigate the role of a country's history of default on its external obligations as a predictor of debt distress. In particular, we use the database of default episodes compiled by Reinhart, Rogoff and Savastano (2003) to identify the fraction of years between independence (or 1824, whichever is later) and 1980 in which a country was in default on its external borrowing. In the full sample of observations we find that while this default history variable is significant, the CPIA remains highly significant as well (Column 7 of Table 4) .[16] From all of this, as well as the results of the following subsection, we are reasonably confident that endogeneity of the CPIA in the sense we have defined it is not driving our findings.

In the remaining columns of Table 4 we attempt to isolate particular shocks that might trigger debt distress. To do so, we replace our real GDP growth variable with measures of real exchange rate movements and fluctuations in the terms of trade. We construct the growth rate of the real exchange rate relative to the US dollar using changes in the nominal exchange rate and GDP deflators. Positive values of this variable correspond to real depreciations. Real depreciations would be expected to raise the risk of debt distress by making dollar-denominated debt service obligations more expensive in domestic terms. We measure the income effect of terms of trade changes as the current local currency share of exports in GDP times the growth rate of the local currency export deflator, minus the share of imports in GDP times the growth rate of the import deflator. Adverse terms of trade shocks lower export earnings and income, and might also trigger debt servicing difficulties. Despite the prior plausibility of these two shocks, we find virtually no evidence that they are significant predictors of debt distress. In the case of

[16] We are unable to estimate the impact of this default history variable in the low-income sample separately. This is because this variable is by coincidence equal to zero for all of the normal times episodes among LICs, creating a singularity in the probit regression.

terms of trade shocks, this may not be too surprising, as Raddatz (2005) documents that these shocks account for only a small share of the variation in output in low-income countries. Our results on real exchange rate movements also echo the negative findings of McFadden et. al. (1985) that we mentioned earlier. We do however continue to find that debt burden and policy are highly significant.

3.4 Robustness of Core Specification: Dynamic Panel Probit Estimates

We conclude our robustness checks by using a dynamic panel probit specification to investigate the extent to which unobserved country characteristics, as well as countries past history of distress, matter for the current likelihood of distress. We estimate the following dynamic probit specification with unobserved country-specific effects:

$$(2) \qquad P[y_{ct} = 1] = \Phi\left(\beta' X_{ct} + \rho \cdot y_{c,t-} + \mu_c\right)$$

where $y_{c,t-}$ denotes the value of the distress indicator in the episode immediately prior to the one occurring at time t in country c; ρ is a parameter capturing the persistence of distress, and μ_c is an unobserved country-specific time-invariant effect capturing unobserved country characteristics that influence the probability of debt distress. This empirical model generalizes the one we have used so far in two important respects. First, it allows for serial dependence in the likelihood of debt distress, by allowing the past value of the outcome variable (distress or not) to affect the probability that the current outcome will be distress. This captures in a very straightforward way the possibility that once a country has experienced debt distress, it is more likely to do so in the future. Second, this model allows for unobserved country effects which affect the probability of distress in all periods for a given country. Importantly, we will not need to assume that the unobserved country effects are independent of the observed right-hand-side variables. This means that we do not have to be concerned that the significance of our findings is being driven by omitted time-invariant country characteristics, such as property rights protection, or a history of macro instability, that might both affect the probability of debt distress and also be correlated with our included right-hand side variables.

The presence of unobserved country-specific effects complicates estimation of the model. As noted above, they cannot be eliminated by a differencing transformation common in linear panel data models. Moreover, since we have a lagged dependent variable, we are faced with the familiar initial conditions problem: loosely, we cannot ignore the fact that by construction, the lagged dependent variable is correlated with the unobserved country effect. We estimate this model by applying the initial conditions correction suggested by Wooldridge (2002). He proposes modelling the individual effect as a linear function of the initial observation on the dependent variable for each country, as well as time averages of all of the right-hand-side variables. He also shows that this specification can be simply estimated using standard random-effects probit software, as long as the list of explanatory variables is augmented with the initial value of the dependent variable and time averages of all of the right-hand-side variables for each country.

