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Value-Added Taxes and International Trade: The Evidence

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ABSTRACT

This paper examines the effect of value-added taxes (VATs) on international trade. Destination-based VATs are commonly thought to encourage exports, since exports are exempt from tax while imports are taxed. Economic theory implies that exchange rate adjustment prevents destination-based VATs from affecting exports and imports, since exchange rate appreciation completely undoes the effects of introducing a VAT. Indeed, this proposition is so well accepted among economists that it has not been subjected to serious prior testing. Evidence from 136 countries in 2000 indicates instead that reliance on VATs is associated with fewer exports and imports. Countries using VATs have one-third fewer exports than do countries not using VATs, and 10 percent greater VAT revenue is associated with two percent fewer exports. A similar pattern appears in an unbalanced panel of 168 countries from 1950-2000, in which VAT use is associated with 12 percent fewer exports. These patterns persist with the inclusion of income and geographic controls, and while the effect of VATs on exports is stronger among low-income countries than it is among high-income countries, there is a significant negative effect of VATs on exports even among high-income countries. The behavior of American multinational firms in 1999 is consistent: ten percent greater local VAT collections are associated with 5 percent fewer exports by local American-owned affiliates. Two features of VAT implementation may account for these effects: VATs tend to be imposed at higher rates on traded goods than on nontraded goods, and exporters often receive only incomplete VAT rebates.

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1. Introduction

Value-added taxes (hereinafter, VATs) represent important sources of government revenue in most of the world outside the United States. Over the last half-century, VATs have been adopted in the vast majority of developed and developing economies and, for these economies, provide an average of one quarter of government revenue. While VATs differ in detail, their common structure is that they tax final consumption by imposing taxes on activities (“value added”) along the production chain. One can reasonably think of a VAT as a sensible form of a sales tax, with the important distinction that a VAT does not tax sales of intermediate goods from one business unit to another. Since these intermediate goods include capital investment goods, VATs do not tax, and thereby discourage, capital investments in the way that corporate income taxes do. As a result, VATs are thought to be very efficient devices for raising government revenue, which has contributed to their growing popularity.

Most of the world’s VATs are destination-based, which means that the taxes are imposed only on goods and services consumed within the taxing jurisdiction. Under a properly-working destination-based VAT, exports receive rebates equal to the amount of VAT paid in the course of producing the exported item, while imports are subject to the VAT at the same rate as domestically-produced goods. Since a destination-based VAT is a tax imposed on imports and on other domestically-consumed goods, and effectively not imposed on exports, it is a commonplace belief that a VAT encourages exports, possibly at the cost of imports and domestic consumption.

The theory of international trade offers a very different prediction. In theory, the destination-based nature of a VAT should have no effect whatsoever on exports and imports.

The reason is that exchange rates adjust to undo the effects of VATs on incentives to export and import. If a country imposes an 8 percent destination-based VAT on all goods and services, and its exchange rate appreciates by 8 percent as a result, then returns to importers and exporters will not change. This kind of one-for-one adjustment of exchange rates to a destination-based VAT is exactly what theory predicts, and as a consequence, VATs are not expected to influence patterns of international trade.

In practice, VATs may substitute for other taxes (such as corporate income taxes) that affect imports and exports, VATs are often nonuniformly applied to goods and services, and there are some difficulties in VAT administration that prevent exporters from receiving VAT rebates – all of which have the potential to influence export behavior. As these considerations are typically thought to be of minor importance, the received wisdom of international trade theory is that destination-based VATs should affect exchange rates but not imports or exports. This theory is so widely accepted that it has seldom, if ever, been subjected to tests based on actual experience.

The purpose of this paper is to consider evidence of the effect of VATs on international trade patterns. The results are consistent neither with the commonplace view that VATs encourage exports, nor with the theoretical prediction that VATs do not affect trade. Instead, the evidence indicates that countries relying on VATs have fewer exports and fewer imports (as a fraction of GDP) than do countries relying on taxes other than VATs. Countries using VATs have one-third fewer exports than those not using VATs, after controlling for income and various geographic attributes. The surprising negative correlation between VAT reliance and international trade is strongest among low-income countries, but is present even within a high-

income subsample of countries. This negative correlation persists as additional variables, including country fixed effects, are added to the analysis.

Practical considerations of VAT experience suggest likely culprits for the trade-retarding effects of VATs. Countries find themselves most able to tax the trade-related sectors of their economies, and typically impose VAT rates at higher effective rates on traded sectors than on nontraded sectors. As a result, countries that rely on VATs effectively tax traded sectors at higher relative rates than do economies that do not rely on VATs, and have smaller import and export sectors as a result. In addition, most countries collect VATs promptly on imports, but fail to provide VAT export rebates in a timely and complete fashion. Consequently, VATs in practice have some of the same features as tariffs on imported goods, which reduce imports and therefore also reduce exports.

The use of VATs to collect revenue reflects conscious choice on the part of governments, so one of the difficulties of interpreting the correlation of VAT reliance and international trade performance is that both measures may reflect the impact of omitted variables related to local economic and political conditions. For example, low-income countries might have difficulty raising tax revenue with any instruments other than a VAT, and might also have weak export sectors. Since national income is measurable, its effect on international trade can be incorporated in the analysis, but a host of other variables are impossible to include, and could plausibly influence the sign and magnitude of the estimated VAT effect.

The analysis addresses the problem of correlated omitted variables in three ways. The first is by including country fixed effects in estimating VAT effects on a panel of countries over the 1950-2000 period, in an effort to control for time-invariant omitted variables that differ

across countries. The estimated effect of VATs on openness and exports continues to be negative in the presence of country fixed effects. The second method used to address the problem of policy endogeneity is to estimate the effect of VAT interactions with per capita GDP. There is good reason to believe that low-income countries are the most likely to impose relatively high VAT rates on traded sectors of their economies, and are the least likely countries to offer exporters timely VAT rebates. Hence, to the extent that the negative association between VATs and international trade reflects incentives rather than the impact of omitted variables, it follows that VATs should discourage trade most strongly in low-income countries – which is consistent with the evidence.

Finally, it is possible that governments whose local firms have difficulty exporting choose to raise revenue with VATs in the hope of improving export performance. The weak export market for local firms should also create a market opportunity for foreign-owned multinationals, so it would follow that the foreign affiliates of American multinational firms might then be active exporters in countries that rely heavily on VATs. The evidence indicates that the opposite is the case: the foreign affiliates of American firms do less exporting from countries relying on VATs than they do from other countries, which is consistent with the incentives that they face from high rates of VAT and the inability to collect complete rebates for their exports.

Section two of the paper reviews the theory of VAT impacts on trade, and the empirical literature on the determinants of economic openness. Section three describes the data used in the empirical analysis, and considers correlations between VAT use and measures of international trade. Section four presents regression results for 136 countries in 2000, an unbalanced panel of 168 countries from 1950 to 2000, and the behavior of the foreign affiliates of American

multinational firms in 52 countries in 1999. In all of these regressions, greater reliance on VATs is associated with reduced exports and openness, after controlling for observable determinants of trade. Section five is the conclusion.

2. *Received wisdom concerning VATs and trade.*

Destination-based VATs are rebated on exports and imposed on imports, two features (known as “border adjustments”) that almost irresistibly suggest that such tax systems encourage exports. As long as prices and exchange rates are determined by market forces, however, the border adjustments under destination-based VATs should not affect either exports or imports. The reason is that price levels and nominal exchange rates adjust to offset perfectly the effect of border adjustments. This mechanism has been appreciated by the international trade literature for some time,¹ and while perhaps counterintuitive, is nevertheless universally accepted by economists.

The theory of international trade starts from the observation that trade is balanced over time, meaning that the present value of a country’s imports must equal the present value of its exports. Trade balance reflects the simple notion that countries are unable to sustain long-run deficits with the rest of the world, nor do they have incentives to maintain long-run surpluses. One consequence of trade balance is that policies, such as tariffs, that discourage imports thereby indirectly also reduce exports. The circular flow of international trade also holds the secret to the unimportance of border adjustments under destination-based VATs, since the simultaneous export incentive with VAT rebates and import disincentive with VAT imposition has no net effect on either exports or imports.

¹ The earliest comprehensive statement of this proposition appears in European Coal and Steel Community, High Authority (1953), known as the “Tinbergen Report.” Subsequent treatments appear in Shibata (1967), Johnson and Krauss (1970), Meade (1974), Floyd (1977), Grossman (1980), and Feldstein and Krugman (1990).

It is useful to think of a country exporting a commodity and subsequently importing the same commodity. With a smoothly-functioning VAT there would be no tax consequence of such a round trip, since the VAT that is rebated at export would be reimposed at import. A destination-based VAT is a tax on net imports (imports minus exports), and since trade balance implies that net imports equal zero in present value, the VAT neither encourages nor discourages exports.² Tariffs are taxes imposed on gross imports, so they discourage both exports and imports by making circular trade costly.

