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WHY DO MORE OPEN ECONOMIES HAVE BIGGER GOVERNMENTS?

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ABSTRACT

This paper demonstrates that there is a robust empirical association between the extent to which an economy is exposed to trade and the size of its government sector. This association holds for a large cross-section of countries, in low- as well as high-income samples, and is robust to the inclusion of a wide range of controls. The explanation appears to be that government consumption plays a risk-reducing role in economies exposed to a significant amount of external risk. When openness is interacted with explicit measures of external risk, such as terms-of-trade uncertainty and product concentration of exports, it is the interaction terms that enter significantly, and the openness term loses its significance (or turns negative). The paper also demonstrates that government consumption is the "safe" activity, in the empirically relevant sense, in the vast majority of countries.

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I. Introduction

The title of this paper should come as a surprise to most economists. That there exists an empirical association between openness and the scope of government is not well known. In fact, it is far from obvious that there should be any such association at all. Moreover, once informed about this empirical regularity, most economists would guess that the correlation is a negative rather than positive one--that is, they would expect the size of government to be smaller in more open economies. This for two reasons mainly. First, societies which choose to open their economies to international trade are likely to have a predilection in favor of free markets, and hence should also prefer smaller government. Second, it is widely presumed that the effectiveness of government intervention is considerably lower in economies that are highly integrated with the world economy, which should also make for smaller government in more open economies.

This paper demonstrates the following. First, there is a positive and robust partial correlation between openness, as measured by the share of trade in GDP, and the scope of government, as measured by the share of government expenditure in GDP. The correlation is robust in the sense that: (a) it is unaffected by the inclusion of other control variables; (b) it exists for measures of government spending drawn from all available datasets; (c) it prevails for both low- and high-income countries; and (d) it is not an artifact created by outliers. In addition, openness in the early 1960s is a statistically significant predictor of the expansion of government consumption over the subsequent three decades.

Second, I show that the explanation that best fits this evidence is one that focusses on the role of external risk. Government consumption appears to play an insulating role in economies subject to external shocks. Societies seem to demand (and receive) a larger government sector as the price for accepting larger doses of external risk. The evidence in favor of this explanation comes from regressions in which openness is interacted with two measures of

external risk, volatility of the terms of trade and the product concentration of exports. In each case, the interaction term is strongly significant (and the fit of the regression improves) while the coefficient on openness per se turns either statistically insignificant or negative when it is significant. Hence, unlike alternative explanations for the empirical association which, as I show below, can be easily dismissed, this one receives considerable support.

The validity of the key hypothesis advanced in this paper hinges on two other presumptions. One is that increases in external risk do lead to greater income volatility. The second is that a larger share of government purchases of goods and services in GDP does reduce income volatility. Neither of these statements is obvious. As a logical matter, it is entirely possible that the converse of these statements would be true. However, I will provide evidence in favor of these two presumptions. I will show that countries facing greater external risk do indeed experience greater volatility not only in their terms-of-trade adjusted GDP, but also in their GDP and in their GDP net of government consumption. Second, I will show that for the overwhelming majority of countries, a small (permanent) increase in the share of government consumption would result in a decline in their volatility of income. These findings add strength to the central conclusion of this paper.

An important precursor to this paper is a study by David Cameron published in 1978. In that study, Cameron (1978) showed that the best single predictor of the increase in an OECD government's tax revenue (as a share of GDP) between 1960 and 1975 was the economy's openness (exports plus imports divided by GDP) in 1960, with a correlation coefficient of 0.78. Cameron argued that more open economies have higher rates of industrial concentration, which tends to foster higher unionization, greater scope for collective bargaining, and stronger labor confederations. These in turn result in larger demands for government transfers--social security, pensions, unemployment insurance, job training, etc--which mitigate external risk. However, Cameron's study was limited to 18 OECD countries. The small number of observations in such a

sample creates problems for distinguishing among alternative hypotheses. For example, empirically it is impossible to tell apart Cameron's hypothesis from one that relates the scope of government to a third variable, country size. Small countries like the Netherlands, Norway, and Belgium trade more and tend to have larger governments. Openness and country size are too collinear in the OECD sample to determine which one of the two is the driving force behind the expansion of the public sector.

In addition, Cameron's specific arguments are probably too specialized to be relevant to our 100-plus country sample. In particular, it is not plausible to attach such importance to the role of labor organizations in most developing countries. Note, in any case, that the empirical relationship between openness and government spending holds for government consumption as well, and not just for transfers. Nonetheless, the hypothesis advanced here is consistent with the idea, considered also by Cameron, that public spending is a risk-reducing instrument on which there is greater reliance in more open economies.[1]

Even though the correlation between openness and government spending exists for most categories of expenditures--interest payments on the public debt seem to be the only significant exception--I focus in this paper mostly on government consumption. The reason is that I can rely on the Heston-Summers measures of government consumption (from the national income accounts) which have a number of advantages. Since they are adjusted for purchasing-power differences across countries, these data are more reliable for purposes of cross-country comparison than are, say, World Bank data on broader government expenditures. Also, the Heston-Summers data are available for a large number of countries and go back more than three decades.

The plan of the paper is as follows. Section II demonstrates the close association

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[1]A related idea has been developed by Bates, Brock, and Tiefenthaler (1991). These authors argue that greater terms-of-trade risk increases the likelihood that a country will raise trade barriers. In addition, they suggest that the availability of social insurance programs reduces this likelihood.

between openness and various measures of government spending. Focussing on government consumption, section III then analyzes the robustness of the association as well as testing for (and dismissing) some alternative explanations for the association. Section IV provides evidence in favor of the central hypothesis of the paper, namely that government consumption plays a sheltering or insulating role to counter external risk. Sections V and VI are concerned with two subsidiary hypotheses in turn: that external risk increases total income (and consumption) risk, and that a larger government share in GDP helps stabilize income. Section VII shows that the paper's central argument is valid for both the "exogenous" and "policy" components of openness (and external risk). Section VIII concludes.

II. The Evidence

Figure 1 shows the simple relationship between openness and government spending in the sample of 23 OECD countries. The vertical axis represents total government spending as a share of GDP, excluding interest payments, averaged over the 1990-92 period. Along the horizontal axis is shown the share of exports plus imports in GDP, averaged over the decade 1980-1989. Note that our measure of openness is calculated over the decade prior to the dates for government spending since the causality is assumed to go from openness to size of government. This is the convention I will follow throughout the paper. (Of course, since openness changes generally slowly, the results would be unaffected had we looked at contemporaneous measures of openness.) Data are from the World Bank's World Data 1995 for government spending, and from Penn World Tables 5.6 for openness.

The figure reveals an unmistakable positive association between openness and size of government. A semi-logarithmic regression equation fits the data extremely well, explaining 44 percent of the cross-country variance in government expenditures. At one end of the distribution we have the United States and Japan, which have the lowest trade shares in GDP and (along with Turkey and Canada) the lowest shares of government spending. At the other end we have

Luxembourg, Belgium, and the Netherlands with very high degrees of openness and large government. Aside from the Cameron (1978) paper already mentioned, earlier studies that have found a correlation between openness and the size of the public economy for the OECD countries include Schmidt (1983) and OECD (1985). Figure 1 shows that the correlation continued to hold as of the early 1990s.

Most economists would react to the above finding by expressing suspicion that the association between openness and the scope of government is a spurious one. Indeed, the OECD evidence is fragile against alternative hypotheses, such as: (a) small countries have larger government shares and are at the same time more open; or (b) European countries have large government sectors (for social and cultural reasons) and are also more open due to the presence of a common market among members of the European Union. The small sample rules out testing these various hypotheses against each other. For example, when population and a dummy for European countries is added to the regression for the OECD sample, the coefficient on openness remains significant only at 10 percent level.

