Forthcoming, Journal of Political Economy

WHY DO MORE OPEN ECONOMIES HAVE BIGGER GOVERNMENTS?

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February 1996
Revised, March 1996
Revised April 1997
This revision, January 1998

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ABSTRACT

There exists a positive correlation between an economy's exposure to international trade and the size of its government. The correlation holds for most measures of government spending, in low- as well as high-income samples, and is robust to the inclusion of a wide range of controls. One explanation is that government spending plays a risk-reducing role in economies exposed to significant amount of external risk. The paper provides a range of evidence consistent with this hypothesis. In particular, the relationship between openness and government size is strongest when terms-of-trade risk is highest.

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I. Introduction

This paper documents a little-known empirical regularity and provides a plausible explanation for it. The regularity consists of a surprisingly strong and robust association between an economy's exposure to foreign trade and the size of its government. The explanation is that government expenditures are used to provide social insurance against external risk.

The claim that there is a positive association between trade exposure and the scope of government is at first sight surprising. It is widely presumed that the effectiveness of government intervention is lower in economies that are highly integrated with the world economy. This would suggest a negative correlation between the volume of trade and the scope of government. Yet the small, highly open economies of central and northern Europe (e.g., Austria, Netherlands, Norway) have some of the world's highest shares of government spending in GDP.

The evidence presented in this paper suggests that the European pattern is not an exception. 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.

The explanation that best fits the evidence is one that focusses on the role of external risk. Societies seem to demand (and receive) an expanded government role as the price for accepting larger doses of external risk. In other words, government spending appears to provide social insurance in economies subject to external shocks. The central 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 becomes insignificant or negative. The same result is confirmed in panel regressions with fixed effects for time periods and countries. Hence, unlike other explanations for the correlation between openness and government size, this one receives considerable support.

If the key argument advanced in this paper is valid, a number of ancillary hypotheses follow. First, increases in external risk must lead to greater volatility in domestic income and consumption. Second, a larger share of government purchases of goods and services in GDP must reduce income volatility. Third, the risk-mitigating role of government spending should be displayed most prominently in social security and welfare spending, particularly in the advanced countries that possess the requisite administrative capability to manage social welfare systems. Fourth, causality should run from exposure to external risk to government spending. I provide evidence in favor of each of these propositions. I also provide a simple general-equilibrium model that clarifies how government consumption can alleviate exposure to external risk under certain plausible conditions.

An important precursor to this paper is a study by David Cameron published in 1978 (Cameron 1978). Cameron 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 in 1960 (exports plus imports divided by GDP), with a correlation coefficient of 0.78. By way of explanation, Cameron argued that more open economies have higher rates of industrial concentration, which tend 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.

Cameron's study was limited to 18 OECD countries, and his explanation for the finding is probably too specific to be relevant to our 100-plus country sample. In particular, it may not be plausible to attach such importance to the role of labor organizations in most developing countries. Further, the empirical relationship between openness and government spending holds for government consumption as well, and not just for transfers on which Cameron based his argument. 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 (see also Bates, Brock, and Tiefenthaler 1991).

The plan of the paper is as follows. Section II demonstrates the close association between openness and various measures of government spending. Focussing on government consumption, section III analyzes the robustness of the association, as well as testing for (and dismissing) some alternative explanations for the association. Section IV discusses the analytics of the central hypothesis of the paper, and provides evidence on both the central and ancillary hypotheses mentioned above. Section V concludes.

II. The evidence

Figure 1 shows the simple relationship between openness and government spending in a sample of 23 OECD countries. The vertical axis represents 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. 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. The United States and Japan are at one end of the distribution with the lowest trade shares in GDP and (along with Turkey and

Canada) the lowest shares of government spending. Luxembourg, Belgium, and the Netherlands are at the other end with very high degrees of openness and large government. Aside from Cameron (1978), earlier studies that have found a correlation between openness and the size of the public sector for the OECD countries include Schmidt (1983) and OECD (1985). Figure 1 shows that the correlation continued to hold as of the early 1990s.

Could the association between openness and the scope of government be a spurious one? The OECD evidence is in fact fragile against alternative hypotheses, such as the following: (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 size of the OECD sample rules out testing these various hypotheses meaningfully against each other. 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 the 90 percent level.

We now turn to a broader sample of countries, for which the sample size should be less constraining. My preferred measure of government for the larger sample is real government consumption from the Penn World Tables. These data have a couple of advantages. They are available for a much larger group of countries than the World Bank data. In addition, they are 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 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 income transfers and public investment.[1] I show results for public investment as well in passing, for comparison purposes. Results for more disaggregated levels of government spending 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 indicators. See for example Tait and Heller (1982), Ram (1987), and Heller and Diamond (1990). 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 (OPENAVGxxyy), 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 (CGAVGxxyy). 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 to the exclusion of only one observation, that for Hong Kong in 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 sample size is larger than in the later period (125 versus 103 countries). 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 for 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 at 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! 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 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 is 80 percent (a difference 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 is 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. Moreover, they are quite a bit larger in magnitude--0.53 and 0.83 respectively.