Where destination-based VATs have the potential to influence trade is through the high rates at which they are often applied to traded sectors of economies.³ Feldstein and Krugman (1987) argue that this differential taxation is likely to induce a negative correlation between VAT use and export performance. To this point should be added the consideration that VAT export rebates are often incomplete and received with great delays. In addition, VATs substitute for other taxes that have the potential to affect exports and imports, and VATs facilitate government growth that also may directly influence international trade.⁴ Consequently, in order to establish the impact of VATs on trade it is necessary to examine the experience of countries adopting and relying on VATs.

3. Data.

The analysis of the impact of VATs on international trade draws on sources covering country-level macroeconomic data, sources that describe the proliferation and reliance on VATs,

² As noted by Frenkel and Razin (1987), among others, there is a potential one-time wealth effect of introducing a destination-based VAT in a country with nonzero net international balances, since such a country will not have perfectly balanced trade going forward.

³ See the evidence reported by Ebrill et al. (2001).

⁴ On the connection between VATs and government growth, see the evidence reported by Stockfish (1985). Hines (2002) notes that Michigan is the only U.S. state to impose a value-added tax, and that its burden (possibly as a result) exceeds that of any other state corporate income tax.

and sources that detail the activities of the foreign affiliates of American multinational firms.

Basic descriptive statistics for the variables employed in the regression analysis that follows are provided in Table 1.

Country level trade and macroeconomic data from 1950 to 2000 are drawn from the Penn World Tables (PWT) (version 6.1 – updated in October 2002) as described in Heston, Summers and Aten (2002). The PWT provide a measure of economic openness that is defined as total trade (exports plus imports) divided by GDP; this is the primary dependent variable of interest in the regressions reported in section 4.⁵ Separately, the PWT 6.1 provides data from national economic accounts that include measures of exports and imports in current and constant prices. These measures of exports and imports are used separately to evaluate the impact of VATs on trade. Additionally, per capita measures of income from the PWT are also used to control for a variety of country characteristics. Rose (2002b) provides a standard set of geographic variables that are correlated with trade intensity and are used in the regression analysis that follows. In order to compare the effects of VATs and tariffs, the paper also employs a measure of import duties taken from the *World Development Indicators* for 1970-1998 as provided and discussed in Rose (2002b). The openness variables averaged 0.6571 over the period from 1950 to 2000, and averaged 0.8940 in 2000. Figure 1 depicts aggregate postwar trends by plotting GDP-weighted openness from 1950 to 2000, during which average openness rose from slightly above 0.20 to approximately 0.50. These figures reflect the relatively lower reliance on trade among larger economies and the dramatic change in openness during this period.

Ebrill, Keen, Bodin, and Summers (2001) provide a detailed analysis of VATs around the world. In particular, the analysis that follows uses their data on years of adoption for countries

⁵ The PWT provide an unbalanced panel of data with as many as 168 countries represented in 1996 to as few as 54 in 1950.

employing a VAT, and on the share of government revenue and GDP in 2000. The dramatic growth in countries using VATs over last half-century is depicted in Figure 1. As described in Table 1, VAT revenues represent twenty percent of government revenues in the sample countries; restricting the sample to those countries using VATs raises the revenue ratio to twenty-five percent.

The Bureau of Economic Analysis (BEA) 1999 survey of U.S. Direct Investment Abroad provides data on the financial and operating characteristics of U.S. firms operating abroad.⁶ These surveys ask reporters to file detailed financial and operating items for each affiliate and information on the value of transactions between U.S. parents and their foreign affiliates. The International Investment and Trade in Services Survey Act governs the collection of the data and the Act ensures that “use of an individual company’s data for tax, investigative, or regulatory purposes is prohibited.” Willful noncompliance with the Act can result in penalties of up to \$10,000 or a prison term of one year. As a result of these assurances and penalties, BEA believes that coverage is close to complete and levels of accuracy are high.

U.S. direct investment abroad is defined as the direct or indirect ownership or control by a single U.S. legal entity of at least ten percent of the voting securities of an incorporated foreign business enterprise or the equivalent interest in an unincorporated foreign business enterprise. A U.S. multinational entity is the combination of a single U.S. legal entity that has made the direct investment, called the U.S. parent, and at least one foreign business enterprise, called the foreign affiliate. In order to be considered as a legitimate foreign affiliate, the foreign business enterprise should be paying foreign income taxes, have a substantial physical presence abroad, have separate financial records, and should take title to the goods it sells and receive revenue from the sale.

In order to construct the variables related to the trading propensities of U.S. multinationals, measures of trading intensities comparable to those employed at the country-level are developed. Specifically, multinational openness is the sum of aggregate affiliate exports and imports of goods by all American-owned affiliates in a country, normalized by the gross product of those affiliates in 1999. Export and import shares are the constituent parts of that measure. In 1999, the mean of the openness measure was 0.6123 and the median was 0.3984 for U.S. multinationals. Given that U.S. multinationals have productive activities that are centered in the United States, these trading propensities may take on the properties of bilateral trading relationships with the United States. Accordingly, geographic variables that are used in gravity models of bilateral trade (including distance, common borders, common language) taken from Rose (2002a) are employed to control for these other determinants of multinational trading intensity.

Figures 2 and 3 consider the relationship between measures of trade intensity and reliance on VATs. In Figures 2a and 3a, plots of the relationship between openness and export shares, respectively, and the share of tax revenues associated with VATs, are provided for all countries employing VATs. While only suggestive, higher reliance on VATs is associated with lower levels of openness and lower export shares. This suggestive relationship could simply reflect the experiences of lower income countries, where VATs may impede trade due to associated administrative complexity. Figures 2b and 3b provide this same plot between openness and exports shares, and reliance on VATs, for the half of the sample with higher than median per capita income.⁷ The persistence of this relationship suggests that the suggestive link between reliance on

⁶ This description draws on Desai, Foley, and Hines (2002a). The final results from the 1999 Benchmark survey are not yet available. The paper employs the data published in BEA (2002) as *U.S. Direct Investment Abroad: Preliminary Results from the 1999 Benchmark Survey*.

⁷ The median per capita income country in the sample is Bulgaria.

VATs and trading propensities is not merely the function of peculiarities associated with low-income countries.

The same relationship between openness and VAT reliance is depicted for U.S. multinationals in Figure 4. Given the transfer pricing incentives that might influence this relationship, the ratio of VAT revenues to GDP is employed as a measure of reliance on VATs.⁸ While the importance of gravity-based variables is clear given the prominence of Canada and Mexico, the basic negative relationship between openness and reliance on VATs noted in Figures 2 and 3 is evident in a suggestive way for U.S. multinationals as well.

4. Evidence.

This section considers evidence of the effects of VATs on economic openness and exports. The method is to regress these measures of international trade on explanatory variables that include indicators of VAT use, in order to identify any independent effect of VATs. Three separate types of evidence are considered: aggregate trading behavior in a 2000 cross-section of 136 countries, aggregate trading behavior in an unbalanced panel of 168 countries from 1950 to 2000, and evidence of the trading behavior of the foreign affiliates of American multinational firms in 52 countries in 1999.

4.1. Cross-sectional evidence for 2000.

Table 2 presents the results of cross-sectional regressions using data for 2000; in the regressions presented in the top panel, the dependent variable is the degree of a country's openness, and in the bottom panel, the dependent variable is the ratio of exports to GDP. The

⁸ Using the VAT share of tax revenues may influence this link as corporate income taxes may change trading propensities. For the link between income and non-income taxes and trading patterns of U.S. multinationals, see Desai, Foley and Hines (2002b).

sample consists of 136 countries for which data are available, though the availability of GDP data restricts the sample to 133 countries in some regressions.

The first column of the top panel of Table 2 presents estimated coefficients from a regression in which the dependent variable is the degree of openness, and the sole explanatory variable (other than the constant) is a dummy variable that equals one if a country uses a VAT, and equals zero otherwise. The -0.2060 estimated coefficient on the VAT dummy variable indicates that VAT use is associated with 21 percent fewer exports plus imports, though this coefficient is not statistically significant. This regression does not control for other considerations, such as income, that are likely to influence international trade behavior, but instead serves largely to confirm that the visual pattern evident in Figure 2a indeed reflects a negative correlation between VATs and openness.

The effect of VAT use on international trade patterns may differ between countries due to differences in VAT administration, zero-rating and other forms of reduced taxation of certain commodities, and other reasons. There is evidence (Ebrill et al., 2001) that low income countries encounter more practical difficulties than do others in rebating taxes on exports, and exhibit the greatest reliance on taxing traded goods under their VATs. It follows that, to the extent that the negative relationship between economic openness and VAT use reflects responses to economic incentives rather than some form of selection, the relationship should become stronger as per capita income falls. Column two reports estimated coefficients from a regression that adds an interaction between the VAT dummy variable and the log of per capita income. The negative and significant coefficient on the VAT dummy variable, along with the positive and significant coefficient on the interaction between the VAT dummy and the log of per capita income, together imply that the use

of VATs is more closely associated with reduced openness among low-income countries than it is with high-income countries.

