

# THE REVENUE RAISING CAPABILITIES OF A VAT SYSTEM IN DEVELOPING COUNTRIES

N T Azaria and Z Robinson<sup>1</sup>

*Department of Economics, University of Pretoria*

## Abstract

The paper attempts to elaborate on the revenue-raising capabilities (economic efficiency and viability) of a value-added tax (VAT) system, particularly in developing countries. The analysis concentrates on the effect of a VAT on tax revenues raised, and the main objective is to determine whether a VAT system generates greater benefits than previously utilised sales taxes, i.e. pre-existing sales taxes (PEST). Using a panel data regression analysis, our results indicate that while all countries gain revenue from the presence of VAT, it is significantly more in developed countries, although the dummy VAT variable interacted with trade openness enters positively for the lower- and upper middle-income groups. This proves the importance of trade for VAT revenues, but also that VAT combined with interaction variables is conducive to higher tax revenues.

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## 1

### Introduction

Markets and financial institutions in developing countries are often highly unorganised, spatially fragmented and determined by external forces. Fiscal measures are thus the only means to mobilise domestic resources (Todaro, 1992). In this respect, developing countries are highly dependent on the amount of tax revenue collected, especially indirect taxes, which are a major source of revenue (51.9 per cent). In the case of the latter, most of the revenue (27.9 per cent) is generated from VAT and general sales taxes (IMF, 2000; 2001), and it is thus important to ensure that these systems operate as efficiently as possible.

This paper attempts to elaborate on the revenue-raising capability (productivity) of a VAT system, via an extensive analysis of the economic efficiency and the viability of such a system. Several studies have already shown that the share of VAT revenues to GDP exceeds that of the PEST in developing countries. Our analysis concentrates on the effect of a VAT on

tax revenues raised, and the main objective is to determine whether a VAT system generates greater benefits than previously utilised sales taxes, i.e. pre-existing sales taxes (PEST). In order to make this determination, the study: (a) reviews relevant literature and existing empirical studies; (b) conducts a panel data regression analysis and compares data before and after the introduction of the VAT; and (c) provides conclusions and appropriate policy suggestions.

## 2

### A theoretical background

#### 2.1 International experience: The origin and spread of VAT

The basic idea of a VAT system (invoice-credit method) seems to date back to the 1920s, although the first practical evidence of such a system appeared in France in 1948. The State of Michigan in the USA introduced a single business tax, an account-based form of VAT, in 1953. At first, VAT was only applied up to the manufacturing stage, with no credit for tax on

capital goods, but later in 1954 it was converted into a consumption-type VAT (though levied at the production stage). Cote d'Ivoire subsequently adopted a manufacturing level VAT in 1960, and Senegal followed later. In 1967, Brazil introduced the first comprehensive VAT, extending to retailers. Western Europe followed, and the pace of VAT implementation remained rapid until the late 1970s, at which

point it slackened for a decade before picking up again in the latter part of the 1980s and 1990s. Nowadays, the comprehensive VAT is an important part of the fiscal system in many countries (see Table 1), and one of the main reasons behind the adoption of a VAT remains the fact that it is seen as a more efficient revenue-raising instrument.

**Table 1**  
Features of different VAT systems

Regions	Countries		Standard rate (%)	VAT revenues	
	Single	Multiple		% of GDP	% of total tax revenue
Africa	20	11	16	3.9	28.4
South America	9	6	}	}	}
Central America	4	3	} 13.5	} 4.9	} 33.0
North America	1	0	}	}	}
Asia	10	5	10.4	3.3	21.7
Australasia	6	0	13.0	4.2	18.0
Western Europe	5	18	18.8	7.0	20.7
Eastern Europe	13	11	20.1	6.4	27.8
Middle East	0	1	15.7	5.7	28.1

Source: IMF, 2001 and OECD, 2001

The VAT system has been a major source of revenue. The standard rate is higher in Western Europe and in transition economies than elsewhere, whilst Asia has the lowest rate. Countries with lower levels of economic development (expressed in terms of per capita GDP), have also increasingly adopted VAT systems as part of their tax reform efforts. Moreover, Africa and Europe have the most complex VAT systems in terms of the number and variety of rates. The time period since introduction of the VAT has a lasting effect on the number of rates applied. The more established VAT systems are characterised by a larger number of rates. As the number of rates increases, tax forms become more complicated, increasing the chance of error on the part of both taxpayers and tax officials, while simultaneously increasing evasion incentives (Tait, 1988: 42). Casanegra de Jantscher (1987: 5) indicates that policymakers in developing countries have, in an effort to mitigate the

regressivity of the VAT, adopted more than one rate. However, these countries tend to obtain a smaller fraction of their VAT receipts from higher rates than the estimates of the tax base would suggest. This is particularly true when the high rates apply to luxury goods, where the temptation to evade is high. Scarce administrative resources compound the problem and experience has shown that neither high nor low VAT rates are enforceable without effective administration. Latin America is a case in point in this respect.