In column (5) of Table 1 we see that openness during the early 1960s can also explain the subsequent 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 expansion of 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 0.66. 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.

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 evidence shows that openness has a statistically significant association with 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 it does so in the 1990-92 regression (not shown). The only major spending item which does not exhibit a statistically significant correlation with openness in either period is interest payments on the public debt. More detail on the disaggregated data is provided in Rodrik (1997a).

Finally, we note that the association between openness and government size apparently exists in all available data sets. These include 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). Government employment (as a share of the labor force) is also positively correlated with openness See Rodrik (1997a and 1997b) for studies that cover these additional data sources.

III. Probing deeper: some hypotheses and checks of robustness

One aspect of robustness has already been discussed: the correlation betwen exposure to trade and scope of government 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.

Table 3 reports the results of various experiments with the benchmark specification. We use the 1985-89 equation for government consumption, as this covers the largest 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 purposes of comparison with later columns. Note that these regressions include the complete set of independent variables considered in Table 1, but the estimated coefficients 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 the lower- and higher-income halves of the sample.

The remaining columns 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 added.) 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 with country size (see, for example, Alesina and Wacziarg 1997). 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. But in both cases the coefficient on openness remains statistically significant. With land area 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, 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 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 the average inflation rate during 1975-90 on the right-hand side to check for this possibility. The estimated coefficient on inflation turns out to be insignificant, while the coefficient on openness remains unaffected.

Next we consider 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!

A related version of the previous argument is that large trade volumes may help governments collect higher revenues from indirect taxes such as sales taxes and VAT. In many poor countries, such taxes are collected disproportionately at the border.[2] To check for this possibility I control for indirect tax revenues including VAT (both as a share of GDP and as a share of total tax revenues) in columns (10) and (11). The estimated coefficient on openness remains unaffected.

I also check for the possibility that the correlation is due to resource rents or other revenue derived by the government from export activities. Columns (12) and (13) introduce the share of primary products in total exports (PRIMSHR85) and a dummy for oil exporting countries (OIL), and in neither case is the coefficient on openness affected. I have also used a direct

measure of export tax revenues (not shown), with similar results.

Finally, what about the possibility of outliers? 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 not 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: social Insurance against external risk

Hence the statistical association between openness and government spending appears to be a robust 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 plausible 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 framework. Divide the economy into three sectors:

private tradables, private non-tradables, and the government sector. Think of a representative 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, the larger the share of the household's total income that derives from the government sector. Can a (permanently) higher share of government consumption mitigate the representative household's exposure to external risk in such an economy? And when will it be optimal for the government to reduce risk in this fashion?

Assume that the government sector is the "safe" sector in a sense that will be made more precise empirically later on. Suppose, in the extreme, 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. I will illustrate this argument with a simple model below.

In principle, external risk should be diversifiable for small countries through participation in international capital markets. In practice, this does not appear to be the case. Karen Lewis summarizes the literature on international portfolio diversification thus (1995, 1914): "recent evidence shows that domestic investors continue to hold almost all of their wealth in domestic assets." For the majority of the countries in our sample, the reason may be that full capital market openness conflicts with other objectives of government policy, or that incentive and sovereign-risk problems restrict the range and extent of financial instruments available to them. For others, the apparent incompleteness of international portfolio diversification remains a puzzle--indeed a central puzzle in the theory of international finance (Lewis 1995). The empirical implications of perfect international consumption risk-sharing--that consumption growth rates

should be unaffected by country-specific shocks--are usually rejected by the data even for the advanced industrial countries with completely liberalized financial markets (Obstfeld 1995; Lewis 1995).

One might also object that the government's risk-reducing role would be best played through the establishment of a safety net, in which case it would show up mainly in government spending on social security and welfare, and not in government consumption. I will show below that this prediction is borne out in the case of the more advanced countries, which do have the administrative capacity to manage social welfare systems. In these countries, government consumption is uncorrelated with exposure to external risk, while spending on social security and welfare is strongly correlated. But governments in the developing countries which predominate in our cross section appear to rely on a broader set of instrumentalities--including, notably, public employment--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 both empirically valid.

A. A simple model

Consider an economy with a fixed supply x of an export good, and which produces two additional goods: a publicly-provided good and a private good. The economy also has a labor endowment normalized to unity, with λ employed in the public sector and $1-\lambda$ in the private sector. Let π denote the (stochastic) price of the export good in terms of the import good (i.e.,

the terms of trade). We assume that the export good is not consumed at home, and that the import good is not produced domestically. Trade is balanced continuously, so the home economy purchases πx quantity of imports.

We treat imports as intermediate goods and assume that they increase the productivity of private production domestically. We take the production function for the private good to be linear in labor, and write it as $\pi x(1-\lambda)$. Note that by making domestic productivity a function of the level of imports, we have captured one plausible channel through which trade risk spills over to the domestic economy. There is strong evidence of such spillovers in the data, as we shall see later (section IV.D). (Expressing private production as a linearly homogeneous production function $f(\pi x, 1-\lambda)$ would not alter any of the qualitative results below, but would add several terms to the algebra.) Finally, the supply of the publicly-provided good is given by $h(\lambda)$, with $h' > 0$ and $h'' < 0$.