For these reasons, we now turn to a much larger sample of countries. As explained in the introduction, my preferred measure of government for the broader sample is real government consumption from the Penn World Tables. These data have a couple of advantages. They are available in electronic form for a much larger group of countries than the World Bank data. In addition, they are in principle free of biases arising from cross-country differences in the relative price of government purchases. Two countries with identical levels of real government purchases will otherwise appear to have very different shares of government in GDP if the price index for such purchases relative to the GDP deflator differs. The disadvantage is that this measure of government includes only consumption, and excludes government transfers and public investment. I show results for public investment as well in passing, for comparison purposes. Results for more disaggregated levels of government spending--including transfers--

will be shown later.

Previous studies on the determinants of government spending in large cross-sections of countries have focussed on a number of explanatory variables. According to Wagner's "law," for example, the demand for government services is income elastic, so that the share of government consumption in GDP is expected to rise with income. Other variables typically considered are demographic and structural conditions. See for example Tait and Heller (1982), Ram (1987), and Heller and Diamond (1990).[2] In light of these studies, our benchmark regression includes the following explanatory variables in addition to openness: per-capita GDP (GDPSH5xx); the dependency ratio in the population (DEPEND90); the urbanization rate (URBAN90); a dummy for socialist countries (SOC); a dummy for OECD members (OECD); and dummies for geographical regions (LAAM, ASIAE, SAFRICA for Latin America, East Asia, and sub-saharan Africa, respectively). These variables were selected after some experimentation to achieve the best overall fit for the regression (but without regard for the significance of the coefficient on openness), within the constraints of data availability. In addition to the variables just discussed, the regressions also include a measure of openness (OPENAVGxxxx), which is the ratio of trade (sum of imports and exports) to GDP, averaged over the prior decade. Aside from the Penn World Tables, Barro and Lee (1994) and the World Bank's World Data 1995 are the main sources for the data. More detail on the sources is provided in the appendix.

The dependent variable in most of these regressions is a three- or five-year average of real government consumption (as a share of GDP) expressed in international prices (CGAVGxxxx). The sample consists of all countries included in the Penn World Tables (version 5.6a) for which the requisite data exist. I have excluded observations for which the openness ratio exceeds 200 percent. This cutoff has very little significance for the actual results as it leads

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[2]The share of foreign trade in GDP was one of the variables included in the Heller and Diamond (1990) study, but the authors do not report their results because they apparently found the coefficient on this variable to be statistically insignificant.

to the exclusion of only one observation, that of Hong Kong for the 1990-92 regressions.

Table 1 displays the benchmark results. The first two columns relate shares of government consumption in GDP to the previous decade's openness during two periods, 1990-92 and 1985-89. I present results for the 1985-89 period alongside those for 1990-92 because the number of observations is larger for the earlier period (125 versus 103). The fit of the regressions is generally good, with an adjusted R^2 of 0.43-0.46. Contrary to Wagner's law, per-capita income enters with a negative sign as a determinant of government consumption in both periods, but is only statistically significant at the 90 percent level in 1985-89. The dependency ratio enters positively and is statistically significant at the 99 percent for both periods. Urbanization enters negatively and is significant at the 95 percent level in 1990-92 and the 90 percent level in 1985-89. The dummy for socialist countries has a positive coefficient, but is not significant at conventional levels. Neither is the dummy for OECD countries. The regional dummies are all statistically significant at the 95 percent level in 1985-89, but not in 1990-92.

We are mainly interested in the estimated coefficient on openness. This coefficient turns out to be positive and highly significant in both cases--at the 99.9 percent level of confidence in fact! The estimated elasticity is a bit larger than 0.2, implying that a share of total trade (exports plus imports) in GDP that is larger by 10 percent is associated in our cross-country sample with a share of government consumption in GDP that is higher by 2 percent. Perhaps a better sense of the quantitative significance of this elasticity can be obtained from the following calculation. The median shares of government consumption and openness in our sample are around 18 percent and 60 percent, respectively. A country whose openness was 80 percent (an increase of 33.3% from the median, corresponding to an increase in the share of imports by 10% of GDP), would be expected to have a level government consumption which was larger than the median by 1.2 percent of GDP (0.333x0.2x0.18)--an increase from 18 to 19.2 percent of GDP. Whether this is a large or modest effect can be debated, but it is relatively tightly estimated. A 95 percent

confidence interval from the 1990-92 regression would place the "true" elasticity between 0.095 and 0.351.

The next two columns show regressions where the dependent variable is now government investment (as a share of GDP). The same set of independent variables as before is used, and results are reported for both 1990-92 and 1985-89. The data, which come from the World Data 1995 of the World Bank are available for a smaller group of countries and have the relative-price problem noted before. Nonetheless the results are interesting, and provide a useful complement to those for government consumption. The estimated coefficients on openness are positive and statistically significant as before (but only at the 95 percent level for 1985-89). Moreover, they are quite a bit larger in magnitude--0.53 and 0.83 respectively. The 1985-89 regression has a very low R^2, and openness and the socialist dummy are the only variables that enter significantly (the latter only at the 90 percent level).

In column (5) of Table 1 we look to see if openness can also explain the increase in government consumption. The dependent variable here is the ratio of the government consumption share in GDP in 1990-92 to that in 1960-64. For most countries, this ratio is greater than one, indicating an increase in government in the last three decades. The independent variables include the initial share of government consumption as well as initial openness (in 1960-64). The adjusted R^2 of the regression is quite respectable at 0.67. The estimated coefficient on initial government is strongly negative, implying a (conditional) convergence effect on government spending. More importantly from our perspective, the estimated coefficient on initial openness is positive and significant at the 99 percent level. Hence, not only is openness an important determinant of government consumption levels across countries, openness in the early 1960s turns out to be a significant predictor of the expansion of government consumption in the subsequent three decades. This is a rather remarkable finding in light of the diversity that characterizes the 100 odd countries in our sample.

The final column of Table 1 repeats the previous regression replacing the increase in government consumption with the increase in openness as the dependent variable. The point of this exercise is to check whether the previous regressions may have been capturing the effect of government spending on openness, rather than vice versa. However, it turns out that the level of government consumption in 1960-64 has no predictive power for the increase in openness over the following three decades. The estimated coefficient on government consumption in 1960-64 is actually negative (but far from significant). It seems that it is openness early on that determines subsequent size of government, not the other way around.

Using World Bank data, Table 2 shows the relationship between openness and disaggregated categories of government spending. The spending data here are for 1985-89 since the sample becomes considerably smaller for the 1990-92 period. The evidence shows that openness exerts a statistically significant positive effect on most types of government spending, including general public services, education, health, housing and community amenities, and economic affairs and services. The estimated coefficients are generally significant at the 99 percent level of confidence. Openness does not enter significantly in the 1985-89 regression for social security and welfare spending, but does so in the 1990-92 regression (not shown). The only major spending item which does not exhibit a correlation with openness in either period is interest payments on the public debt. More detail on the disaggregated data is provided in Rodrik (1995).

Finally, we note in passing that the close link between openness and government size is one that apparently exists in all available data sets. These cover the Penn World Tables and the World Bank's World Data 1995, as noted above. In addition, UNESCO data on government spending on education exhibit a strong positive correlation with openness. The same is true for IMF data on government revenue as well: more open economies have larger tax/GDP ratios, holding other characteristics constant (see also Tanzi 1992). See Rodrik (1995) for an analysis

that covers these additional data sources. Measures of government size based on indicators other than spending or revenue are scarce. However, data from a recently compiled data base (the World Bank Labor Market Data Base) reveals that general government employment (as a share of the labor force) is also positively correlated with openness, again holding other things constant (Rodrik 1996).

III. Probing Deeper: Some Hypotheses and Checks of Robustness

We next turn to the question of how robust the association between openness and the scope of government is. One aspect of robustness has already been discussed above: the correlation spans a wide range of data sets and exists for different measures of government size. In this section we will experiment with various versions of the benchmark regressions reported in Table 1, and in doing so also check for the validity of some possible explanations for the association in question.

Table 3 reports the results of various experiments with the benchmark specification. We use the 1985-89 benchmark for government consumption, as this covers the maximum number of countries (125). The first column of Table 3 reproduces the coefficient estimate on the openness variable from column (2) of Table 1, for comparison purposes. Note that these regressions all include the complete set of independent variables considered in Table 1,[3] but the estimates for the other independent variables are not shown in the table to avoid clutter.