The results of this specification can be found in Table 5. The first four rows of this table contain the main coefficients of interest, on the lagged dependent variable and our three main explanatory variables of interest. As before, we continue to find that debt indicators, policy, and growth remain significant predictors of the probability of debt distress in the full sample, and in the low-income country sample only debt and policies matter. The point estimates of the coefficients on debt and on policy are also quite close to what we found in Table 2. Interestingly, we find no evidence that debt distress in the previous period significantly raises the probability of distress in the next period, after debt burdens, policy and growth have been controlled for. Taken together, these results suggest that unobserved time-invariant country characteristics are not responsible for our main results, and that the observed persistence of debt distress over time is mostly due to country effects and the persistence of debt burdens, policies, and shocks rather than a recent history of distress itself.[17]

[17] This last result contrasts with the finding of McFadden et. al. (1985), who do find evidence for state-dependence in episodes of debt-servicing difficulties.

4. Policy Implications

We have showed that the likelihood of debt distress depends not only on low-income countries' debt burdens, but also on the quality of their policies and institutions. This finding has important implications for the lending strategies of official creditors such as the World Bank. Our basic point here is that assessments of the appropriateness of a country's debt burden should reflect the quality of policies and institutions in that country. Our empirical results indicate that there is a significant tradeoff between debt burdens and policy: countries with better policies and institutions can carry substantially higher debt burdens than countries with worse policies and institutions without increasing their risk of debt distress.

Figure 3 highlights this tradeoff. We consider a hypothetical country with a growth rate of 3.6 percent (i.e. the mean of our sample). Then, for the indicated value of the CPIA on the horizontal axis, we compute the level of the present value of debt relative to exports that would be consistent with a predicted probability of debt distress equal to 39 percent which corresponds to the unconditional mean in our sample of LICs (truncating negative values at zero).[18] We report the same relationship between policy and debt based on our estimates pooling data for all countries. The tradeoffs between debt and policy are considerable. For our estimates based on LICs, we find that a country with average growth, and poor policy (corresponding to a CPIA score of 3 which is roughly the first quartile of our sample), would be able to tolerate a present value of debt to exports of about 100 percent. In contrast, a country with good policy (corresponding to a CPIA score of 4 which is the fourth quartile of our sample), would be able to tolerate a debt level nearly three times higher with the same distress probability. For our estimates based on all countries, we find a flatter tradeoff. The implied debt level for a poor policy country with a CPIA of 3 would be 75 percent, while for a fairly good policy country with a CPIA of 4 it would be 160 percent. Of course, for lower (higher) debt distress probabilities, these lines would shift down (up), corresponding to lower (higher)

[18] These implied debt levels are obtained by solving $p=\Phi(\beta_0+\beta_1 x\text{Debt}+\beta_2 x\text{Policy}+\beta_3 x\text{Growth})$ for debt, where p is the desired probability of debt distress.

levels of debt for any level of policy. In addition, the precise magnitudes of the effects of differences in debt and policy on these implied debt levels depends on all of the estimated coefficients in the regressions on which these estimates are based, and these are subject to margins of error and vary across specifications. Thus, these figures can only give us a sense of the rough order of magnitude of effects of policies on the level of debt consistent with a given distress probability.

Our second policy implication is that the risk of debt distress should be taken into account when deciding the terms of resource transfers to low income countries. Our point here is simple. In recent years large increases in flows of development finance have been advocated in order to help countries meet the Millenium Development Goals. If these flows are provided in the form of concessional loans as they have been in the past, many recipient LICs are likely to see very sharp increases in their debt burdens. This could easily undo the reductions in debt burdens due to past debt relief efforts and thus have little lasting impact on the risk of debt distress.

We illustrate this point using a simple hypothetical calculation. We focus on the 28 countries that have to date received debt relief under the HIPC initiative. Between 1990 and 2003, these countries as a group received $58 billion in disbursements of mostly concessional loans from official creditors. Given the calls for much greater aid to these countries, it is not inconceivable that these countries receive the same amount of disbursements over the next five years. We next assume that the rate of concessionality of this new lending is the same as it is on the stock of debt outstanding as of 2003. We use this assumption to calculate the present value of this additional lending, and suppose further that it is distributed across countries in the same proportions as past official lending to these countries. This allows us to calculate a hypothetical present value of debt five years in the future, that can be thought of as corresponding to a rapid scaling-up in aid in the form of development lending to these countries with no change in the terms of these loans. Under this scenario, the ratio of the present value of debt to exports would rise from a median of 157 percent, to a median of 299 percent for these 28 countries. Based on our estimates in Column 2 of Table 2, and assuming no change in policies or

growth performance, the estimated risk of debt distress would rise from a median of 33 (based on end-2003 data) to 52 percent. If we assume that exports in these countries grow at their historical rate over the next five years, the increase in the ratio of the present value of debt to exports would be smaller, but still very substantial, to 248 percent of exports for the median country.