The government determines the size of the public sector (λ) before the specific realization of π is known. We can view this as the optimal determination of the size of the public sector in view of the underlying variability of the terms of trade. For simplicity, let the publicly-provided good and the private good be perfect substitutes in consumption. The government's problem is the following:

$$\underset{\lambda}{Max}\ V(\lambda) \equiv E[u(h(\lambda) + \pi x(1-\lambda))]$$

where $u(.)$ stands for the utility function of the representative household, with $u'(.) > 0$ and $u''(.) < 0$. Let π be distributed with mean π_m and variance σ^2. Taking a second-order Taylor approximation to $u(h(\lambda) + \pi x(1-\lambda))$ around π_m, and taking expectations, we can express $V(\lambda)$ as follows:

$$V(\lambda) \approx u(h(\lambda) + \pi_m x(1-\lambda)) + \frac{1}{2}u''(h(\lambda) + \pi_m x(1-\lambda))\ (1-\lambda)^2\ x^2\ \sigma^2$$

Expected utility is decreasing in the variance of the terms of trade. Define $R = x\sigma$ as our measure of exposure to external risk. The associated first-order condition is:

$$[u'(.) + \frac{1}{2}u'''(.)\ (1-\lambda)^2\ R^2]\ (h'(\lambda) - \pi_m x) - \frac{1}{2}u''(.)\ R^2 = 0.$$

A sufficient condition for the first term in square brackets to be positive is that the representative household exhibit "prudence" in consumption (i.e., that $u'''(.) > 0$), which we assume. A direct implication is that exposure to external risk ($R > 0$) results in the optimal level of λ to be larger.

Hence consider two economies A and B, with $R_A = 0$ and $R_B > 0$, but identical in all other respects. The first-order condition for the A-economy simplifies to $h'(\lambda_A) = \pi_m x$. For the B-economy, $h'(\lambda_B) < \pi_m x$. Since $h''(.) < 0$, we have $\lambda_B > \lambda_A$.

Standard portfolio arguments suggest that an increase in the riskiness of exports calls for a reallocation of the economy's resources towards the safe activity (government), even when the return to government activities lies below the (mean) return to other activities.[3] I have shown this result in a model with a fixed supply of exports. In a model in which export supply is variable, and exports compete for resources with the government sector, the risk-reducing effect of government consumption would be even more direct and immediate.

B. Empirical tests of the central hypothesis

A test of our central hypothesis can be carried out by checking whether the relationship between openness and government consumption is stronger in economies which are exposed to greater amounts of external risk. For this we need empirical proxies for exposure to external risk. There are two such measures which I use here.

One is terms-of trade risk, which is the measure used in the model above. In an economy with no market imperfections, 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 $\frac{1}{2}[(x+m)/y]$ x *st.dev.(d*π*)*. 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. Table 4 shows the results for the 1990-92 sample. The first column of the table displays the benchmark regression for government consumption, 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 the new variables both on their own 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 as predicted by the risk-mitigating hypothesis, the coefficient on the interaction term is positive and statistically significant at the 95 percent confidence level. Equally important, the coefficient on openness (entered 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 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 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. Results using the1985-89 sample (not shown) are, if anything, stronger: both measures of external risk 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.

The remaining two columns of Table 4 check for the possibility that our measures of external risk may be proxying for low income or for greater revenue extraction when exports are made up of predominantly primary resources. Terms-of-trade instability and export concentration are negatively correlated with per-capita income and positively correlated with the primary-commodity share of exports. Our interaction terms could be capturing a non-linearity in income,

or rent extraction by the government from primary exports (through marketing boards, government ownership, and other controls on exports). However, when per-capita income is interacted with openness and included in the regressions, the results reported above do not change (column 5). Neither is there a change when the primary share of exports (interacted with openness) is included (column 6). The coefficients on the external risk variables are robust to the addition of these new terms. Moreover, our findings are unaffected by the inclusion in the regression of all the other variables considered previously in Table 3 (results not shown).[4]

Table 5 replicates the results in a panel setting: it shows that past exposure to external risk is a statistically significant determinant of government consumption, even after a full set of period and country fixed effects is introduced. For the purposes of this estimation, I have divided the period from 1960 to 1992 into seven sub-periods, and calculated averages of government consumption, openness, and terms-of-trade risk for each of these sub-periods. The panel regressions are run using both fixed and random effects, as well as in first differences. The coefficient on lagged external risk is positive and statistically significant In all specifications but one (where it is borderline insignificant). The results indicate that the association between exposure to external risk and government size is not a purely cross-sectional one; it exists also in the time series for individual countries.

One way to summarize what we have learned from these exercises 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. 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.