The regression reported in column three of Table 2 adds three powers of log GDP (the coefficients of which are not reported) in order to control for any effects of income differences. Inclusion of GDP variables increases the magnitude of the estimated coefficient on the VAT dummy variable to -0.2968 , and it is statistically significant. The regression reported in column four adds geographic variables (the area of the country, dummy variables indicating whether the country is landlocked or an island, and two remoteness variables that are constructed as the inverse of distance-weighted GDP). Controlling for geographic considerations further increases the magnitude of the estimated effect of VATs to -0.3217 .

Columns 5-8 of the top panel of Table 2 repeat these regressions, replacing the dummy variable indicating use of VATs with the ratio of VAT revenues to total tax collections. This variable distinguishes between countries (such as Japan) that use VATs to collect modest fractions of their tax revenue from those (such as Argentina and Peru) that rely heavily on VATs for government revenue. The results are similar to those reported in columns 1-4. Greater reliance on VATs is associated with reduced openness, as indicated by the -1.0391 coefficient in column 5, and the results reported in column 6 indicate that the effect of VATs on openness is strongest among low-income countries. In the specification that includes GDP and geographic controls, reported in column 8, the estimated -0.7785 coefficient implies that 10 percent greater reliance on VATs as a source of government revenue is associated with 8 percent reduced openness.

The bottom panel of Table 2 presents the determinants of exports, which is one component of openness. This panel presents estimated coefficients from regressions in which the dependent

variable is the ratio of exports to GDP, and the independent variables are the same as those used in the regressions reported in the top panel of Table 2. Export behavior exhibits the same pattern as does openness, in that VATs are associated with reduced exports, and the effect of VATs on exports is strongest at lower income levels. In the regression reported in column 4 of the bottom panel of Table 2, the -0.1461 coefficient implies that the use of VATs is associated with 15 percent fewer exports as a share of GDP. Since the mean ratio of exports to GDP in 2000 was 42 percent, the estimated effect of VATs is quite large. VAT rates on trade-intensive industries might average 25 percent, so it follows that these taxes are responsible for a 25-35 percent reduction in exports, reflecting average export elasticities exceeding unity.⁹

Columns 5-8 of the bottom panel of Table 2 present estimated coefficients from regressions in which the VAT dummy variable is replaced by the ratio of VAT revenues to total government tax collections. VAT reliance continues to be associated with reduced exports in these specifications. The estimated -0.3744 coefficient in column 8 indicates that the difference between not using a VAT and replacing all other taxes with VATs is associated with 37 percent fewer exports as a fraction of GDP. Since exports as a fraction of GDP have a mean of 42 percent, it follows that great reliance on VATs is associated with significantly reduced exports.¹⁰ Estimated effects of VATs on imports, not reported in the tables, are similar to those for exports.

4.2. *VAT effects in a panel of countries.*

The evidence reported in Table 2 indicates that countries using VATs to finance their governments in 2000 are less open, and have fewer exports, than those not using VATs. It is

⁹ Sawyer and Sprinkle (1996) suggest that the elasticity of exports from the United States is in the neighborhood of unity, based on their survey of empirical studies of aggregate U.S. export and import elasticities. See also Hooper, Johnson, and Marquez (1998). Smaller countries may have export elasticities that exceed these.

useful to consider the behavior of a panel of countries over a much longer period of time in order to determine whether these correlations persist over time.

Table 3 displays estimated coefficients from regressions using data from an unbalanced panel of up to 168 countries over the 1950-2000 time period. The dependent variable in the regressions reported in the top panel of Table 3 is economic openness. The results closely resemble those obtained by analyzing the 2000 cross-section, and reported in Table 2. Columns 1-4 report estimated coefficients on VAT dummy variables that equal one if a country uses VATs. The evidence indicates that the use of VATs is associated with reduced openness, the effect being strongest for low-income countries. The -0.1749 coefficient reported in column 3 implies that countries using VATs are 17.5 percent less open (as a fraction of GDP) than others. Since the mean ratio of openness to GDP is 0.89, this represents 20 percent reduced openness.

The panel structure of the data permits the introduction of country fixed effects, which control for time-invariant features of a country's economy that affect international trade. Column 4 of Table 3 reports estimated coefficients from regressions that include country fixed effects, year controls, GDP controls (that in this case pick up the effect of growth rates that differ between countries over the 1950-2000 period), and geographic controls. Reliance on VATs continues to be associated with reduced openness, but the magnitude of the estimated effect falls considerably. The estimated -0.0274 coefficient in column 4 indicates that VAT use is associated with 2.7 percent reduced openness, which is one-sixth the size of the effect estimated in the regression (reported in column 3) that omits country fixed effects. There are two reasons why this coefficient is so much smaller in magnitude than the estimated effect of VATs when country fixed effects are

¹⁰ No government relies exclusively on a VAT for its tax revenue. The highest value of the VAT tax revenue share variable in 2000 is 53.2 percent (Peru), while the lowest value is zero.

omitted. The first reason is that the panel regression with fixed effects controls for country features including whether or not it ever adopts a VAT, so the VAT coefficient is identified only by timing changes as an economy reacts to the introduction of a VAT. Any sluggishness in the reaction of exports and imports to VAT adoption is likely to be reflected in downward bias in the magnitude of the estimated effect of VATs on international trade. The second reason for the significantly smaller coefficient magnitude in column 4 is that the fixed effects remove the impact of omitted variables (such as political and economic considerations) that are correlated both with economic openness and with decisions to use VATs.

The regressions reported in columns 5-8 of the top panel of Table 3 use VAT shares of total tax revenue in place of the VAT dummy variable.¹¹ The results are similar to those obtained using the VAT dummy variable: greater reliance on VATs is associated with reduced openness, the effect being strongest at low income levels. The estimated -0.5867 coefficient in column 7 indicates that ten percent greater reliance on VATs is associated with 6 percent reduced openness. The estimated magnitude of the impact of VAT revenue shares falls considerably with the introduction of country fixed effects, as reported in column 8, since the estimated -0.0978 coefficient implies that openness declines by slightly less than one percent in response to ten percent greater reliance on VATs.

The bottom panel of Table 3 reports export regressions for the 1950-2000 panel. Reliance on VATs is associated with reduced exports in the panel, the effect again being strongest at low

¹¹ Due to the difficulty of obtaining annual data on VAT collections and government revenues, VAT shares of total tax revenue are drawn from Ebrill et al. (2001, pp. 9-12), which report ratios for the most recent years available for each country. The operating assumption in using these data is that VAT revenues are zero prior to VAT introduction, and subsequently remain a constant fraction of total tax revenue. This assumption is obviously unrealistic, though the variable does distinguish between countries that rely heavily on VATs (in recent years) and those that do not. The use of this variable also may reduce the chance that the results are sensitive to the endogeneity of VAT collections to

income levels. The estimated -0.0714 coefficient on the VAT dummy variable in column 3 of the bottom panel of Table 3 indicates that VAT use is associated with seven percent fewer exports as a share of GDP, which is approximately eight percent of mean exports. Introduction of country fixed effects in the regression reported in column 4 greatly reduces the magnitude of the estimated coefficient. Columns 5-8 report estimated coefficients from regressions in which the VAT dummy variable is replaced by the VAT share of total tax revenue. Greater reliance on VATs has a negative and significant effect on exports in all of these specifications, and the effect is strongest for low-income countries. The estimated -0.2601 coefficient in column 7 of the bottom panel of Table 3 indicates that ten percent greater VAT tax shares reduce exports by 2.6 percent of GDP, or six percent of mean exports. The use of country fixed effects in the regression reported in column 8 reduces the magnitude of the estimated VAT effect considerably, though it remains negative and significant.

The evidence points consistently to a greater impact of VATs on openness and trade in low-income countries than in high-income countries. This pattern raises the possibility that the estimated trade impact of VATs for the large sample of countries reflects economic or political features of low-income countries, apart from those related to VAT administration, that might not apply to high-income countries. In order to check this possibility, the regressions reported in Table 3 were re-run on observations from half of the countries in the original sample, those with per capital incomes equal to or exceeding that of the median country (Bulgaria). The results are reported in Table 4.

international trade levels. As a general matter, however, the noisiness of the nonzero values of the VAT/GDP variable in the panel is likely to reduce the estimated effect of VATs on international trade.