The next two columns of the table show the results of splitting the sample into two sub-samples of roughly equal size according to level of income, using $2500 in 1985 dollars as the cutoff. The coefficient on openness is virtually identical for the two income groups, and it remains statistically significant at the 99 percent level for both sub-samples. Hence the relationship between openness and government consumption exists for both rich and poor

[3]A slight caveat: the OECD dummy could not be included in the regression reported in column (2) because there are no OECD countries with per-capita GDP below $2500.

countries.

The remaining columns (except for the last) check whether the coefficient on openness remains stable and statistically significant when additional candidate explanatory variables are included in the regression. We first consider the possible influence of country size. Columns (4) and (5) experiment with two different measures of country size: land area (AREA) and population (POP85). (Note that since all variables are included in logs, and per-capita income is already a regressor, there is no point in including total GDP once population has already been tried.) The idea behind including these variables is to test whether the observed correlation between openness and government size is due to the following possibility: Assume that the provision of public services is subject to significant indivisibilities--e.g., every country, regardless of size, needs one parliament. Then government size as a share of GDP will be negatively correlated, ceteris paribus, with country size. Since openness is negatively correlated with country size as well, the observed association between openness and government spending could be spurious and due to the omission of a size variable. However, there is no evidence that something like this is at work here. Both of the size variables enter with a positive sign, and the estimated coefficient on land area is actually highly significant. In both cases, the coefficient on openness remains statistically significant. With land included, the openness coefficient actually increases in magnitude significantly (to 0.34).

Column (6) checks for the possibility that openness increases government spending by enhancing the economy's ability to borrow from external sources. If the penalty to be suffered by a sovereign debtor (from trade sanctions, say) increases with the economy's dependence on trade, which seems plausible, external credit rationing will tend to be less binding in more open economies. In such economies, then, the government can borrow more and spend more, assuming that it views spending as inherently desirable. To control for this possibility, the debt-GNP ratio is included as an independent variable (DETGNP85). The estimated coefficient on the

debt-GNP ratio is positive and significant at the 90 percent level, so there is some support for the theoretical prediction. However, the coefficient on openness remains unchanged and highly significant.

Another hypothesis is that more open economies may have lower inflation and, because of that, a larger tax base. Under high inflation conditions, the government's tax base erodes both as a result of delays in tax payments in unindexed systems (the Olivera-Tanzi effect) and as a consequence of the shrinkage of the formal sector at the expense of the informal sector. The regression in column (7) includes a measure of inflation on the right-hand side--the depreciation of the currency between 1970 and 1985--to check for this possibility (XR85/XR70). The coefficient on currency depreciation turns out to be insignificant, while the coefficient on openness remains unaffected.

The final hypothesis we consider is that trade itself may be a convenient tax handle for governments in poor countries which have difficulty raising taxes from other sources. Openness may then allow for higher levels of government spending by allowing higher level of tax revenues. Restricting the sample now to developing countries, for which the hypothesis is primarily relevant, we check whether openness exerts an effect on government consumption, once the level of trade taxes is controlled for. Column (8) shows the result of including trade tax revenues (as a share of GDP) as an additional independent variable (INTL8688). This variable covers all revenue from trade sources, including import duties and export taxes. The estimated coefficient on it turns out to be negative (and statistically significant at the 90 percent confidence level). The coefficient on openness increases in magnitude and remains highly significant. While the sign on trade taxes may be surprising, what seems to be going on is the following: governments that raise a lot of revenue from trade (even after controlling for per-capita income) tend to have very few other tax handles, and therefore their ability to spend tends to be severely restricted. Further evidence for this interpretation comes from column (9), which includes the share of trade taxes in

all tax revenues on the right-hand side (INTL8688/TOTAL8688). The estimated coefficient on this variable is negative and significant at the 99 percent level. Including this particular variable in the regression also results in raising the t-statistic on the openness elasticity to above 5!

Finally, should we worry about outliers? The short answer is no. Figure 2 displays the partial relationship between openness and government consumption--partial in the sense that other determinants of government consumption are controlled for--generated by the regression in column (4) of Table 3. There are 115 countries in this figure, and some of them have been identified by country codes to give the reader a sense of where different countries stand. The figure is a good way of summing up what we have so learned so far: there is a tight and robust empirical association between openness to trade and government consumption (as a share of GDP) in a large cross-section of countries. Further, the figure makes clear that the result is by no means driven by the presence of outliers: the 115-country sample covers practically the full range of our measures of openness and government consumption.

IV. A Possible Explanation: Government as Shelter from External Risk

I hope to have convinced the reader by this point that the statistical association between openness and government spending is a genuine one. It is not a spurious relationship generated by omitted variables. Nor is it an artifact of the sample of countries selected or of a specific data source. The question is why this relationship exists.

One possible answer, which I will show below is consistent with the evidence, is the following. More open economies have greater exposure to the risks emanating from turbulence in world markets. We can view larger government spending in such economies as performing an insulation function, insofar as the government sector is the "safe" sector (in terms of employment and purchases from the rest of the economy) relative to other activities, and especially compared to tradables. Hence in countries significantly affected by external shocks the government can

mitigate risk by taking command of a larger share of the economy's resources.

To fix ideas, consider the following model. Divide the economy into three sectors: private tradables, private non-tradables, and the government sector. Think of an extended household in this economy as having claims on income streams from each of these three types of activities. The larger the share of government consumption in the economy (λ), the larger the share of the household's total income that derives from the government sector. Now assume that the government sector is the "safe" sector. I will elaborate below on what the empirically relevant meaning of this is, but for the moment just assume that employment and incomes in the government sector are stable and uncorrelated with any of the shocks to which the economy is subjected. Under these circumstances, some of the riskiness in the household's income due to external shocks can be mitigated by having a larger government sector. And if the government acts as the agent of households which dislike risk, it will choose to consume a greater share of the society's resources in economies that are subject to greater amounts of external risk.

In principle, external risk should be diversifiable for small countries through participation in international capital markets. In practice, this does not prove possible, either because full capital market openness conflicts with other objectives of government policy or because incentive and sovereign-risk problems restrict the range and extent of financial instruments available to countries and their governments. One might also object that the government's risk-reducing role could be best played through the establishment of a safety net, in which case it would show up only in government spending on social security and welfare, and not at all in government consumption. However, social security systems are difficult to set up even in the most advanced countries, and it stands to reason that the developing countries which predominate in our cross section would rely on a broader set of instrumentalities to achieve risk reduction.

Even accepting that full diversification through participation in international capital

markets is realistically not possible, the story outlined above makes two leaps of faith. One is that economies subject to greater amounts of external risk necessarily experience more risk in total income as well, the latter being what really matters to the representative household. The second is that the government sector is "safe" in the sense that an expansion in it would reduce aggregate income risk. Neither of these propositions is obvious, but I will present evidence below that suggests they are not too far off the mark as an empirical matter. For the moment we turn to examining in greater detail the implications of the hypothesis stated above.

A test of the hypothesis would be to check whether the relationship between openness and government consumption is stronger in economies which are likely to be exposed to greater external risk, holding the ratio of trade to GDP itself constant. The question is whether there exist empirical proxies for the extent of external risk countries are exposed to, aside, of course, from openness itself. There are two such measures which I use here.

One is terms-of trade risk, which is an obvious measure of price risk. In a well-functioning economy where all adjustments take place through prices (rather than quantities), a measure of the volatility of the streams of income associated with fluctuations in the external terms of trade would not only be the theoretically appropriate measure of external risk, it would be the only relevant measure of such risk. More formally, let x, m, and y stand for volumes of exports, imports and GDP, respectively. Let π be the natural logarithm of the price of exports relative to imports (the terms of trade). Let the log of the terms of trade follow a random walk, possibly with drift (a hypothesis which cannot be rejected for most countries). The unanticipated component of the income effects of a terms of trade change can then be expressed (as a percentage of GDP) as $\frac{1}{2}[(x+m)/y][d\pi - \alpha]$, where α is the trend growth rate in the terms of trade. The standard deviation of this is $\frac{1}{2}[(x+m)/y] \times$ st.dev.$(d\pi)$. Hence, interacting our measure of openness ($[x+m]/y$) with the standard deviation of the first (log) differences in the terms of trade gives us (twice) the appropriate measure of external risk.