C. The role of social security and welfare spending

If government spending plays a risk-mitigating role, we would expect to see this primarily reflected in income-transfer programs and in social security and welfare spending. In most developing countries, income-transfer schemes tend to be rudimentary for reasons of administrative capacity. Consequently, their governments tend to rely on public employment, in-kind transfers, and public-works programs--all of which show up in government consumption--in order to broaden safety nets. But in advanced countries with social welfare programs in place, it should be primarily spending on social security and welfare that is correlated with exposure to external risk, not government consumption. That is indeed what we find.

Table 6 displays a set of regressions for three separate groups of countries: (I) members of the OECD; (ii) countries with1985 GDP per capita greater than $4500; and (iii) all countries. For each set of countries, I have run two regressions, one with social security and welfare spending as the dependent variable and the other with government consumption. To make the estimated coefficients comparable across the two specifications, I restrict the sample to

countries for which I have data for both types of government spending. (This explains the sample size of 68 in the regressions for "all countries.")

The results are interesting. For each of the three groups of countries, the estimated coefficient on external risk is considerably larger in the social security and welfare regression than in the government consumption regression. This indicates that spending on social security and welfare is significantly more sensitive to exposure to external risk than is government consumption, which is consistent with our theory.[5] Note however that this coefficient becomes smaller as we move from the high-income to the broader broader sample of countries, and the precision with which it is estimated becomes lower. This is also plausible, as it reflects both the greater difficulty of administering income-transfer programs in low-income countries and the greater measurement error. Note finally that exposure to external risk does not have a statistically significant impact on government consumption in the OECD or high-income samples. In these samples, it is spending on social security and welfare that correlates with external risk and not government consumption. Once again, this bears out the theory.

D. Does exposure to external risk increase aggregate risk?

We now return to one 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. 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 7 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; (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. In particular, they provide justification for a key feature of the model used above, namely that external risk spills over to domestic production (see Gavin and Hausmann 1996 for similar results). It is also interesting to note that "private" GDP appears to be more responsive to external risk than aggregate GDP, judging both by the estimated coefficients and their significance levels.

The final column of Table 7 shows that external risk is a significant determinant of the

volatility of private consumption as well. In fact, the estimated coefficient on 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.[6]

E. Can a higher level of government consumption stabilize income?

We next turn to another question raised about the central hypothesis: can a higher level of government consumption really help stabilize income?[7] A critical feature of the model discussed previously is that the technologies for private and public production are different. I assumed in particular that the government sector is the safe sector, in which production and incomes are non-stochastic.[8] In practice, however, government consumption is unstable as well, and it will generally covary with all sources of risk including the terms of trade. Whether public production exhibits different stochastic properties than private production is ultimately a question that can be settled only empirically.

A paper by Galí (1994) has documented a robust negative correlation between government size and GDP volatility in the OECD countries. This result is informative for our purposes, but falls short in one respect: Under our maintained hypothesis that government consumption tends to be systematically higher in economies subjected to greater shocks, a cross-country regression that regresses income volatility on the share of government consumption in GDP (as in Gali 1994) is mis-specified. In particular, the coefficient on government consumption in such a regression would be biased downwards. So I take a different approach here, one which is more consistent with the framework of this paper and which relies on the variance-covariance structure of of the components of GDP for 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 the variance-covariance structure 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. 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(dπ, dy_p)* is positive, as strongly suggested by our results in Table 6. Even when government consumption is stochastic, an increase in λ will reduce income volatility provided λ , σ_g^2, and *cov(dπ, 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 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 result is quite striking: a small (permanent) increase in government consumption (as a share of GDP) would result in more stable incomes in the overwhelming 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 that 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 is not severe, as governments have many other objectives besides minimizing risk.

Consider for example a formulation of the government's planning problem that is more

general (but is also more heuristic) than the one laid out above. Suppose the government cares both about risk and economic activity, γ. Let us write its 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 size is costly to real activity either because it has to be financed by distortionary (and growth-impeding) taxes or because government production is less efficient: 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 increasing government size has some cost (see Slemrod 1995 and Cashin 1995 for reviews of the evidence on these costs). 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.

F. Causality issues

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 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. One potential problem this raises is that of endogeneity. Could causality be running from government size to external risk exposure, rather than the other way around? (While I have used lagged measures of openness in the regressions, this obviously does not fully get around the endogeneity problem.)

I try three related approaches to demonstrating causality, all of which rely on extracting the exogenous component of trade shares. We first create a measure of "natural" openness for each country (NATLOPEN) 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. Using NATLOPEN in lieu of OPENAVGxxyy is one way of eliminating potential simultaneous-equation bias. The first column of Table 8 displays the results. Due to the availability of DIST 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.

Second I use a measure recently developed by Frankel and Romer (1996) which is available for a larger set of countries. This is an instrument for trade shares based on geographical determinants similar to those employed here. The major difference is that their instrument is constructed using bilateral trade data and a gravity-like estimating framework. Column (2) of Table 8 shows the results using the Frankel-Romer instrument for openness. The coefficient on external risk remains statistically significant (but at the 90% level).