This simple example illustrates our point that a large scaling-up in loan-based aid to low-income countries, without significant changes in the terms of these loans, is likely to result in sharp increases in external debt burdens and in the risk of debt distress. To avoid this, a greater role for grants will be required, and, for countries with a given quality of policies, the share of grants will need to be significantly higher where debt distress probabilities are high, and lower where distress probabilities are low. This implication is also consistent with our results in Columns (3) and (6) of Table 3 where we saw that the greater was the concessionality of debt, the lower was the risk of debt distress.

At the same time, however, we do not argue that grants should supplant loans one-for-one in nominal terms in countries where the risk of debt distress is high, for two reasons. First, replacing loans with grants equal to the face value would represent a vastly larger resource transfer than is currently envisioned by donors, and obtaining the necessary financing would be difficult. Second, such a scheme would implicitly "reward" countries implementing weak policies with more grants, and thus greater overall resource transfers, undermining efforts to target aid to countries with good policies.

One possible scheme for calibrating the share of grants without exacerbating these targetting problems would be the following three-step process. First, the total amount of new lending can be converted into its grant-equivalent from the donors' perspective, by taking the face value of the new lending and subtracting the present value of future debt service obligations. Second, this grant-equivalent could be allocated across countries following some kind of aid allocation rule that recognizes the importance of "needs" (i.e.

the prevalence of poverty), and "aid effectiveness" (i.e. a function of the quality of policies and institutions of the recipient country, as is currently done by the International Development Association (IDA), the soft-loan window of the World Bank). Third, for countries below a specified distress probability (in other words, where the capacity for servicing debt in the future is considered relatively good), this grant equivalent could be "grossed-up" into a much larger amount of concessional lending with the same grant equivalent.

Such a scheme would have a number of advantages. It would avoid the large and likely unsustainable increases in debt burdens that would follow from large-scale across-the-board new lending to low-income countries. This scheme not only ensures that resources are targetted to countries with high poverty and good policies, but also provides and additional reward for good policy. This is because countries would prefer to be able to "gross-up" as much of their grant-equivalent allocation as possible into lending, and improvements in policy can create additional "headroom" for new borrowing by lowering the probability of debt distress. Finally, this scheme also would not require any new commitments by donors to finance new grants, over and above the implicit commitment to new transfers in grant equivalent terms implicit in donors commitments to lending at existing rates of concessionality. This is because donors would be committing to the same transfer to a country whether they provide only the grant element, or they convert this grant element into loan with the same grant equivalent. If anything, the resource transfer from the perspective of the donor might be even smaller, to the extent that calibrating the fraction of loans to the probability of debt distress results in higher actual repayment rates in the future.[19]

[19] In 2005, the IMF and World Bank adopted a joint Debt Sustainability Framework for Low-Income Countries that endorsed a greater role for grants to reduce the risk of debt distress. It spelled out a set of policy-dependent debt sustainability thresholds that are based on the empirical analysis in the working paper version of this paper. IDA has chosen to implement a modified version of the proposal we advanced here and in the working paper version of this paper. The key difference however is the IDA proposal converts the full amount of proposed lending to countries at risk of debt distress into grants, less a small discount. This results in greater resource transfers to countries at risk of debt distress and so reduces the policy-selectivity of IDA resource transfers.

In summary, we have shown that the risk of debt distress depends significantly on a small set of factors: debt burdens, policies and institutions, and shocks. We have shown that this finding is robust to several robustness checks, and that our empirical model does a reasonable job of predicting future debt distress. While at some level these results should not be too surprising, they do have important implications for how resource transfers to low-income countries could be financed. Our results indicate that the probability of debt distress is already high in many low-income countries, and is likely to increase sharply if the large-scale development finance required to meet the Millenium Development Goals is provided in the form of concessional lending at historic levels of concessionality. We have also proposed a simple scheme of financing resource transfers to low-income countries in a way that controls the probability of debt distress, provides good incentives to borrowers, and does not involve additional donor commitments to finance large-scale new grants.

Appendix: Data Sources

Our debt distress indicator requires data on arrears, Paris Club deals, and IMF programs. Data on arrears are taken from the World Bank's Global Development Finance (GDF) publication. The arrears data consist of arrears to official and private creditors, and are expressed as a share of total debt outstanding. For Paris Club deals, we use the list of all deals as reported on the Paris Club website (www.clubdeparis.org). For IMF programs, we obtain data on commitments under SBA/EFF programs from the IMF's International Financial Statistics, as well as data on the size of each country's quota which we use to normalize commitments.