The second measure I use is a quantity-based measure, and it is an index of the product concentration of exports. More specifically, it is a Gini-Hirschman index of concentration defined over 239 three-digit SITC categories of exports, as calculated by UNCTAD. Countries which export only a few commodities are presumably more exposed to external risk than countries with a diversified set of exports, in a way that need not necessarily show in fluctuations in the terms of trade. So the second measure of external risk is generated by interacting openness with this concentration index. In practice, however, the two measures turn out to be very closely related (with a correlation coefficient close to 0.8).

The basic strategy in the next set of regressions, then, is to interact with openness (a) the terms-of-trade variability, and (b) the product concentration of exports to see whether the inclusion of these additional variables results in statistically significant coefficients and improves the fit of the regressions. We first show the results for the 1990-92 sample. The first column of Table 4 is the benchmark regression for government consumption, with the sample now restricted to the 92 countries for which data on the terms of trade and export concentration (as well as all the previous variables) are available. The purpose of this first column is to facilitate comparison with the new regressions in the rest of the table. (Note that OPENAVG8089 is not in logs in this version of the benchmark, to allow for the inclusion of new variables both in themselves and in interaction with openness.)

Column (2) of the table displays the results when the export concentration index (CI90) is added to the regression, both individually and interacted with openness. We note that the adjusted R^2 rises somewhat, and that as predicted by the risk-mitigating hypothesis discussed above, the coefficient on the interaction term is positive and statistically significant at the 95 percent confidence level. Equally important, the coefficient on openness alone has now become completely insignificant. Hence we have rather clear confirmation that the effect of openness on government consumption is strongest in countries with more concentrated exports.

The results with the terms-of-trade risk (TOTDLOGSTD) are even more striking (column 3). When this variable is included, the improvement in the fit of the regression is sizable (with the adjusted R^2 rising from 0.395 to 0.445). The interaction term is significant at the 99 percent level, while the estimated coefficient on openness alone now turns negative. These results are particularly encouraging in light of the fact that, as discussed above, this particular interaction term is the theoretically appropriate measure of external risk for an open economy. In fact when the terms of trade and export concentration measures of risk are included simultaneously in the regression (column 4), it is terms-of-trade risk that does all the work--despite the high correlation between the two.

The remaining two columns of Table 4 are aimed at dispelling any doubts in the reader's mind that our measures of external risk may be proxying for low income. It is the case that both terms of trade instability and export concentration are negatively correlated with per-capita income, which raises the possibility that our interaction terms are simply capturing a non-linearity related to income. However, when per-capita income is interacted with openness and added to the regressions, the results reported above do not change (column 5 and 6). The coefficients on the external risk variables are robust to this change in the specification.

The same exercise is repeated for the 1985-89 sample in Table 5. This earlier sample gives us a handful of additional observations (with N rising from 92 to 105). These results are stronger and even more favorable to the hypothesis. Including explicit measures of external risk improves the fit of the regressions significantly. The interaction variables are statistically significant at the 99 percent level, and once again there is strong indication that it is terms-of-trade risk which is the operative channel. Once terms-of-trade risk is controlled for, the estimated coefficient on openness becomes not only negative but also statistically significant (see columns 3, 4, and 6).

One way to summarize what we have learned from this exercise is to use the estimated

coefficients to ask how much openness matters to government consumption in countries at different points along the distribution of terms of trade instability. Consider a country with the mean level of government consumption in our sample (which is around 20 percent). Estimates in column (3) of Table 4 suggest that an increase in the share of total trade (exports plus imports) in GDP of 10 percentage points would increase government consumption by 0.8 percentage points of GDP if that country is located at the mean of the cross-country distribution of terms of trade instability. The same increase in openness would lead to an increase in government consumption of 1.7 percentage points of GDP if that country experiences terms-of-trade instability one standard deviation above the mean instead. For a country with terms-of-trade instability one standard deviation below the mean, the impact on government consumption would be virtually nil.

Hence, we conclude that openness matters to the scope of government because of the role played by external risk. Governments consume a larger share of domestic output in economies subject to greater amounts of external risk. Once external risk is controlled for, openness does not seem to exert an independent effect on government consumption. Put differently, openness appears to work purely through its consequence of exposing the economy to greater amounts of external risk.

V. Does External Risk Increase Aggregate Income Risk?

We now return to the first of the doubts raised above about the relevance of the hypothesis advanced here. The idea that greater exposure to external risk increases the total risk to which residents of a country are exposed should raise some eyebrows. It is certainly the case that the world economy as a whole is less volatile than the economy of any single country. We can expect the world market to be less risky than any of its constituent parts, thanks to the law of large numbers. Hence it is entirely possible that greater exposure to external risk is

accompanied by reduced exposure to domestic sources of risk, and that the balance works out in favor of lower risk in aggregate. What goes against this is that openness to trade generally implies specialization in production through the forces of comparative advantage. All else equal, we would expect the production structure to be less diversified in more open economies. And in an economy that cannot purchase insurance from the rest of the world, what matters is not the stability of the world economy as a whole, but the stability of the stream of earnings from domestic production. Consequently, whether greater exposure to external risk is accompanied with higher or lower amounts of risk in total is an empirical matter.

Table 6 provides the relevant evidence. We regress income volatility on our measure of external risk to see if countries with greater exposure to external risk also tend to experience greater volatility in income. We use three measures of income: (a) real GDP adjusted for changes in the terms of trade, which gets closest to a measure of real national income[4]; (b) real GDP; and (c) real GDP net of government consumption (which I call "private" GDP). Our measure of volatility is the standard deviation of the first (log) differences of these series over the 1960-90 period. External risk is captured, as before, by multiplying openness with the standard deviation of the first (log) differences of the terms of trade.

The results indicate that external risk is positively (and significantly) associated with income volatility for all three measures of income. The estimated coefficients indicate (after suitable transformation) that a 10 percent increase in external risk is accompanied by a 1.0-1.6 percent increase in income risk. This finding is least surprising for the terms-of-trade adjusted GDP--after all, fluctuations in the terms of trade enter this measure of income directly. But GDP and "private" GDP are not influenced by the terms of trade directly, so these results have real economic content.[5] It is also interesting to note that "private" GDP appears to be more

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[4]However, this measure still leaves out net factor receipts from abroad (this being the difference between GNP and GDP).

responsive to external risk than aggregate GDP, judging both by the estimated coefficients and their significance levels.

The final column of Table 6 shows that external risk is a significant determinant of the volatility of private consumption as well. In fact, the estimated coefficient for external risk is largest by far in the regression for consumption volatility, as is the R^2. This can be read as strong evidence against the presence of consumption smoothing through participation in international capital markets.

VI. Can a Higher Level of Government Consumption Stabilize Income?

We finally turn to the second question raised about the central hypothesis: can a higher level of government consumption really help stabilize income? Note that the relevant question is not whether countercyclical fiscal policy can stabilize income in Keynesian fashion. It is whether a permanently higher level of government consumption can do so. In the sketch of a model that was discussed before, I skirted the issue by assuming that the government sector is the safe sector, where incomes are non-stochastic. As an empirical matter, this of course won't do. Government consumption is in practice unstable as well, and it will generally covary with all sources of risk including the terms of trade.

A cross-country approach to answering this question (as in the previous section) would be subject to a serious bias. To see this, suppose we regress income volatility on the share of government consumption in GDP across countries. If government consumption tends to be systematically higher in economies subjected to greater shocks, as our central hypothesis predicts, then the coefficient on government consumption in such a regression would be biased downwards. So I take a different approach, one that is based on the time-series evidence for

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[5]Similar results (on the volatility of real GDP) have been reported by Gavin and Hausman (1996), using a panel created by dividing the 1970-1992 period into three seven-year sub-periods.

each individual country.