Finally, an explicit instrumental variables approach using population and distance as instruments (in addition to the other exogenous variables in the benchmark specification) yields the results in column (3). The estimated coefficient on external risk is now larger and significant at the 99% level. Note that our set of instruments (distance and population) is as close to being exogenous as one can hope for in cross-country regressions. The validity of this instrument set

is easily confirmed using standard tests for over-identifying restrictions.

Hence, our results using the exogenous component of openness are quite similar to those obtained earlier. They confirm our theory about the importance of external risk in determining the size of government consumption.

V. Concluding comments

The correlation between openness and government size has a number of implications. For one thing, it makes it more difficult to disentangle the relationship between government size and openness, on the one hand, and economic growth, on the other. Assuming, for example, that openness exerts an independent effect on growth, the typical regression in which growth is regressed on government size would yield a biased coefficient. A similar bias would exist in a regression of growth on trade, if government size has an independent effect on growth.

But there are broader implications as well, with regard to the relationship between markets and governments. We often view these two 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 international integration of markets is often perceived as undercutting the effectiveness of governmental action at the national level. The findings presented in this paper provide a different perspective, suggesting that there may be a degree of complementarity between markets and governments. 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 that the reasons have to do with the provision of social insurance. Openness exerts the strongest influence on government consumption in economies which are subject to the greatest amounts of external risk. Governments appear to have sought to mitigate the exposure to risk by increasing the share of domestic output which

they consume.

This paper has focussed on the cross-country statistical evidence. But there also exists a number of country studies, mostly undertaken by political scientists, which discuss how governments in different parts of the world have responded to the insecurities generated by trade by expanding government programs. Katzenstein (1984 and 1985), for example, has documented in detail how the small European states like Sweden, Austria, and the Netherlands "complement[ed] their pursuit of liberalism in the international economy with a strategy of domestic compensation" (1985, 47)--entailing, among other policies, investment programs, incomes policies, industrial subsidies, and income transfers. The experience of Spain prior to its accession to the EU in 1986 is also instructive: public expenditure on transfers, social programs and compensatory programs aimed at regional inequalities expanded greatly prior to the mid-1980s, partly in anticipation of the eventual impact of EU membership (see Maravall 1993 for an account). In Chile, which had become increasingly open to trade under the Pinochet regime, the first priority of the incoming democratically-elected government in 1990 was "the restoration of benefits for low-and middle-income groups .. and the development of new social programs targeted at high-risk groups..." (Marcel and Solimano 1994, 228).

There are few natural experiments in the social sciences, but the experiences of Spain and Chile perhaps come close. The expansion of social welfare spending in both cases--one of them following the death of a dictator and in anticipation of accession to the EU, the other in the immediate aftermath of transition to democracy following a period of extensive opening up to trade--is illustrative of the hypothesis discussed in this paper. Another case in point, smaller in scope, is the use of trade adjustment assistance (TAA) programs in the United States. These programs cover extended unemployment benefits, and training and relocation subsidies for workers displaced by imports. They have been used (originally in the context of multilateral liberalization in GATT and more recently in NAFTA) as an explicit quid pro quo for labor's

acquiescence in trade liberalization.

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.[9] Looking forward, they also suggest that scaling governments down without paying attention to the economic insecurities generated by globalization may actually harm the prospects of maintaining global free trade.

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
DEPENDxx	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
GSVAT8688	indirect tax revenues on goods and services and VAT	FAD
INTL8688	taxes on international trade	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	
OIL	dummy for oil exporters	
OPENAVGxxyy	exports plus imports divided by GDP	PWT5.6
POPxx	population	WD
PRIMSHRxx	share of primary exports in total exports	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
URBANxx	urbanization rate	WD

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.

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NOTES

I thank a referee and an editor for very useful suggestions, Faruk Gül and Richard Zeckhauser for helpful conversations, Chi Yin for excellent research assistance, and participants at several seminars for comments.

1. Government consumption is defined in the U.N. System of National Accounts as "expenditure, including imputed expenditure, incurred by general government on both individual consumption goods and services and collective consumption services" (U.N. 1993, 516). In view of the difficulty of valuing government services, in practice this item is measured as the cost to the government of the services it provides, including most sgnificantly the wage bill. Some of its main sub-categories are public administration, public order, national defense, health and education.

2. I am grateful to a referee for making this point.

3. The presence of a complete set of state-contingent markets at home would not affect this conclusion as long as the technology employed in government production is not available to the private sector. This is because external risk is not diversifiable domestically.

4. Our results on the importance of exposure to external risk in determining government consumption levels have also been confirmed in a subsequent paper by Commander, Davoodi, and Lee (1996) which uses a somewhat different data set and econometric specification.

5. Removing the OECD countries from the "all countries" sample does not affect the estimated coefficient on external risk (or its level of statistical significance) in column (5) of Table 6.

6. We note also that the results reported in Table 7 are unchanged when exposure to external risk is instrumented in the fashion described in section IV.F below.

7. 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.