Our core regressions include the present value of debt as a share of exports. Data on the numerator of this measure come from Dikhanov (2003). He applies currency-, maturity-, and time-specific market interest rates to the flow of debt service obligations on a loan-by-loan basis, using data from the World Bank's Debtor Reporting System database to arrive at a historical series of present value of public and publicly-guaranteed debt for all developing countries since 1970. For the denominator we use exports in current US dollars taken from the World Development Indicators (WDI). We use the same data source to construct the growth rate of GDP in constant local currency units for our growth variable. The CPIA variable is a confidential policy assessment produced by World Bank country economists. Details on its structure, and limited disclosure of recent data, are available at www.worldbank.org. Data on the share of debt owed to official creditors, and on the share of public- and publicly-guaranteed debt in total debt (at face value) are taken from the GDF.

In our robustness checks we use the Rule of Law measure constructed by Kaufmann, Kraay, and Mastruzzi (2005). We also use countries' default history as reported by Reinhart, Rogoff, and Savastano (2003). We construct a dummy for years of high inflation using CPI inflation data obtained from the WDI, and supplemented with data on the growth rate of the GDP inflator where CPI inflation is not available. Our real exchange rate index is the bilateral real exchange rate relative to the US, using the price

index of GDP in the home country and the US. Data on these variables also come from the WDI.

References

Aylward, Lynn and Rupert Thorne (1998). "An Econometric Analysis of Countries' Repayment Performance to the International Monetary Fund". IMF Working Paper No. 98/32.

Berg, Andrew and Jeffrey Sachs (1988). "The Debt Crisis: Structural Explanations of Country Performance". Journal of Development Economics. 29(3):271-306.

Birdsall, Nancy, C. Claessens, and I. Diwan. (2003). "Policy Selectivity Foregone: Debt and Donor Behavior in Africa". World Bank Economic Review. 17(3):409-435.

Collins, Susan (2003). "Probabilities, Probits, and the Timing of Currency Crises". Manuscript, Georgetown University.

Cline, William (1984). *International Debt: Systemic Risk and Policy Response*. Institute of International Economics: Washington, DC.

Cohen, Daniel (1996). "The Sustainability of African Debt". World Bank Policy Research Department Working Paper No. 1691.

Detragiache, Enrica and Antonio Spilimbergo (2001). "Crises and Liquidity: Evidence and Interpretation". IMF Working Paper No. 01/2.

Dikhanov, Yuri (2003). "Reconstruction of Historical Present Value of Debt for Developing Countries, 1980-2001: Methodology and Calculations". Manuscript, The World Bank.

Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi (2005). "Governance Matters IV: Updated Governance Indicators for 1996-2004. World Bank Policy Research Department Working Paper No. 3630.

Lloyd-Ellis, H., G.W. McKenzie, and S.H. Thomas (1990). "Predicting the Quantity of LDC Debt Rescheduling". Economics Letters. 32(1):67-73.

Manasse, Paolo, Nouriel Roubini, and Axel Schimmelpfenning (2003). "Predicting Soverign Debt Crises". Manuscript, University of Bologna, IMF and New York University.

McFadden, Daniel, Richard Eckaus, Gershon Feder, Vassilis Hajivassiliou and Stephen O'Connell (1985). "Is There Life After Debt? An Econometric Analysis of the

Creditworthiness of Developing Countries", in Gordon Smith and John Cuddington, eds., *International Debt and the Developing Countries*. World Bank: Washington, DC.

McKenzie, David (2004). "An Econometric Analysis of IBRD Creditworthiness". International Economic Journal. 18(4):427-448

Raddatz, Claudio (2005). "Are External Shocks Responsible for the Instability of Output in Low-Income Countries?". Manuscript, The World Bank.

Reinhart, Carmen, Kenneth Rogoff, and Miguel Savastano (2003). "Debt Intolerance". Brookings Papers on Economic Activity, forthcoming.

Reinhart, Carmen (2002). "Default, Currency Crises, and Sovereign Credit Ratings". World Bank Economic Review. 16(2):151-170.

Underwood (1990). "The Sustainability of International Debt". Manuscript, The World Bank.

Wooldridge, Jeffrey (2002). "Simple Solutions to the Initial Conditions Problem in Dynamic, Nonlinear Panel Data Models with Unobserved Heterogeneity". Manuscript, Michigan State University.