We begin with some notation. Let $Y_p = C + I + (X - M)$ stand for private GDP, $\Pi = p / p^*$ for the external terms of trade, α for openness (the share of imports in absorption or, equivalently with balanced trade, the share of exports in GDP), GDP for $Y_p + G$, and λ for G/GDP (the share of government consumption in GDP). In the absence of net factor payments from abroad, we can express real income as

$$Y = \Pi^{\alpha}(Y_p + G),$$

and in natural logarithms (with lower-case letters denoting natural logs):

$$y = \alpha\pi + (1-\lambda)y_p + \lambda g$$

The growth rate of real income is in turn:

$$dy = \alpha\, d\pi + (1-\lambda)\, dy_p + \lambda\, dg.$$

Let σ_y^2 stand for the variance of the growth rate of real income, which is our measure of income volatility and risk. This can be expressed as:

$$\sigma_y^2 = \alpha^2\sigma_\pi^2 + (1-\lambda)^2\sigma_{y_p}^2 + \lambda^2\sigma_g^2 + 2\alpha(1-\lambda)cov(d\pi,\, dy_p) + 2\alpha\lambda cov(d\pi,\, dg) + 2(1-\lambda)\lambda cov(dy_p,\, dg)$$

where $\sigma_{y_p}^2$, σ_g^2, σ_π^2 are the variances of the growth rates of private income, government consumption, and the terms of trade, respectively, and the other terms have the obvious interpretations. Now we ask how income volatility would respond to a small increase in the share of government consumption, holding all else constant. Differentiating the previous expression with respect to λ:

$$(1) \qquad \frac{1}{2}\frac{d\sigma_y^2}{d\lambda} = [\lambda\sigma_g^2 - (1-\lambda)\sigma_{y_p}^2] + \alpha[cov(d\pi,\, dg) - cov(d\pi,\, dy_p)] + (1-2\lambda)cov(dg,\, dy_p)$$

This result states that the consequence depends on the pattern of variances and covariances of the different income streams, as well as on the prevailing α and λ. Note that the openness of the

economy is being held constant in this exercise, so that increased government consumption is coming at the expense of the private non-tradables sector. When government consumption is non-stochastic, the above expression reduces to

$$\frac{1}{2}\frac{d\sigma_y^2}{d\lambda} = -(1-\lambda)\sigma_{y_p}^2 - \alpha cov(d\pi, dy_p)$$

which is unambiguously negative provided $cov(d\pi, dy_p)$ is positive, as strongly suggested by our results in Table 5. Even when government consumption is stochastic, an increase in λ will reduce income volatility provided λ , σ_g^2, and $cov(d\pi, dy_p)$ are sufficiently small.

We can actually use the observed pattern of variances and covariances in our sample to calculate for each country the magnitude and sign of the expression in (1). In other words, we can rely on the historical pattern of shocks experienced by each country to form an idea about how a small enough increase in the share of government consumption in GDP is likely to affect the volatility of real income in that country. For this purpose, I have calculated the relevant variances and covariances over the 1971-90 period (the period for which terms of trade data are available in the World Bank's World Data 1995) for each country with the requisite data. Plugging this data into equation (1) gives us a distribution of $d\sigma_y^2/d\lambda$ for a total of 147 countries. The histogram is shown in Figure 3. The main finding is that a small (permanent) increase in government consumption (as a share of GDP) can be expected to play an income-stabilizing role in the vast majority of countries--119 out of 147. All advanced industrial countries, without exception, have $d\sigma_y^2/d\lambda < 0$.

A couple of caveats may be in order. First, the calculation is obviously valid only for small changes in λ. Second, our approach assumes that the pattern of variances and covariances would remain unaffected following an increase in government consumption. This may be

defensible for a small enough increase in λ. Third, there is an endogeneity problem here as well, in that governments which choose the level of λ to minimize income risk would set $d\sigma_y^2/d\lambda = 0$, confounding the effect we are looking for. However, this last problem can be addressed by considering that governments have many other objectives besides minimizing risk.

Suppose, for example, that governments care both about risk and economic growth, γ. Let us write their objective function as $v(\gamma, \sigma_y^2)$, with $\partial v/\partial \gamma > 0$ and $\partial v/\partial \sigma_y^2 < 0$. The first-order condition for maximizing v(.) is:

$$(\partial v/\partial \gamma)\, d\gamma/d\lambda + (\partial v/\partial \sigma_y^2)\, d\sigma_y^2/d\lambda = 0.$$

Assume that increasing government consumption is costly to real activity because it has to be financed by distortionary (and growth-impeding) taxes: i.e., $d\gamma/d\lambda < 0$. Then an interior solution will be found at a level of λ such that $d\sigma_y^2/d\lambda < 0$. Intuitively, governments will never push the risk-minimizing motive to its maximum limit as long as raising government consumption has some cost.[6] Hence in practice we can expect to observe levels of government consumption that fall well short of the point where no further reductions in income volatility could be achieved.

To summarize, the time-series evidence for the vast majority of countries shows that higher levels of government consumption would be associated with reduced volatility in income flows.

VII. Exogenous and Policy Components of Openness

Countries differ in their exposure to trade for a number of reasons. One set of reasons has to do with geography: countries that are large and distant from their trade partners will naturally tend to be more self-sufficient and have lower ratios of trade to GDP. But, in addition, exposure to trade is also a function of government policy: countries with high tariff and non-tariff

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[6]See Slemrod (1995) for a recent review of the evidence on the costs, or lack thereof, of government spending.

baririers to trade will have lower exposure to trade, holding all else constant. Our measure of openness, which is the ratio of trade to GDP, conflates these two sets of determinants. In this section, I will show that the evidence developed previously applies to both the "natural" and "policy" components of openness.

We first create a measure of natural openness for each country (NATLOPEN). We do this by regressing the log of OPENAVG7584 on the logs of distance from major trade partners (DIST) and population (POP85), plus a set of country-grouping dummies (SOC, OECD, LAAM, ASIAE, SAFRICA). This regression has an R^2 of 0.71, and yields the expected signs on the coefficients (negative and significant on both DIST and POP85). The predicted values from this regression tell us how open we expect a country to be on the basis of geographic and other exogenous determinants alone. We call this predicted value NATLOPEN. Econometrically, this procedure is equivalent to instrumenting for OPENAVGxxyy using exogenous variables. Hence, using NATLOPEN in lieu of OPENAVGxxyy in the next set of regressions is also the appropriate way of eliminating potential simultaneous-equation bias. Such bias would be present if there is causality running from government consumption to openness. Note that our set of instruments is as close to being exogenous as one can hope for in cross-country regressions. Indeed, the validity of this instrument set is easily confirmed using standard tests for over-identifying restrictions.

The first column of Table 7 displays the results of substituting NATLOPEN for OPENAVG7584 in a regression of the type shown previously in Tables 4 and 5. Due to the availability of DIST only for a smaller number of countries, the sample size is now reduced to 82. Nonetheless, the fit of the regression is not much affected. More importantly, the coefficient on the interaction term (NATLOPEN x TOTDLOGSTD) is positive and statistically significant (at the 95 percent level) as before. The coefficient on NATLOPEN is negative, but not significant. Hence, our results using the exogenous component of openness are quite similar to those

obtained earlier.[7] They confirm our theory about the importance of external risk in determining the size of government consumption.

The remaining columns of Table 7 consider the role of the policy component of openness. There are a number of different indicators of trade policy that one could use here, none of which is entirely satisfactory. I focus here on a frequency measure of non-tariff barriers to trade on intermediate and capital goods (OWQI), taken from Barro and Lee (1994), which is in turn based on UNCTAD sources. Higher levels of OWQI indicate more restrictive trade policies, so I use the transformation 1-OWQI to measure the degree of policy-related openness. Columns (2)-(5) of the table experiment with various combinations of the right-hand side variables under consideration. Note that the interaction term (1-OWQI) x TOTDLOGSTD is now measuring the degree of external risk policy makers have chosen to take on. The coefficient on this terms enters with a positive sign, and is significant at either the 90 or 95 percent levels of confidence. Hence the evidence confirms that both the exogenous and policy components of external risk are determinants of the size of government.