8. This difference can derive in practice from the distinct nature of the goods that are typically considered to be public goods--public administration, law and order, and national defense. It can also result from the divergent incentive and governance structures that characterize production in the two For example, there is a large literature on government employment practices which suggests that earnings and employment levels in the public sector tend to be either relatively immune to business-cycle conditions or purposefully countercyclical. See Agenor (1996), Kraay and van Rijckeghem (1995), and Lindauer and Nunberg (1996).

9. 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, <u>its multilateralism would be predicated upon domestic interventionism</u>. (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. Such arguments are reminiscent ot Polanyi's (1944) classic book which argued that unfettered free trade is fundamentally incompatible with social order and stability.

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	6.426	4.439
	(0.536)	(0.383)	(0.990)	(2.872)	(0.936)	(0.852)
log GDP/cap.	-0.030	-0.105***	-0.413*	-0.013	-0.151	-0.194
	(0.084)	(0.063)	(0.143)	(0.448)	(0.133)	(0.121)
log dependency ratio	0.642*	0.630*	0.372	-0.304	0.387	0.146
	(0.241)	(0.193)	(0.499)	(1.457)	(0.388)	(0.353)
log urbanization	-0.203**	-0.136***	-0.006	-0.556	-0.381*	0.080
	(0.093)	(0.075)	(0.185)	(0.537)	(0.123)	(0.112)
socialist	0.169	0.092	-0.559	-1.631***	0.924*	0.260
	(0.130)	(0.100)	(0.413)	(0.909)	(0.227)	(0.207)
OECD	-0.007	-0.014	-0.051	-0.080	0.040	0.384
	((0.144)	(0.122)	(0.246)	(0.851)	(0.254)	(0.231)
Latin America	-0.171	-0.218**	-0.564**	0.122	-0.072	-0.041
	(0.113)	(0.094)	(0.221)	(0.661)	(0.191)	(0.174)
East Asia	-0.206	-0.338**	-0.193	-0.206	-0.693	0.836
	(0.140)	(0.130)	(0.267)	(0.913)	(0.228)	(0.208)
Sub-Saharan Africa	-0.107	-0.239**	-0.161	0.002	-0.100	0.041
	(0.118)	(0.101)	(0.232)	(0.732)	(0.194)	(0.177)
log GCAVG6064					-1.308*	-0.019
					(0.119)	(0.108)
log OPENAVG8089	**0.223***		**0.534***			
	(0.064)		**(0.134)**			
log OPENAVG7584		**0.205***		**0.835****		
		(0.057)		**(0.401)**		
log OPENAVG6064					**0.272***	-0.510*
					(0.094)	(0.086)
Adj. R^2	0.428	0.458	0.456	0.013	0.664	0.360
SE	0.317	0.313	0.558	1.931	0.512	0.466
N	103	125	75	98	99	99

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* (0.091)	0.397* (0.145)	0.267*** (0.154)	0.532* (0.142)	0.349** (0.174)	0.273 (0.292)	0.616* (0.225)	0.618* (0.240)	0.496* (0.111)	0.097 (0.184)
N	81	83	82	84	84	78	81	81	83	81
Adj. R^2	0.244	0.132	0.154	0.085	0.099	0.322	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	bench-mark	splitting the sample by income		controlling for:								
		< $2500	> $2500	country size		external borrowing	inflation	trade taxes		sales taxes and VAT		export revenue from primary exports	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
log OPENAVG7584	0.205* (0.057)	0.266* (0.081)	0.230* (0.083)	0.345* (0.068)	0.221** (0.087)	0.229* (0.070)	0.214* (0.065)	0.385* (0.080)	0.355* (0.067)	0.296* (0.079)	0.315* (0.068)	0.248* (0.060)	0.209* (0.058)
log AREA				0.065* (0.019)									
log POP85					0.005 (0.030)								
log DETGNP85						0.088*** (0.053)							
log inflation rate (1975-90)							0.015 (0.041)						
log INTL8688								-0.098*** (0.057)					
INTL8688/ TOTAL8688									-0.617* (0.227)				
log GSVAT8688										0.027 (0.038)			
GSVAT8688/ TOTAL8688											0.194 (0.286)		
log PRIMSHR85												0.134** (0.056)	
OIL													0.049 (0.117)
Adj. R^2	0.458	0.273	0.447	0.547	0.483	0.429	0.440	0.491	0.521	0.475	0.472	0.460	0.455
N	125	64	61	115	120	89	113	79	79	64	79	107	125

Notes: Same as Table 2.

Table 4: The importance of external risk

Independent variables	*Dependent variable: log of Real Government Consumption as % of GDP (log CGAVG9092)*					
	(1)	(2)	(3)	(4)	(5)	(6)
OPENAVG8089	0.003**	0.000	-0.003	-0.004	-0.005	-0.004
	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
CI90		-0.661		0.429		
		(0.366)		(0.594)		
OPENAVG8089 x CI90		**0.011****		**-0.004**		
		(0.005)		(0.008)		
TOTDLOGSTD			-3.053*	-4.155**	-3.284*	-2.640**
			(1.087)	(1.833)	(1.122)	(1.118)
OPENAVG8089 x TOTDLOGSTD			**0.053***	**0.064****	**0.058***	**0.043****
			(0.017)	(0.027)	(0.018)	(0.020)
OPENAVG8089 x GDPSH589					2.27e-07	
					(2.68e-07)	
OPENAVG8089 x PRIMSHR90						0.003
						(0.003)
N	103	94	97	92	97	96
Adjusted R^2	0.397	0.417	0.438	0.436	0.437	0.446

Notes: Same as table 2.