World Bank (2003). "Annual Report: Special Purpose Financial Statements and Internal Control Reports of the International Development Association". Washington: The World Bank.

Figure 1: Identifying Debt Distress Events: Example of Kenya

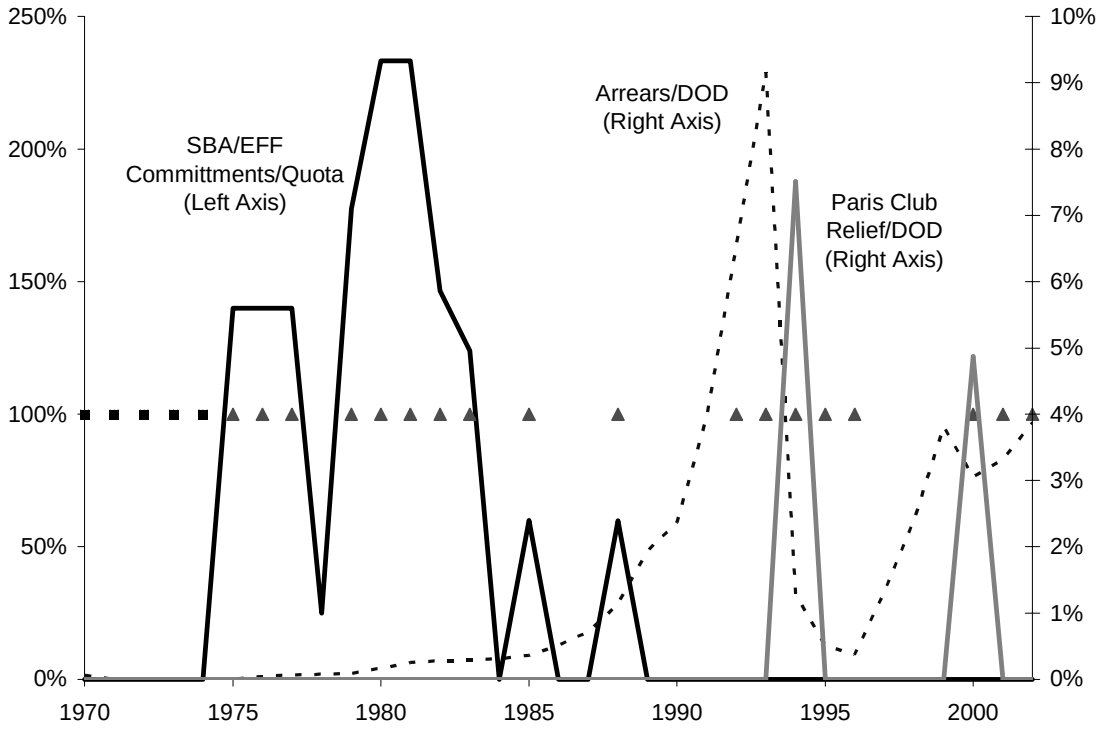
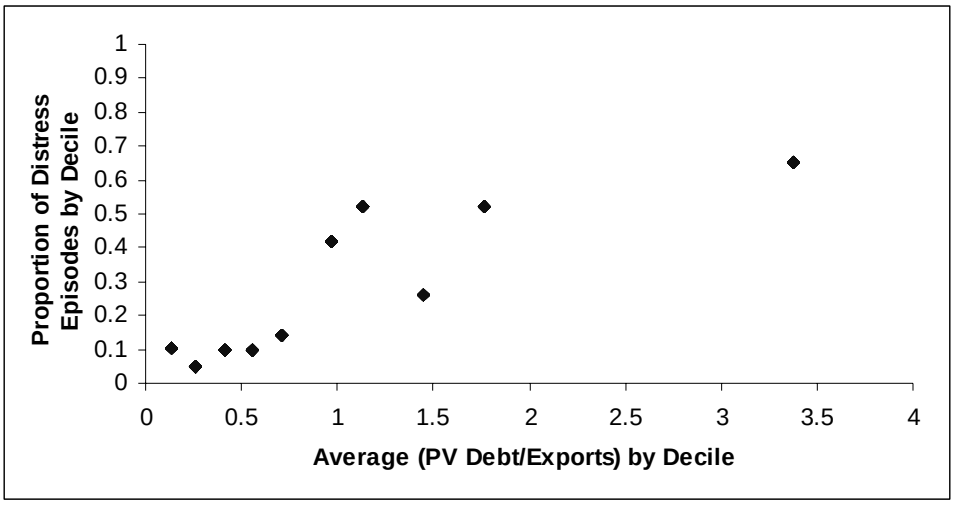
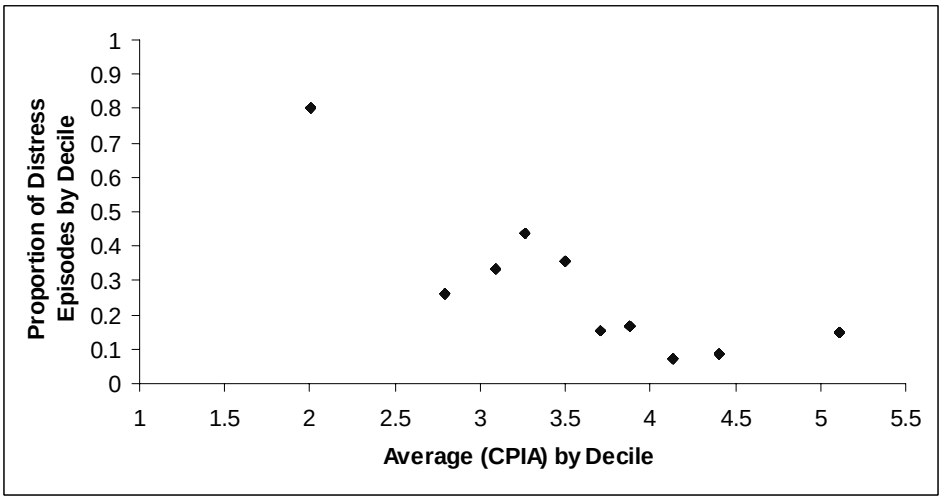