The results for high-income countries reported in Table 4 are generally consistent with results for the whole sample reported in Table 3. The estimated -0.2072 coefficient on the VAT dummy variable in column 3 of the top panel of Table 4 (in which the dependent variable is openness) is of slightly greater magnitude than the corresponding coefficient in Table 3. Similarly, the estimated -0.7447 coefficient in column 7 of the top panel of Table 4 is somewhat larger than the corresponding coefficient in Table 3. The export share regressions, reported in the bottom panels of Tables 4 and 3, are likewise generally similar. One notable difference between the results presented in Table 4 and those in Table 3 appears in the specifications (reported in columns 4 and 8) that include country fixed effects. In the high-income sample VAT reliance has a positive estimated effect on economic openness when fixed effects are included, though the positive coefficients are statistically insignificant in the regressions (reported in column 4) that use the VAT dummy variables.

A host of economic and policy variables have the potential to influence international trade patterns,¹² making it impossible to control for all of their effects while estimating the impact of VATs. Since tariffs clearly influence incentives to import and export, and VATs share some of their features, it is useful to check whether VATs continue to influence openness and exports after controlling for the effects of tariffs.

Table 5 presents estimated coefficients from regression specifications that are the same as those reported in Table 3 except that they include a variable measuring average tariff rates. The estimated effects of VAT reliance on openness and exports are quite similar to those reported in Table 3, the primary difference being that estimated VAT effects are not statistically different from

¹² See Feenstra (1995) and Leamer and Levinsohn (1995) for surveys of empirical studies of factors influencing international trade behavior.

zero in specifications including country fixed effects and average tariff rates. Higher tariff rates reduce openness and exports in all specifications. The magnitude of estimated tariff effects is generally consistent with those of estimated VAT effects. Thus, in column 3 of the top panel of Table 5, the estimated -0.1875 coefficient on the VAT dummy variable is approximately one-fifth the magnitude of the estimated -0.8282 coefficient on tariff levels, implying the use of VATs has roughly the same trade effect as do 20 percent tariff rates.

4.3. *VAT effects on trade by American multinational firms.*

One possible interpretation of the results reported in Tables 2-5 is that governments whose economies exhibit poor export performance might react by adopting VATs, either as a matter of free choice or as a consequence of pressure from multilateral agencies. In this interpretation, governments adopt VATs because they believe that doing so will stimulate exports, but if the export effect is not immediate, then the data might show a negative short-term relationship between VATs and export performance.

The export behavior of the foreign affiliates of American multinational firms offers a window into the extent to which endogenous VAT adoption might account for the results reported in Tables 2-5. American-owned affiliates in foreign countries typically produce and sell much of their output locally, somewhat less frequently exporting and importing goods with other countries. It is possible to construct an “openness” measure of the behavior of these affiliates, defined as the ratio of their exports plus imports to gross product. If firms in a country in which an affiliate is located are insufficiently engaged in international trade relative to market fundamentals, to the point that the local government is willing to change tax policy to encourage trade, then there are also market opportunities for foreign multinationals to enter the market to exploit profitable trading

opportunities. Hence if VAT rates do not influence international trade directly, but are instead endogenous to the international trading behavior of locally-owned firms, then it should be the case that VAT rates are also associated with greater exports and openness on the part of American multinational firms.

Table 6 presents estimated coefficients from regressions explaining the international trade behavior of the foreign affiliates of American multinational firms in 2000 as a function of local VAT rates, GDP controls, and geographic variables. The results are not consistent with the simple endogeneity interpretation of VAT adoption, since greater reliance on VATs is associated with reduced openness and reduced exports. Openness regressions are reported in columns 1-3; the estimated -8.3379 coefficient on the VAT share variable in column 3 indicates that one percent higher VAT rates are associated with 8 percent reduced openness. Similarly, the -3.2177 coefficient on the VAT share variable in column 6 indicates that affiliates located in countries with high VAT rates do less exporting than other affiliates, measured as fractions of gross product. Since there is ample evidence that the level of American multinational activity in a country is a function of local tax rates,¹³ the VAT rate variable used in these regressions is the ratio of VAT collections to GDP.

It appears that the foreign affiliates of American firms respond to VATs in much the same way as do local firms: by reducing their exports and imports. While this evidence does not demonstrate that all of the estimated effects of VATs on international trade reflect responses to induced changes in relative prices, it does imply that a certain form of endogeneity is not responsible for the sign and significant magnitude of the estimated effects. The behavior of American multinational firms also confirms that the patterns observed in the behavior of all

exporters and importers around the world appear as well among the transactions of some of the world's most economically advanced companies.

5. *Conclusion.*

The proposition that value-added taxes encourage exports by rebating taxes at the border appears to have no empirical foundation. Instead, countries that rely heavily on VATs export and import less as a fraction of GDP than do other countries, and the negative relationship between VATs and exports persists after controlling for observable variables. The negative effects of VATs on international trade are most pronounced among lower-income countries, though they are present among high-income countries and in the behavior of the foreign affiliates of American multinational firms. While it is difficult to rule out the possibility that countries using VATs would have even worse export performance if they were forced to rely on corporate income taxes or other methods of raising the same tax revenues, none of the evidence appears to point in this direction.

It is important to interpret this evidence properly. The negative relationship between VATs and international trade reflects the experience of countries using VATs over the 1950-2000 period, but it need not apply to a country currently adopting a well-designed and properly-administered VAT. The reasons that VATs impede international trade is that they tend to be imposed most heavily on traded sectors of economies, governments often fail to provide adequate VAT rebates for exports, VATs replace other taxes that may influence trade, and VATs encourage the growth of government. Governments contemplating the introduction or expansion

¹³ See the evidence in Desai, Foley, and Hines (2002a,b), and the findings of studies surveyed by Hines (1999).

of VAT use have it within their powers to address all of these issues, if they so choose; what the data reflect are average results of past policies.

Economic theory holds dear the notion that destination-based VATs do not affect trade, doing so with sufficient conviction that the empirical relationship between VAT usage and export and import performance is seldom if ever analyzed. The finding that, in practice, VATs are associated with reduced exports and imports serves as a reminder not only of the usefulness of examining theories in the cold light of experience, but also that the details of tax policy implementation can significantly influence their effects. The results suggest that VAT practice differs markedly from VAT theory, and point to the potential salutary effects of reforming VAT administration in countries around the world.

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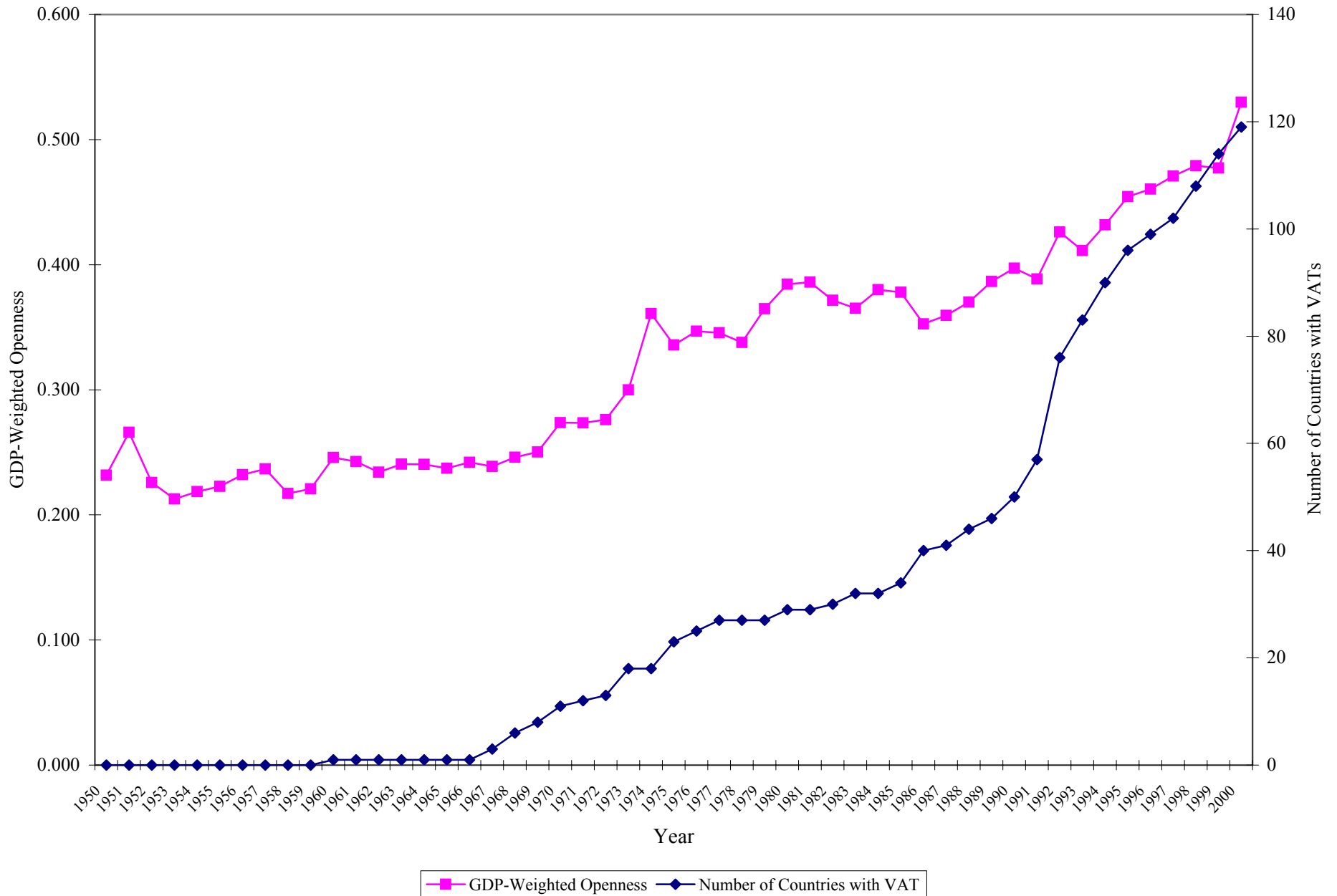
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Figure 1: The Evolution of VAT Adoption and GDP-Weighted Openness, 1950-2000



Note: The left axis measures GDP-Weighted Openness and the right axis measures the number of countries with a VAT.