Table 5: Panel estimation

	dependent variable:				
	log of real government consumption (% of GDP)				Δ real government consumption (% of GDP)
	fixed effects	random effects	fixed effects	random effects	
GDP/cap.	6.17e-06 (7.60e-06)	-1.48e-05* (5.56e-06)	-2.83e-05* (7.83e-06)	-3.60e-05* (5.50e-06)	-8.90e-05*** (4.63e-05)
$openness_{-1}$	0.0018** (0.0008)	0.0011*** (0.0006)	-0.0012 (0.0008)	-0.0007 (0.0006)	
$t.o.t.\ variability_{-1}$	0.2321 (0.2423)	0.1539 (0.2266)	-0.2481 (0.2252)	-0.2985 (0.2193)	
$openness_{-1}$ x $t.o.t.\ variability_{-1}$	**0.0061 (0.0038)**	**0.0087** (0.0036)**	**0.0081** (0.0034)**	**0.0097* (0.0033)**	
Δ openness					-0.0172 (0.0161)
Δ t.o.t. variability					-5.1396*** (3.0161)
Δ (openness x t.o.t. variability)					**0.0997** (0.0482)**
period dummies	no	no	yes	yes	yes
F	11.76		20.34		
Prob > F	0.000		0.000		
chi^2		56.30		217.20	50.11
Prob > chi^2		0.000		0.000	0.000
N	662	662	662	662	472

Notes: Data are period averages for 1960-64, 1965-69, 1970-74, 1975-79, 1980-84 1985-89, and 1990-92 (except for GDP/cap, which is for the beginning of each period).

Table 6: The effect of external risk on social security and welfare expenditures, by income groups

Independent variables	*Dependent variable: log of government expenditure (by type) as % of GDP*					
	OECD countries		Countries with 1985 per capita GDP > $4500		All countries	
	social security and welfare	government consumption	social security and welfare	government consumption	social security and welfare	government consumption
	(1)	(2)	(3)	(4)	(5)	(6)
OPENAVG7584	-0.170* (0.043)	-0.005 (0.010)	-0.043*** (0.021)	0.006 (0.005)	-0.018 (0.013)	-0.002 (0.003)
TOTDLOGSTD	-134.088* (22.147)	-9.371*** (5.198)	-35.010** (12.418)	1.057 (2.732)	-16.484* (5.665)	-2.953** (1.391)
OPENAVG7584 X TOTDLOGSTD	1.869* (0.431)	0.069 (0.101)	0.438** (0.210)	-0.039 (0.046)	0.183*** (0.096)	0.048** (0.023)
N	19	19	25	25	68	68
Adj. R^2	0.75	0.35	0.23	0.05	0.48	0.50

Notes: See appendix for variable definitions. Regressions in columns (5) and (6) include other regressors in the benchmark specification, coefficients on which are not shown.

Table 7: 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

Table 8: Exogenous measures of exposure to external risk (dependent variable: log CGAVG8589)

Independent variables	Estimation method		
	OLS NATLOPEN used for openness	OLS Frankel-Romer measure used for openness	IV
	(1)	(2)	(3)
Openness	-0.005 (0.004)	-0.001 (0.004)	-0.006** (0.003)
TOTDLOGSTD	-2.899** (1.373)	-0.886 (0.722)	-4.360** (1.102)
Openness x TOTDLOGSTD	0.058** (0.027)	0.043*** (0.025)	0.076* (0.018)
N	82	116	82
Adj. R^2	0.46	0.42	0.60

Notes: Coefficients on other included regressors are not shown. Column (3) uses log population (POP85), log distance (DIST), and the exogenous variables in the benchmark specification (alone and interacted with TOTLOGSTD) as instruments for Openness and Openness x TOTDLOGSTD.