Figure 2: Correlates of Debt Distress





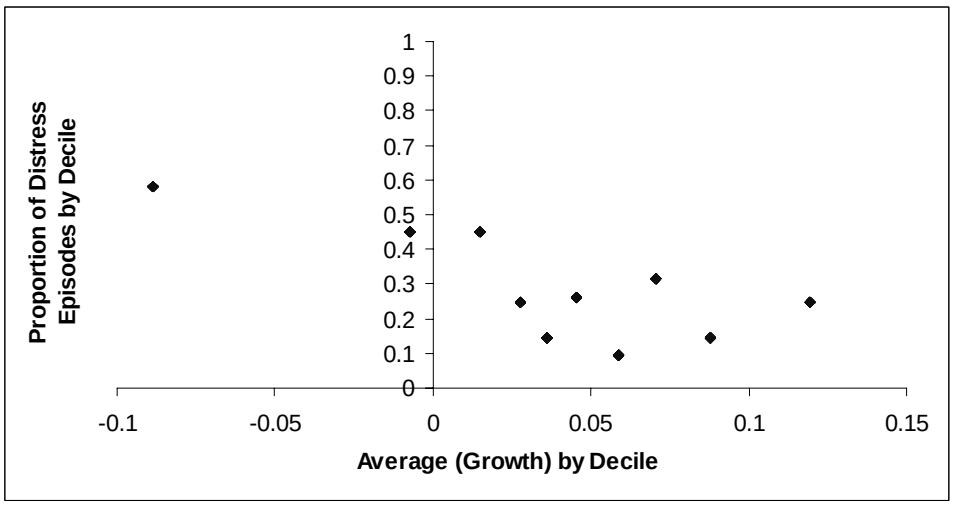
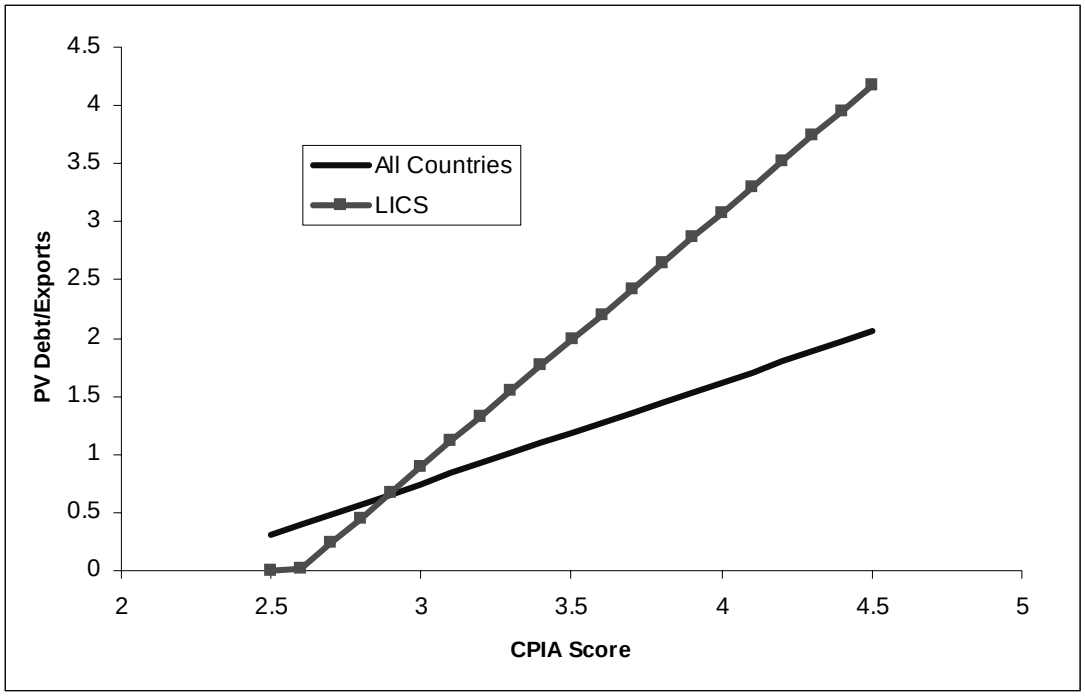