VIII. Concluding Comments

Economists tend to think of governments and markets as substitutes. Most types of government intervention, save for those related to the provision of public goods, law and order, and property rights, are viewed as inimical to the operation of markets. The expansion of markets, on the other hand, is perceived as undercutting the effectiveness of governmental action, both in macroeconomic and microeconomic areas. The findings presented in this paper

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[7]Frankel and Romer (1996) have recently developed an instrument for openness based on geographical determinants similar to those employed here, with the major difference being that their instrument is constructed using bilateral trade data and a gravity-like estimating framework. To see whether using the Frankel and Romer (1996) instrument in lieu of NATLOPEN makes any difference, I re-ran the regressions in Table 7 substituting the former. The results were essentially identical. In particular, the interaction term was always significant at the 90 percent level or better.

provide a very different perspective on the relationship between markets and governments. Contrary to what most economists would expect, the scope of government has been larger, not smaller, in economies taking greater advantage of world markets. Indeed, governments have expanded fastest in the most open economies.

The evidence considered here suggests strongly that the reasons have to do with the risks of being exposed to shocks of external origin. Openness exerts the strongest influence on government consumption in economies which are subject to the greatest amounts of terms-of-trade risk. Governments appear to have sought to mitigate the exposure to external risk by increasing the share of domestic output which they consume. Of course, on a priori grounds, it is not altogether clear that a higher share of government consumption can stabilize incomes. But I have provided some evidence that the government sector can indeed be considered as the "safe" sector--in the empirically relevant sense--for the vast majority of countries.

International trade has expanded significantly during the postwar period. Despite some reversals since the 1980s, so has the scope of government activity in most countries of the world. The findings presented in this paper suggest that this was perhaps no coincidence.[8] And looking forward, they suggest that scaling governments down--which is the trend of the 1990s--may actually harm the prospects of maintaining free trade on a global scale. Globalization may well require big, not small, government.

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[8]See Ruggie (1982) for a very useful discussion on this point. Ruggie argues that the international economic liberalism of the postwar period, far from shunting aside the role of government policy, gave it a central role. He calls this "the compromise of embedded liberalism":

> The task of postwar institutional reconstruction ... was to ... devise a framework which would safeguard and even aid the quest for domestic stability without, at the same time, triggering the mutually destructive external consequences that had plagued the interwar period. This was the essence of the embedded liberalism compromise: unlike the economic nationalism of the thirties, it would be multilateral in character; unlike the liberalism of the gold standard and free trade, its multilateralism would be predicated upon domestic interventionism. (p. 393, emphasis added)

According to Ruggie, the objective of stabilizing domestic employment and output was never meant to be sacrificed at the altar of free trade.

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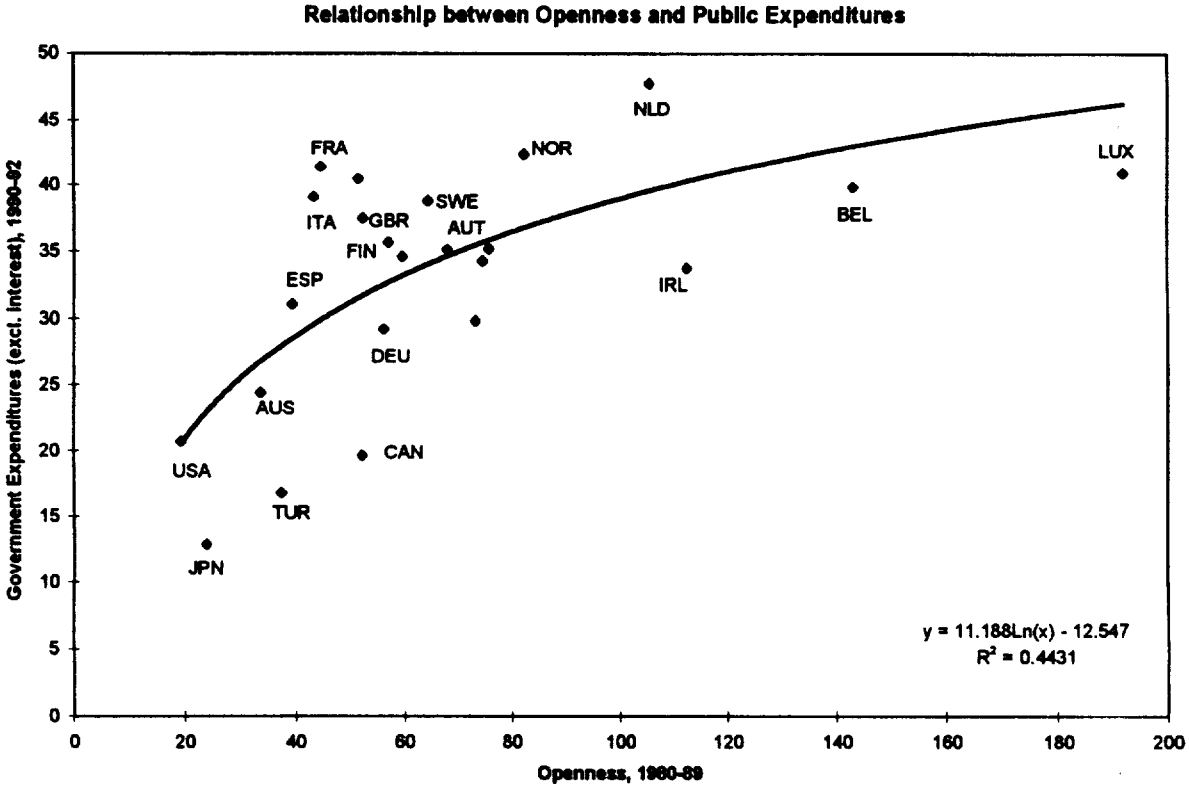
Relationship between Openness and Public Expenditures
Government Expenditures (excl. interest), 1990-92
Openness, 1980-89
y = 11.188Ln(x) - 12.547
R² = 0.4431
NLD
FRA
NOR
LUX
SWE
ITA
GBR
AUT
BEL
FIN
ESP
IRL
DEU
AUS
CAN
USA
TUR
JPN
0
5
10
15
20
25
30
35
40
45
50
0
20
40
60
80
100
120
140
160
180
200