Figure 2a: The Relationship Between VAT Reliance and Openness, 2000

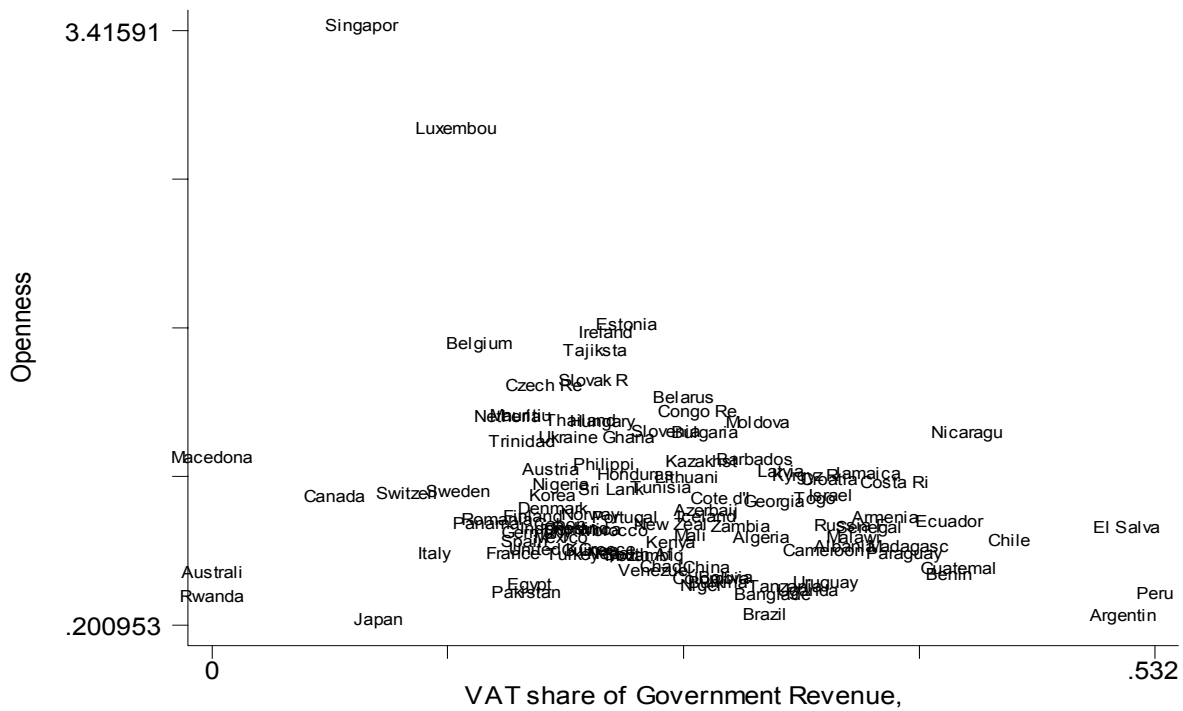
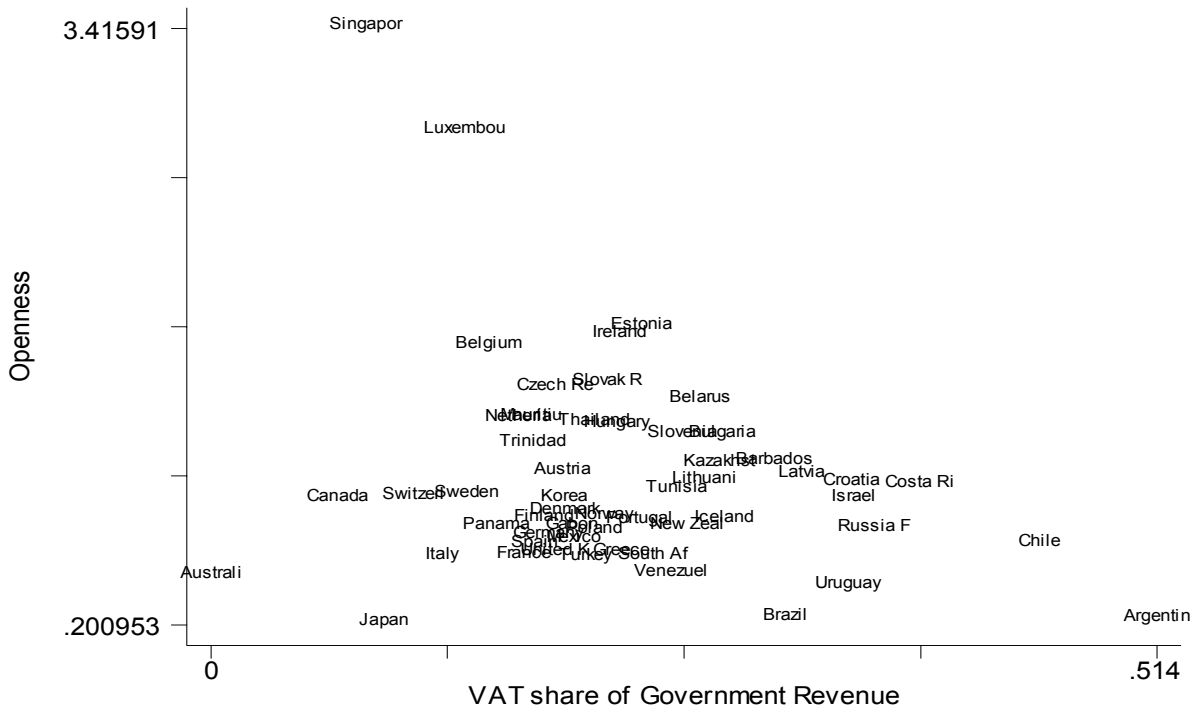


Figure 2b: The Relationship Between VAT Reliance and Openness for High-Income Countries, 2000



Notes: The figures presents a scatterplot of countries comparing levels of openness against the reliance on VATs in 2000. "Openness, 2000" is the ratio of total trade (exports plus imports) to GDP in 2000. "VAT Share of Government Revenue, 2000" is the ratio of total VAT revenues to total tax revenue in 2000. The top figure is for all countries and the bottom figure is restricted to countries with a higher than median per capita income.