Figure 3: Policies and Debt Distress



.

Table 1: Distress Episodes

Albania	1992-2002	Ecuador	1983-1996	Malawi	1979-1985
Argentina	1983-1995	Ecuador	2000-2002	Niger	1983-1990
Burundi	1998-2002	Egypt, Arab Rep.	1984-1995	Nigeria	1986-2002
Benin	1983-1998	Ethiopia	1991-2002	Nicaragua	1983-2002
Burkina Faso	1987-1998	Ghana	1996-1998	Pakistan	1980-1983
Bangladesh	1979-1981	Guinea-Bissau	1981-2002	Pakistan	1995-2002
Bulgaria	1991-2000	Guyana	1978-2002	Paraguay	1986-1994
Brazil	1983-1985	Honduras	1979-2001	Rwanda	1994-2002
Brazil	1998-2002	Haiti	1978-1980	Senegal	1980-2002
Chile	1983-1989	Indonesia	1997-2002	El Salvador	1990-1992
Cote d'Ivoire	1981-1996	India	1981-1983	Somalia	1981-2002
Cameroon	1987-2002	Jordan	1989-2002	Seychelles	1990-2002
Congo, Rep.	1985-2002	Kenya	1992-1996	Thailand	1997-1999
Colombia	1999-2001	Kenya	2000-2002	Trinidad and Tobago	1988-1992
Comoros	1987-2002	Cambodia	1989-2002	Tunisia	1986-1991
Cape Verde	1988-2002	Liberia	1980-2002	Turkey	1978-1984
Costa Rica	1980-1995	Morocco	1980-1994	Turkey	1999-2002
Dominican Republic	1983-1999	Madagascar	1980-2002	Uruguay	1983-1986
Algeria	1994-1997	Mexico	1983-1992	Vietnam	1988-2002
				Zimbabwe	2000-2002

Means of Key Variables in Normal Times and Distress Events

	All Observations		LICs		MICs	
	Normal	**Distress**	**Normal**	**Distress**	**Normal**	**Distress**
Average Length of Episode	5.000	10.845	5.000	12.594	5.000	8.692
Average During Episode of:						
Arrears/Debt	0.006	0.094	0.005	0.133	0.006	0.046
Paris Club Relief/Debt	0.000	0.017	0.000	0.018	0.000	0.016
SBAEFF/Quota	0.031	0.988	0.036	0.523	0.027	1.559
Net Transfers/GDP	0.014	0.005	0.031	0.021	0.005	-0.014
Value Before Episode of:						
PV Debt/Exports	0.818	1.724	1.089	1.956	0.666	1.440
CPIA	3.789	3.084	3.489	2.849	3.957	3.374
Growth	0.047	0.012	0.043	0.028	0.050	-0.007

Table 2: Basic Results

Sample	(1) All	(2) LIC(a)	(3) MIC(a)
PV Debt / Exports	0.644	0.143	0.262
	(0.152)***	(0.074)*	(0.060)***
CPIA	-0.557	-0.311	-0.020
	(0.142)***	(0.091)***	(0.051)
Real GDP Growth	-4.620	-0.930	-2.080
	(2.085)**	(1.199)	(0.749)***
Constant	0.821	1.911	-1.375
	(0.512)	(0.789)**	(0.925)
Observations	200	83	117
Out-of-Sample Predictive Power (Fraction of events correctly predicted)			
All Events	0.71	0.75	0.78
Distress Events	0.74	0.56	0.70
Normal Times Events	0.70	0.83	0.80

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
(a) Marginal effects rather than slope coefficients are reported for first three variables in order to facilitate comparison of magnitude of estimated effects between these two columns.