Figure 1

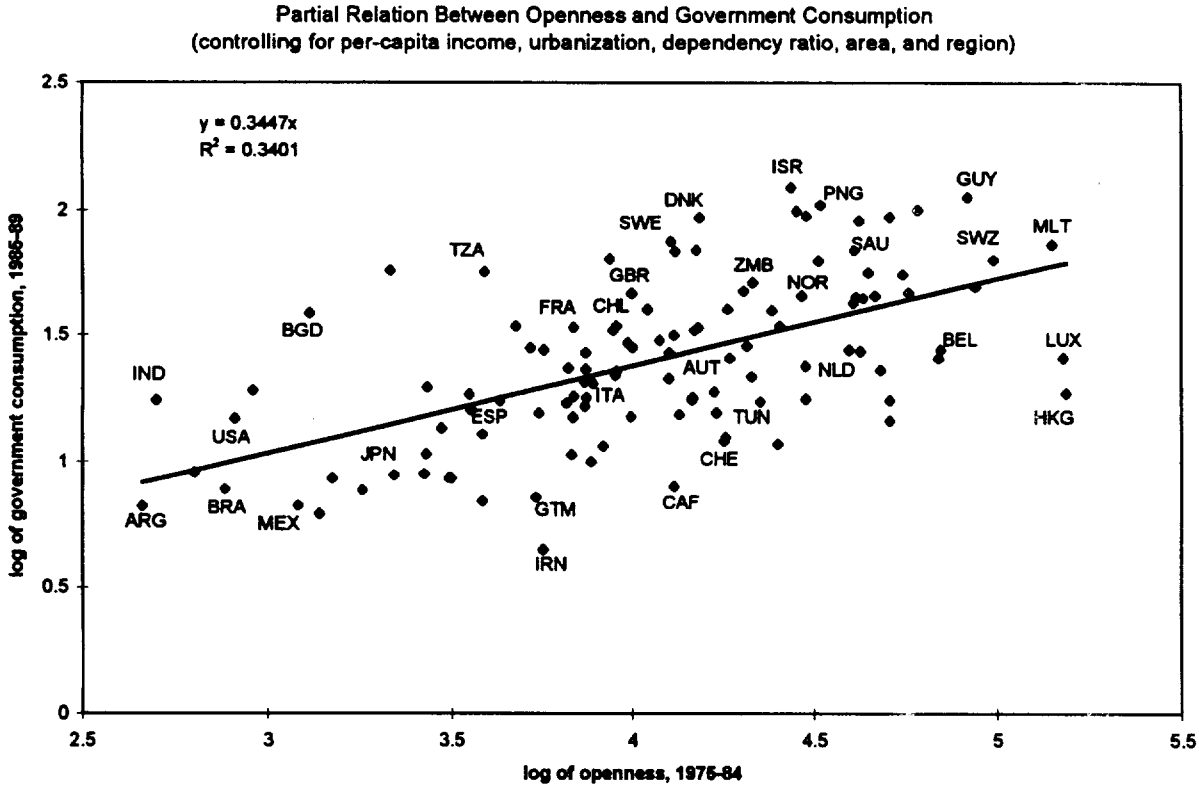
Partial Relation Between Openness and Government Consumption
(controlling for per-capita income, urbanization, dependency ratio, area, and region)
y = 0.3447x
R² = 0.3401
log of government consumption, 1985-89
log of openness, 1975-84
2.5
2
1.5
1
0.5
0
2.5
3
3.5
4
4.5
5
5.5
ISR
GUY
PNG
DNK
SWE
MLT
SWZ
SAU
TZA
ZMB
GBR
NOR
FRA
CHL
BGD
BEL
LUX
IND
AUT
NLD
ITA
ESP
TUN
HKG
USA
JPN
CHE
ARG
BRA
MEX
GTM
CAF
IRN

Figure 2

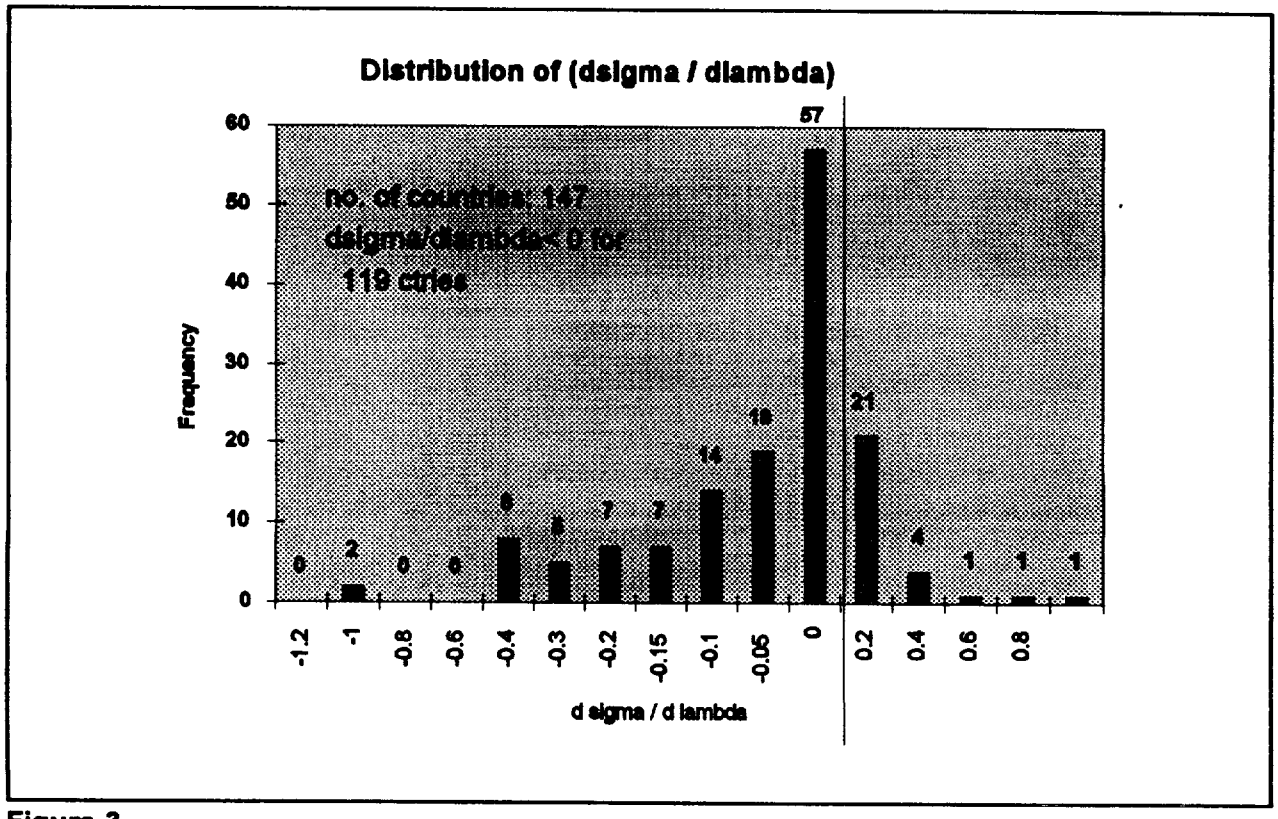
Distribution of (dsigma / dlambda)
no. of countries: 147
dsigma/dlambda < 0 for
119 cries
Frequency
60
50
40
30
20
10
0
0
2
0
0
8
6
7
7
14
18
57
21
4
1
1
1
-1.2
-1
-0.8
-0.6
-0.4
-0.3
-0.2
-0.15
-0.1
-0.05
0
0.2
0.4
0.6
0.8
d sigma / d lambda

Figure 3

Table 1: Openness and Government Spending

independent variables	dependent variables					
	log CGAVG9092	log CGAVG8589	log GIAVG9092	log GIAVG8589	DGOV6092	DOPEN6092
	(1)	(2)	(3)	(4)	(5)	(6)
constant	3.289*	3.786*	-1.778***	-4.708	6.450	4.439
log GDP/cap.	-0.030	-0.105***	-0.413*	-0.013	-0.179	-0.194
log dependency ratio	0.642*	0.630*	0.372	-0.304	0.318	0.145
log urbanization	-0.203**	-0.136***	-0.006	-0.556	-0.353	0.080
socialist	0.169	0.092	-0.559	-1.631***	0.924	0.261
OECD	-0.007	-0.014	-0.051	-0.080	0.025	0.383
Latin America	-0.171	-0.218**	-0.564**	0.122	-0.076	-0.041
East Asia	-0.206	-0.338**	-0.193	-0.206	-0.623	0.837
Sub-Saharan Africa	-0.107	-0.239**	-0.161	0.002	-0.101	0.041
log GCAVG6064					-1.328*	-0.020
log OPENAVG8089	**0.223***		**0.534***			
log OPENAVG7584		**0.205***		**0.835****		
log OPENAVG6064					**0.305***	-0.510*
Adj. R^2	0.428	0.458	0.456	0.013	0.671	0.358
SE	0.317	0.313	0.558	1.931	0.510	0.469
N	103	125	75	98	98	98

Notes: See text for variable descriptions. Asterisks denote level of statistical significance:

* significant at the 99% level
** significant at the 95% level
*** significant at the 90% level.