Figure 3a: The Relationship Between VAT Reliance and Export Shares, 2000

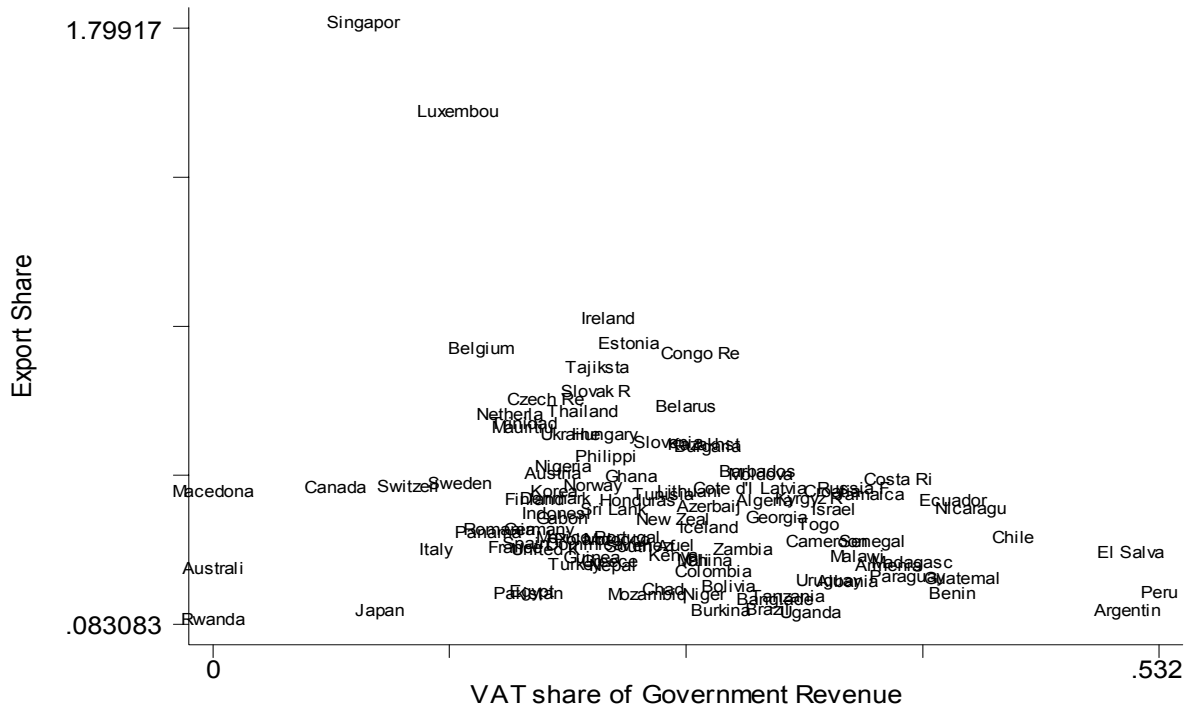
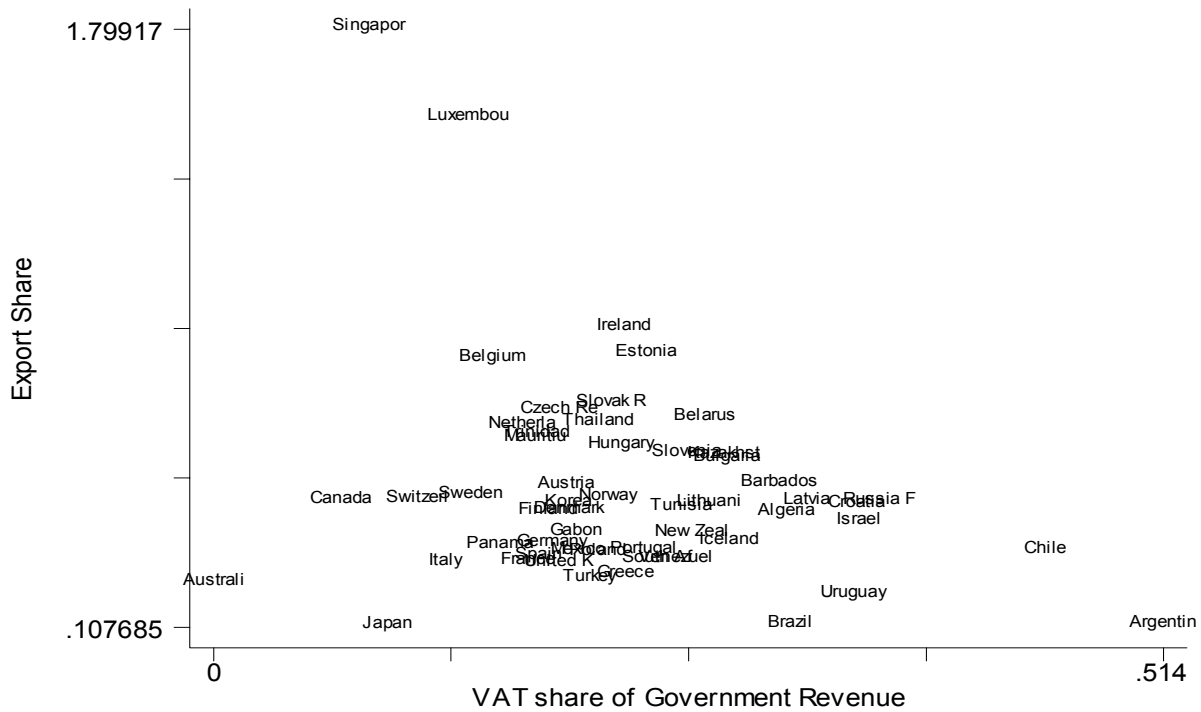
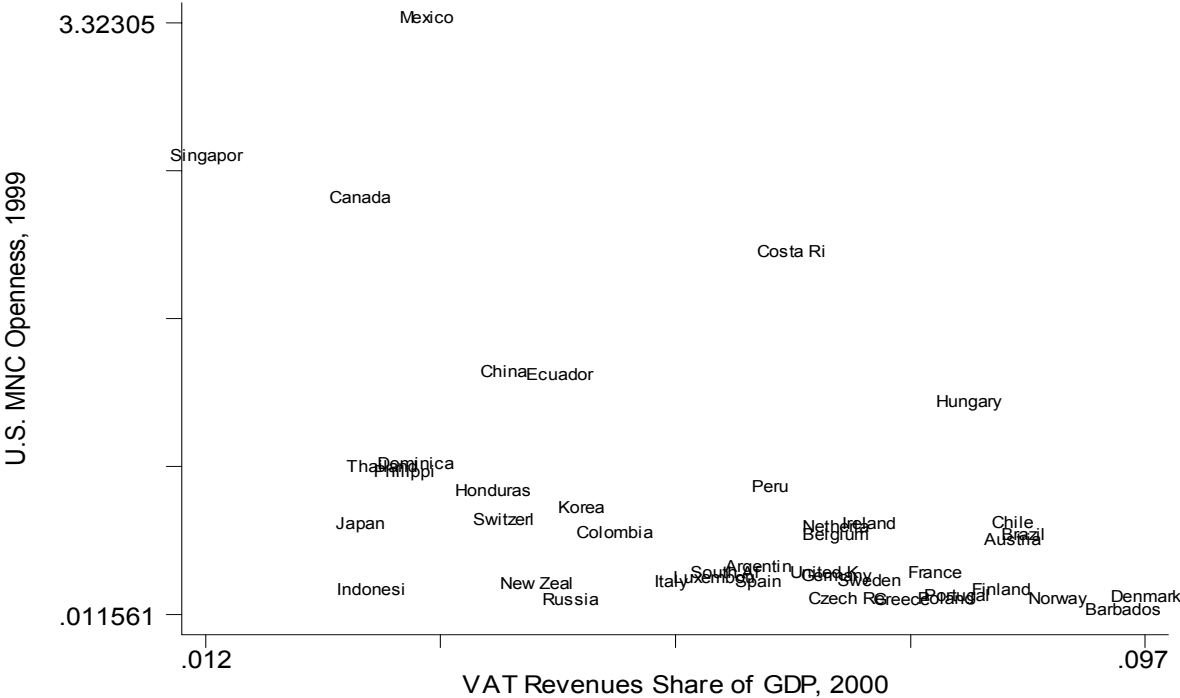


Figure 3b: The Relationship Between VAT Reliance and Export Shares for High-Income Countries, 2000



Notes: The figures presents a scatterplot of countries comparing levels of export shares against the reliance on VATs in 2000. "Export Share, 2000" is the ratio of exports to GDP in 2000. "VAT Share of Government Revenue, 2000" is the ratio of total VAT revenues to total tax revenue in 2000. The top figure is for all countries and the bottom figure is restricted to countries with a higher than median per capita income.

Figure 4: The Relationship Between VAT Reliance and MNC Trading Propensities, 2000



Notes: The figure presents a scatterplot of countries comparing levels of total trade from U.S. multinationals in 1999 against the reliance on VATs in 2000. "U.S. MNC Openness, 1999" is the ratio of exports plus imports to gross product for U.S. multinationals in 1999. "VAT Revenues Share of GDP, 2000" is the ratio of total VAT revenues to GDP in 2000.