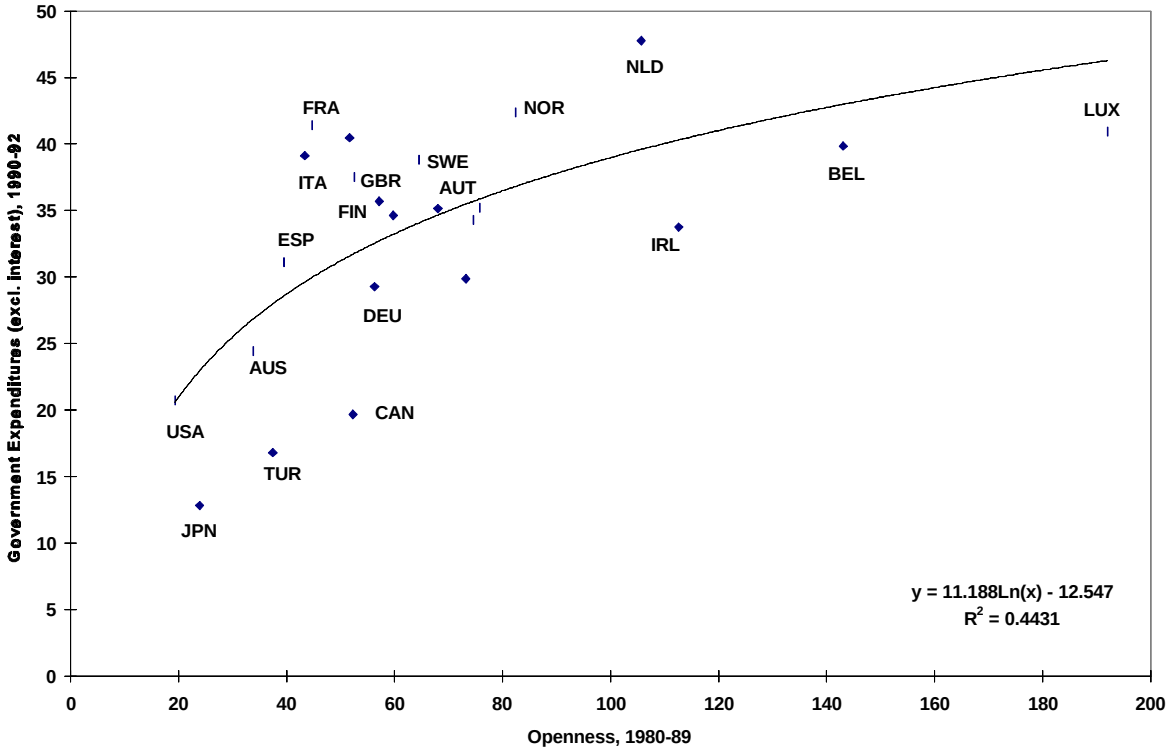

Figure 1 Relationship between openness and government expenditures

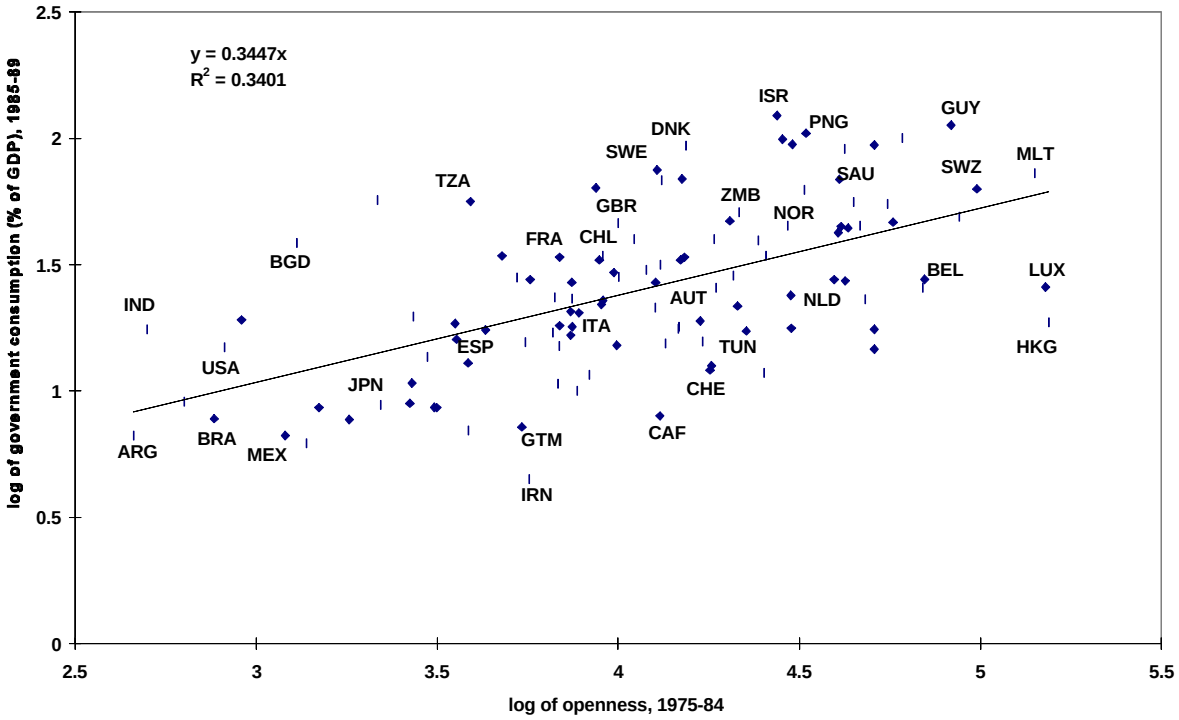

Figure 2: Partial relationship between openness and government consumption (controlling for per-capita income, urbanization, dependency ratio, area, and regional dummies)