Table 3: Does The Type of Debt Matter?

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	All	All		LIC	LIC	
PV Debt / Exports	1.062	0.620	0.796	0.917	0.408	0.590
	(0.219)***	(0.167)***	(0.186)***	(0.379)**	(0.225)*	(0.272)**
CPIA	-0.534	-0.621	-0.572	-1.254	-0.909	-0.961
	(0.166)***	(0.164)***	(0.193)***	(0.427)***	(0.281)***	(0.363)***
Real GDP Growth	-5.166	-3.590	-4.667	-2.276	-3.557	-2.758
	(2.655)*	(2.520)	(2.588)*	(4.474)	(3.769)	(3.859)
PPG Share of Debt	-3.330			-6.151		
	(0.774)***			(2.015)***		
Share of Debt Owed to Official Creditors		-1.280			-1.642	
		(0.466)***			(0.963)*	
Concessionality (1-PV/Nominal Debt)			-2.125			-3.129
			(0.833)**			(1.279)**
Constant	2.627	1.833	1.064	7.452	3.479	3.080
	(0.793)***	(0.741)**	(0.780)	(2.383)***	(1.290)***	(1.414)**
Observations	167	167	154	64	64	62

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Role of Policies and Shocks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Sample	All	All	All	LIC	LIC	LIC	All	All	All	LIC	LIC
PV Debt / Exports	0.644 (0.151)***	0.655 (0.156)***	0.654 (0.153)***	0.373 (0.187)**	0.369 (0.186)**	0.368 (0.188)*	0.594 (0.156)*	0.644 (0.148)***	0.656 (0.158)***	0.419 (0.186)**	0.367 (0.203)*
CPIA		-4.994 (2.131)**	-0.533 (0.142)***		-2.086 (3.307)	-0.811 (0.234)***	-0.573 (0.145)***	-0.526 (0.146)***	-0.597 (0.161)***	-0.698 (0.248)***	-0.801 (0.264)***
Real GDP Growth	-5.381 (2.235)**	-0.556 (0.155)***	-3.755 (2.140)*	-2.416 (3.110)	-0.789 (0.241)***	-2.506 (3.148)	-4.740 (2.128)**				
Thrice-Lagged CPIA	-0.384 (0.189)***			-0.808 (0.234)***							
Rule of Law		0.014 (0.176)			-0.097 (0.332)						
High Inflation			0.997 (0.667)			-0.222 (1.206)					
Default History							2.101 (0.826)**				
Growth in RXR								-0.361 (0.909)		-1.979 (1.497)	
Growth in TOT									-0.321 (1.438)		-0.090 (1.565)
Constant	0.194 (0.531)	0.833 (0.566)	0.613 (0.528)	1.912 (0.789)**	1.770 (0.923)*	1.947 (0.811)**	0.809 (0.520)	0.535 (0.543)	0.833 (0.615)	1.376 (0.829)*	1.878 (0.899)**
Observations	190	200	199	200	83	83	200	194	175	81	69

Standard errors in parentheses
*** significant at 10%; ** significant at 5%; *** significant at 1%**

Table 5: Dynamic Probit Results

	(1)	(2)
Sample	All	LIC
Lagged Dependent Variable	-0.641	-0.311
	(0.451)	(0.736)
PV Debt / Exports	0.628	0.557
	(0.256)**	(0.334)*
CPIA	-0.522	-1.486
	(0.260)**	(0.520)***
Real GDP Growth	-8.237	-6.122
	(3.407)**	(5.791)
Initial Dependent Variable	0.031	0.381
	(0.502)	(0.808)
Average(PV Debt/Exports)	0.152	-0.323
	(0.363)	(0.409)
Average(CPIA)	-0.153	0.700
	(0.326)	(0.560)
Average(Real GDP Growth)	5.839	2.701
	(4.729)	(7.612)
Constant	1.100	2.094
	(0.859)	(1.408)
Observations	191	78
Number of Countries	87	39

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%