Table 1 : Descriptive Statistics

	No. of Observations	Mean	Median	Standard Deviation
<i><u>2000 Cross-section Data</u></i>				
Openness, 2000	136	0.8940	0.7592	0.5090
Export Share, 2000	136	0.4239	0.3689	0.2783
Import Share, 2000	136	0.4700	0.4065	0.2494
VAT Revenues as a share of Total Government Revenues, 2000	136	0.1993	0.2140	0.1390
Log Per Capita Income, 2000	133	8.5478	8.6630	1.1182
<i><u>Panel Data</u></i>				
Openness, 1950-2000	5,850	0.6571	0.5511	0.4537
Export Share, 1950-2000	5,847	0.3023	0.2495	0.2275
Import Share, 1950-2000	5,847	0.3545	0.2945	0.2445
VAT Revenues as a share of Total Government Revenues, 1950-2000	5,850	0.0675	0.0000	0.1256
Log Per Capita Income, 1950-2000	5,788	8.1617	8.1539	1.0300
Tariff Rate, 1970-1998	2,272	0.1074	0.0890	0.0934
<i><u>U.S. Multinational Corporation Trade Data</u></i>				
Multinational Openness, 1999	47	0.6123	0.3984	0.7226
Multinational Affiliate Imports, 1999	52	0.2833	0.1980	0.3040
Multinational Affiliate Exports, 1999	47	0.3159	0.0836	0.4596
VAT Revenues as a share of GDP, 2000	52	0.0524	0.0585	0.0284

Notes: The table provides the numbers of observations, means, medians and standard deviations for the variables employed in the paper. "Openness, 2000" and "Openness, 1950-2000" are the ratios of total trade (exports plus imports) to GDP for 2000 and for the period from 1950 to 2000. "Export Share, 2000," "Export Share, 1950-2000," "Import Share, 2000," and "Import Share, 1950-2000" are the ratios of exports and imports, respectively, to GDP for 2000 and for the period from 1950 to 2000. "VAT Revenues as a Share of Total Government Revenues, 2000" and "VAT Revenues as a Share of Total Government Revenues, 1950-2000" are ratios of VAT revenues to overall government revenue for 2000 and for 1950-2000. "Multinational Openness, 1999," "Multinational Affiliate Imports, 1999," "Mutlinational Affiliate Exports, 1999" are the ratios of total trade (exports plus imports), exports, and imports to total gross product for all American affiliates in a given country. "Tariff Rate, 1970-1998" is the ratio of import duties to imports as reported in World Development Indicators.

Table 2
The Effects of VATs on Openness and Exports in 2000

Dependent Variable: Openness in 2000								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	1.0530 (0.1064)	1.0685 (0.1125)	-25.6216 (25.3129)	-20.8935 (22.1611)	1.1011 (0.0923)	1.0549 (0.0879)	-23.1636 (24.8173)	-19.2751 (22.1140)
Presence of VAT Dummy	-0.2060 (0.1160)	-1.1261 (0.3711)	-0.2968 (0.1151)	-0.3217 (0.1217)				
Presence of VAT Dummy *Log GDP Per Capita		0.1022 (0.0429)						
VAT Share of Tax Revenue, 2000					-1.0391 (0.3058)	-3.2270 (1.0940)	-0.8413 (0.2646)	-0.7785 (0.2879)
VAT Share of Tax Revenue, 2000 *Log GDP Per Capita						0.2782 (0.1327)		
GDP controls?	N	N	Y	Y	N	N	Y	Y
Geographic controls?	N	N	N	Y	N	N	N	Y
No. Obs.	136	133	133	133	136	133	133	133
R-Squared	0.0290	0.0950	0.1843	0.3180	0.0805	0.1045	0.1746	0.2929
Dependent Variable: Export Share in 2000								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.4760 (0.0602)	0.4915 (0.0634)	-13.6432 (13.6255)	-11.1262 (12.5545)	0.5236 (0.0515)	0.4993 (0.0489)	-12.6227 (13.3821)	-10.4077 (12.5233)
Presence of VAT Dummy	-0.0676 (0.0653)	-0.7267 (0.2033)	-0.1281 (0.0629)	-0.1461 (0.0669)				
Presence of VAT Dummy *Log GDP Per Capita		0.0732 (0.0233)						
VAT Share of Tax Revenue, 2000					-0.5007 (0.1694)	-2.3355 (0.5854)	-0.3827 (0.1433)	-0.3744 (0.1603)
VAT Share of Tax Revenue, 2000 *Log GDP Per Capita						0.2284 (0.0718)		
GDP controls?	N	N	Y	Y	N	N	Y	Y
Geographic controls?	N	N	N	Y	N	N	N	Y
No. Obs.	136	133	133	133	136	133	133	133
R-Squared	0.0104	0.1045	0.2138	0.3018	0.0625	0.1166	0.2119	0.2885

Notes: The table presents estimated coefficients from OLS regressions. In the top panel, the dependent variable is the ratio of total trade (exports plus imports) to GDP in 2000. In the bottom panel, the dependent variable is the ratio of exports to GDP in 2000. In columns 3, 4, 7 and 8 of both panels, three powers of log GDP per capita are included as additional controls. In columns 4 and 8 of both panels, geographic controls (area, island dummy, landlocked dummy, and two measures of output-weighted distance measures) are also included as controls. "Presence of VAT Dummy" equals one if the country employs a VAT. "VAT Share of Tax Revenue, 2000" is the ratio of VAT tax revenue to total tax revenue in 2000. The remaining terms are interactions of those variables with log GDP per capita. Heteroskedasticity-consistent standard errors are presented in parentheses.

Table 3
The Effects of VATs on Openness and Exports, 1950-2000

Dependent Variable: Openness								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.6895 (0.0078)	0.6861 (0.0079)	-8.1378 (2.7602)		0.7002 (0.0075)	0.6916 (0.0074)	-6.6382 (2.7651)	
Presence of VAT Dummy	-0.1244 (0.0162)	0.1074 (0.0112)	-0.1749 (0.0164)	-0.0274 (0.0085)				
Presence of VAT Dummy *Log GDP Per Capita		0.6861 (0.0079)						
VAT Share of Tax Revenue, 2000					-0.6379 (0.0451)	-2.5653 (0.2946)	-0.5867 (0.0441)	-0.0978 (0.0269)
VAT Share of Tax Revenue, 2000 *Log GDP Per Capita						0.2316 (0.0354)		
Year Effects?	Y	Y	Y	Y	Y	Y	Y	Y
GDP controls?	N	N	Y	Y	N	N	Y	Y
Geographic controls?	N	N	Y	Y	N	N	Y	Y
Country Effects?	N	N	N	Y	N	N	N	Y
No. Obs.	5,850	5,788	5,788	5,788	5,850	5,788	5,788	5,788
R-Squared	0.0932	0.1094	0.2807	0.8727	0.1067	0.1119	0.2813	0.8727
Dependent Variable: Export Share								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.3091 (0.0040)	0.3084 (0.0040)	-4.1336 (1.4417)		0.3186 (0.0038)	0.3141 (0.0038)	-3.4622 (1.4441)	
Presence of VAT Dummy	-0.0261 (0.0083)	-0.6551 (0.0497)	-0.0714 (0.0083)	-0.0094 (0.0043)				
Presence of VAT Dummy *Log GDP Per Capita		0.0715 (0.0058)						
VAT Share of Tax Revenue, 2000					-0.2413 (0.0231)	-1.9031 (0.1519)	-0.2601 (0.0222)	-0.0336 (0.0135)
VAT Share of Tax Revenue, 2000 *Log GDP Per Capita						0.1986 (0.0183)		
Year Effects?	Y	Y	Y	Y	Y	Y	Y	Y
GDP controls?	N	N	Y	Y	N	N	Y	Y
Geographic controls?	N	N	Y	Y	N	N	Y	Y
Country Effects?	N	N	N	Y	N	N	N	Y
No. Obs.	5,847	5,788	5,788	5,788	5,847	5,788	5,788	5,788
R-Squared	0.0666	0.0835	0.2741	0.8699	0.0783	0.0902	0.2767	0.8699

Notes: The table presents estimated coefficients from OLS regressions. In the top panel, the dependent variable is the ratio of total trade (exports plus imports) to GDP in years from 1950 to 2000. In the bottom panel, the dependent variable is the ratio of exports to GDP in years from 1950 to 2000. In all columns, year fixed effects are employed. In columns 3, 4, 7 and 8 of both panels, three powers of log GDP per capita are included as additional controls. In columns 4 and 8 of both panels, geographic controls (area, island dummy, landlocked dummy, and two measures of output-weighted distance measures) are also included as controls. In columns 3 and 4, country effects are included. "Presence of VAT Dummy" equals one if the country employs a VAT. "VAT Share of Tax Revenue, 2000" is the ratio of VAT tax revenue to total tax revenue in 2000. The remaining terms are interactions of those variables with log GDP per capita. Heteroskedasticity-consistent standard errors are presented in parentheses.