Table 2: Openness and Government Expenditures by Functional Category (1985-89)

Independent variables	Dependent variables (all in % of GDP):									
	all govt spending (excl. "other")	public services	defense	education	health	social security & welfare	housing	culture, etc.	economic affairs & services	other (incl. interest payments)
log OPENAVG7584	0.300*	0.397*	0.267***	0.532*	0.349**	0.256	0.616*	0.618*	0.496*	0.097
N	81	83	82	84	84	80	81	81	83	81
Adj. R^2	0.244	0.132	0.154	0.085	0.099	0.273	0.127	0.079	0.333	0.120

Notes: Other regressors not shown in the table: constant, log GDPSH585, log DEPEND90, log URBAN90, SOC, OECD, LAAM, ASIAE, SAFRICA.
Asterisks denote level of statistical significance:

* significant at the 99% level
** significant at the 95% level
*** significant at the 90% level.

Table 3: Checking for Robustness and Alternative Explanations
Dependent Variable: log CGAVG8589

Independent variables	benchmark	splitting the sample by income		controlling for:					
		< $2500	> $2500	country size		external borrowing	inflation	trade taxes	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log OPENAVG7584	0.205*	0.266*	0.230*	0.345*	0.221**	0.229*	0.223*	0.385*	0.355*
log AREA				0.065*					
log POP85					0.005				
log DETGNP85						0.088***			
log XR85/XR70							0.012		
log INTL8688								-0.098***	
INTL8688/ TOTAL8688									-0.617*
Adj. R^2	0.458	0.273	0.447	0.547	0.483	0.429	0.464	0.491	0.521
N	125	64	61	115	120	89	119	79	79

Notes: Other regressors not shown in the table: constant, log GDPSH585, log DEPEND90, log URBAN90, SOC, OECD, LAAM, ASIAE, SAFRICA. See appendix for variable definitions. Asterisks denote level of statistical significance:

* significant at the 99% level
** significant at the 95% level
*** significant at the 90% level.

Table 4: The Importance of External Risk (1990-92 regressions)

Independent variables	*Dependent variable: log of Real Government Consumption as % of GDP (log CGAVG9092)*					
	(1)	(2)	(3)	(4)	(5)	(6)
OPENAVG8089	0.004*	0.000	-0.004	-0.004	-0.002	-0.005
CI90		-0.610		0.429	-0.768***	
OPENAVG8089 x CI90		**0.011****		**-0.004**	**0.013****	
TOTDLOGSTD			-3.146*	-4.155**		-3.397*
OPENAVG8089 x TOTDLOGSTD			**0.054***	**0.064****		**0.059***
OPENAVG8089 x GDPSH589					2.82E-07	2.36E-07
N	92	92	92	92	92	92
Adjusted R^2	0.396	0.410	0.445	0.436	0.410	0.443

Notes: See appendix for variable definitions. Coefficients on other included regressors are not shown.

* significant at 99% level;

** significant at 95% level;

*** significant at 90% level.

Table 5: The Importance of External Risk (1985-89 regressions)

Independent variables	*Dependent variable: log of Real Government Consumption as % of GDP (log CGAVG8589)*					
	(1)	(2)	(3)	(4)	(5)	(6)
OPENAVG7584	0.003*	-0.002	-0.005**	-0.005**	-0.002	-0.004***
CI80		-0.909*		-0.012	-0.932*	
OPENAVG7584 x CI80		0.015*		0.002	0.015*	
TOTDLOGSTD			-3.856*	-3.649**		-3.817*
OPENAVG7584 X TOTDLOGSTD			0.061*	0.054**		0.060*
OPENAVG7584 X GDPSH585					3.24E-08	-2.17E-08
N	105	105	105	105	105	105
Adj. R^2	0.439	0.506	0.535	0.528	0.504	0.530

Notes: See appendix for variable definitions. Coefficients on other included regressors are not shown.

* significant at 99% level;

** significant at 95% level;

*** significant at 90% level.

Table 6: Impact of External Risk on Volatility of Income and Consumption

	Dependent variable: standard deviation of growth rates of			
Independent variables	real GDP adjusted for the terms of trade	real GDP	real "private" GDP	real consumption
constant	0.026* (0.003)	0.026* (0.003)	0.025* (0.003)	0.027* (0.004)
GDPSH575	-4.22E-07 (3.97E-07)	-3.40E-07 (3.64E-07)	-1.42E-07 (3.91E-07)	-7.53E-07 (7.37E-07)
SOC	0.001 (0.006)	0.001 (0.005)	0.004 (0.006)	0.006 (0.005)
OECD	-0.012* (0.004)	-0.012* (0.004)	-0.013* (0.004)	-0.013*** (0.007)
LAAM	-0.006 (0.004)	-0.005 (0.003)	-0.005 (0.004)	-0.005 (0.004)
ASIAE	-0.012* (0.003)	-0.011* (0.003)	-0.011* (0.003)	-0.016* (0.006)
SAFRICA	0.001 (0.004)	0.002 (0.004)	0.004 (0.004)	0.006 (0.004)
OPENAVG6092 x TOTDLOGSTD	**0.0007* (0.0002)**	**0.0004** (0.0002)**	**0.0006* (0.0002)**	**0.0012* (0.0003)**
N	104	104	104	104
Adj. R^2	0.39	0.36	0.36	0.48

Notes: Standard errors in parentheses.

Table 7: Exogenous and Policy Components of Openness
Dependent variable: log CGAVG8589

Independent variables	(1)	(2)	(3)	(4)	(5)
NATLOPEN	-0.005	-0.004	-0.004		
TOTDLOGSTD	-2.899**	-1.952	-2.285	0.109	
NATLOPEN x TOTDLOGSTD	0.058**	0.047***	0.048***		
1 - OWQI		-0.228		-0.258	
(1 - OWQI) x TOTDLOGSTD		2.863***	1.756**	3.263***	1.884**
N	82	81	81	84	87
Adj. R^2	0.46	0.48	0.48	0.44	0.46

Notes: See text and appendix for variable definitions. Coefficients on other included regressors are not shown.

* significant at 99% level;

** significant at 95% level;

*** significant at 90% level.

APPENDIX

List of Variables and Sources		
Variable	Definition	Source
AREA	land area	Barro & Lee 1994
ASIAE	dummy for East Asian countries	Barro & Lee 1994
CIxx	Export concentration index	UNCTAD
GIAVGxxyy	govt. capital expenditures	WD
CGAVGxxyy	real government consumption as a percent of GDP	PWT 5.6
DEPEND90	dependency ratio	WD
DETGNP85	debt-GNP ratio, 1985	WD
DGOV6092	CGAVG9092/CGAVG6064	PWT 5.6
DIST	geog. distance from 20 major world exporters	Barro & Lee 1994
DOPEN6092	OPENAVG9092/OPENAVG6064	PWT 5.6
GDPSH5xx	real per-capita GDP	Barro & Lee 1994
INTL8688	taxes on international trade (% of GDP), 1986-88	FAD
LAAM	dummy for Latin American countries	Barro & Lee 1994
NATLOPEN	"natural" openness -- exogenous component of OPENAVG7584	Computed from Barro & Lee 1994 and WD
OECD	dummy for OECD countries	Barro & Lee 1994
OPENAVGxxyy	exports plus imports divided by GDP	PWT5.6
OWQI	frequency coverage measure of non-tariff barriers to trade on intermediate and capital goods	Barro & Lee 1994
POPxx	population	WD
SAFRICA	dummy for sub-Saharan African countries	Barro & Lee 1994
SOC	dummy for socialist countries	Sachs & Warner 1995
TOTAL8688	total tax revenue as a share of GDP, 1986-88 avg.	FAD
TOTDLOGSTD	st. dev. of log-differences in terms of trade, 71-90	WD
URBAN90	Urbanization rate	WD
XRxx	Exchange rate	Barro & Lee 1994

Notes: "xx" refers to year 19xx, while "xxyy" refers to an average during 19xx-19yy (unless specified otherwise). All government expenditure and revenue data are expressed as a percent of GDP or GNP. "PWT 5.6" stands for Penn World Tables 5.6; "WD" for World Data 1995, (World Bank); "FAD" for Fiscal Affairs Department of IMF; "UNCTAD" for Handbook of International. Trade and Development Statistics of UNCTAD, various issues.