Table 4
The Effects of VATs on Openness and Exports, 1950-2000, High-Income Countries

Dependent Variable: Openness								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.8281 (0.0146)	0.8260 (0.0147)	-65.8679 (32.8336)		0.8287 (0.0131)	0.8253 (0.0135)	-74.9226 (32.4227)	
Presence of VAT Dummy	-0.2680 (0.0259)	-2.0815 (0.2605)	-0.2072 (0.0255)	0.0022 (0.0110)				
Presence of VAT Dummy *Log GDP Per Capita		0.1954 (0.0287)						
VAT Share of Tax Revenue, 2000					-1.1424 (0.0730)	-2.6553 (0.8738)	-0.7447 (0.0689)	0.0844 (0.0403)
VAT Share of Tax Revenue, 2000 *Log GDP Per Capita						0.16948 (0.0999)		
Year Effects?	Y	Y	Y	Y	Y	Y	Y	Y
GDP controls?	N	N	Y	Y	N	N	Y	Y
Geographic controls?	N	N	Y	Y	N	N	Y	Y
Country Effects?	N	N	N	Y	N	N	N	Y
No. Obs.	2,883	2,883	2,883	2,883	2,883	2,883	2,883	2,883
R-Squared	0.1304	0.1443	0.2861	0.9112	0.1492	0.1498	0.2875	0.9113
Dependent Variable: Export Share								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.4027 (0.0073)	0.4016 (0.0073)	-41.5574 (17.0155)		0.4057 (0.0066)	0.4033 (0.0068)	-45.5255 (16.8234)	
Presence of VAT Dummy	-0.1221 (0.0130)	-1.1347 (0.1350)	-0.0983 (0.0129)	0.0026 (0.0056)				
Presence of VAT Dummy *Log GDP Per Capita		0.1091 (0.0149)						
VAT Share of Tax Revenue, 2000					-0.5545 (0.0362)	-1.6417 (0.4502)	-0.3677 (0.0347)	0.0506 (0.0203)
VAT Share of Tax Revenue, 2000 *Log GDP Per Capita						0.1218 (0.0514)		
Year Effects?	Y	Y	Y	Y	Y	Y	Y	Y
GDP controls?	N	N	Y	Y	N	N	Y	Y
Geographic controls?	N	N	Y	Y	N	N	Y	Y
Country Effects?	N	N	N	Y	N	N	N	Y
No. Obs.	2,883	2,883	2,883	2,883	2,883	2,883	2,883	2,883
R-Squared	0.1256	0.1429	0.2762	0.9043	0.1478	0.1490	0.2792	0.9045

Notes: The table presents estimated coefficients from OLS regressions. In the top panel, the dependent variable is the ratio of total trade (exports plus imports) to GDP in years from 1950 to 2000. In the bottom panel, the dependent variable is the ratio of exports to GDP in years from 1950 to 2000. The sample is restricted to those countries with greater than median per capita income. In all columns, year fixed effects are employed. In columns 3, 4, 7 and 8 of both panels, three powers of log GDP per capita are included as additional controls. In columns 4 and 8 of both panels, geographic controls (area, island dummy, landlocked dummy, and two measures of output-weighted distance measures) are also included as controls. In columns 3 and 4, country effects are included. "Presence of VAT Dummy" equals one if the country employs a VAT. "VAT Share of Tax Revenue, 2000" is the ratio of VAT tax revenue to total tax revenue in 2000. The remaining terms are interactions of those variables with log GDP per capita. Heteroskedasticity-consistent standard errors are presented in parentheses.

Table 5
The Effects of VATs on Openness and Exports Controlling for Tariffs, 1970-1998

Dependent Variable: Openness								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.8755 (0.0321)	0.8604 (0.0348)	-5.1443 (4.1020)		0.8607 (0.0263)	0.8583 (0.0292)	-3.5864 (4.1163)	
Presence of VAT Dummy	-0.1601 (0.0258)	-0.3539 (0.1410)	-0.1875 (0.0234)	-0.0099 (0.0100)				
Presence of VAT Dummy *Log GDP Per Capita		0.0220 (0.0171)						
VAT Share of Tax Revenue, 2000					-0.6154 (0.0689)	0.3334 (0.5004)	-0.6020 (0.0615)	-0.0356 (0.0436)
VAT Share of Tax Revenue, 2000 *Log GDP Per Capita						-0.1073 (0.0616)		
Tariff Levels	-0.9885 (0.1469)	-0.8995 (0.1687)	-0.8282 (0.1204)	-0.4711 (0.0600)	-0.8725 (0.1270)	-0.8925 (0.1487)	-0.7699 (0.1137)	-0.4699 (0.0598)
Year Effects?	Y	Y	Y	Y	Y	Y	Y	Y
GDP controls?	N	N	Y	Y	N	N	Y	Y
Geographic controls?	N	N	Y	Y	N	N	Y	Y
Country Effects?	N	N	N	Y	N	N	N	Y
No. Obs.	2,272	2,268	2,268	2,268	2,272	2,268	2,268	2,268
R-Squared	0.0631	0.0613	0.1195	0.9437	0.0719	0.0673	0.2791	0.9437
Dependent Variable: Export Share								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.4129 (0.0163)	0.4001 (0.0176)	0.8932 (2.1127)		0.4143 (0.0134)	0.4061 (0.0148)	1.7148 (2.1178)	
Presence of VAT Dummy	-0.0585 (0.0129)	-0.2845 (0.0719)	-0.0810 (0.0119)	-0.0053 (0.0050)				
Presence of VAT Dummy *Log GDP Per Capita		0.0256 (0.0087)						
VAT Share of Tax Revenue, 2000					-0.2706 (0.0344)	-0.3484 (0.2446)	-0.2884 (0.0307)	-0.0198 (0.0223)
VAT Share of Tax Revenue, 2000 *Log GDP Per Capita						0.0113 (0.0302)		
Tariff Levels	-0.5910 (0.0761)	-0.5085 (0.0864)	-0.3805 (0.0604)	-0.2122 (0.0288)	-0.5631 (0.0661)	-0.5316 (0.0763)	-0.3624 (0.0569)	-0.2115 (0.0288)
Year Effects?	Y	Y	Y	Y	Y	Y	Y	Y
GDP controls?	N	N	Y	Y	N	N	Y	Y
Geographic controls?	N	N	Y	Y	N	N	Y	Y
Country Effects?	N	N	N	Y	N	N	N	Y
No. Obs.	2,272	2,268	2,268	2,268	2,272	2,268	2,268	2,268
R-Squared	0.0761	0.0764	0.2898	0.9417	0.0877	0.0822	0.2945	0.9373

Notes: The table presents estimated coefficients from OLS regressions. In the top panel, the dependent variable is the ratio of total trade (exports plus imports) to GDP in years from 1970 to 1998. In the bottom panel, the dependent variable is the ratio of exports to GDP in years from 1970 to 1998. In all columns, year fixed effects are employed. In columns 3, 4, 7 and 8 of both panels, three powers of log GDP per capita are included as additional controls. In columns 4 and 8 of both panels, geographic controls (area, island dummy, landlocked dummy, and two measures of output-weighted distance measures) are also included as controls. In columns 3 and 4, country effects are included. "Presence of VAT Dummy" equals one if the country employs a VAT. "VAT Share of Tax Revenue, 2000" is the ratio of VAT tax revenue to total tax revenue in 2000. "Tariff Levels" is the ratio of import duties to imports as reported in World Development Indicators. The remaining terms are interactions of those variables with log GDP per capita. Heteroskedasticity-consistent standard errors are presented in parentheses.

Table 6
The Effects of VATs on U.S. Multinational Trading Propensities, 1999

Dependent Variable:	Ratio of Affiliate Exports Plus Affiliate Imports to Gross Product			Ratio of Affiliate Imports to Gross Product			Ratio of Affiliate Exports to Gross Product		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	1.1690 (0.2737)	-29.6850 (22.0856)	-13.0805 (15.8656)	0.5057 (0.1035)	-8.3505 (4.9291)	-8.6576 (5.3180)	0.6025 (0.1702)	-18.8382 (13.0066)	-5.6038 (10.3702)
VAT Share of GDP, 2000	-10.5498 (3.7976)	-11.4994 (4.6992)	-8.3379 (3.6619)	-4.2430 (1.3508)	-4.9897 (1.7468)	-3.2177 (1.0899)	-5.4313 (2.4976)	-6.1052 (3.0300)	-5.0804 (2.7380)
GDP controls?	N	Y	Y	N	Y	Y	N	Y	Y
Geographic controls?	N	N	Y	N	N	Y	N	N	Y
No. Obs.	47	47	47	52	52	52	47	47	47
R-Squared	0.1657	0.2139	0.6472	0.1573	0.2057	0.7159	0.1085	0.1792	0.5107

Notes: The table presents estimated coefficients from OLS regressions. The dependent variable in columns 1, 2, and 3 is the ratio of total trade (exports plus imports) to total gross product for all affiliates of U.S. multinationals in a country in 1999. The dependent variable in columns 4, 5, and 6 is the ratio of affiliate imports to total gross product for all affiliates of U.S. multinationals in a country in 1999. The dependent variable in columns 7, 8, and 9 is the ratio of affiliate exports to total gross product for all affiliates of U.S. multinationals in a country in 1999. The specifications in columns 2, 3, 5, 6, 8, and 9 all include three powers of log GDP per capita as additional controls. The specifications in columns 3, 6 and 9 incorporate geographic variables (area, distance from the U.S., common language dummies, border dummies, island dummies) as additional controls. "VAT share of GDP, 2000" is the ratio of VAT tax revenues to GDP in 2000. Heteroskedasticity-consistent standard errors are presented in parentheses.