At the beginning of the 1980s, most Latin American tax systems were complex and cumbersome, loaded with hundreds of revenue agencies with little revenue being collected. Consumption and production suffered from multiple rates and administration was weak (Shome, 1995). These taxes were also insufficient because of the 'cascade' effect that taxed not only the value of production but also taxes paid at earlier stages of production. Mostly

levied at the manufacturing rather than the retail stage, they hampered competition and added to production costs. In terms of commodity taxation, VAT was an important part of the reform effort between the early 1980s and 1994, and the number of countries with a VAT doubled from ten to 20. In the early 1980s, some countries either had a rudimentary VAT up to the manufacturing-importing stage, or a production-type (origin-based) VAT that disallowed credit for capital goods purchases. In the second half of the decade, these countries began to reform their VATs, by reducing the number of rates (Bolivia, Chile, Colombia and Mexico) and expanding the base by reducing exemptions and raising coverage, particularly of services (Argentina, Bolivia, Chile, Colombia and Mexico). Furthermore, some countries, notably Argentina, Chile, Colombia and Mexico converted to consumption-type (destination-based) VAT, and improved their tax administrations.

In countries such as India and Argentina, commodity tax reforms have proceeded more slowly than those in Brazil, only starting in 1992, perhaps because of concerns about implementation. India's sales tax system is still problematic because of its non-harmonised nature with various types of sales taxes at central and state level, including a CST levied on an origin base at state level. Most of the Asian economies carry a sales tax or VAT-rate of ten per cent and as such the World Economic Forum (1999) classifies sales tax or VAT rates in Asian economies as a competitive asset whereas Latin America's sales tax or VAT systems is seen as a liability. Argentina, however, provides the best-case scenario in this analysis because it has already started to switch over to a destination-based sub-national VAT system.

Countries that achieved a significant increase in their tax-to-GDP ratios, such as Argentina, Bolivia and Colombia, often did so through VAT. As VAT revenue rose, countries relied less on excises, taxing only a few items such as beverages, tobacco, petroleum products, and automobiles instead of a broad range of goods and services. All of the major countries in Latin America have also done away with export duties, and most have reformed import tariffs, with the

dispersion of these rates being reduced and tariff levels significantly decreased. The Latin American experience is far from perfect, especially in terms of sub-national commodity taxation, for instance Brazil.

As already mentioned, Brazil was the first country to introduce a fully-fledged VAT in 1967. The introduction of VAT in Brazil and the consequent problems were directly related to the fact that it was also introduced as a sub-national VAT. The rate structure also changed from a single to a multiple rate system and the new tax resulted in a series of complex technical and administrative problems of how to apply different VATs in the different states (the ICMS for each state) in addition to a federal VAT (the IPI)<sup>2</sup>. The origin principle applied to interstate trade in Brazil. There was no meaningful concept of administrative integration between the federal and state versions of the VAT. Brazil thus had all the problems of dealing with cross-border trade that had been problematic even within the EU, but in addition had excessive compliance and administrative costs, location distortion, and tax exporting and competition (Bird, 1992). Economic complications still existed in spite of uniform rates for the states on exports. Attempts were also made to alleviate the distorting effect of the origin principle, by imposing a standard rate of 12 per cent on interstate trade (with an exception of a lower rate of seven per cent on shipments to the poorer state). Bird (1992:25) argues that, in Brazil, as in Argentina and India, a decent VAT system will require the implementation of the destination principle at different tax rates on interstate trade. There should be some means of compensating 'losing' states for revenue losses implied by the transition. This type of system resembles the one applicable in Canada and the tax-sharing option (specifically the so-called 'gewerbsteuer', or local business tax) in Germany.

Recent recommendations in Brazil made provision for the adoption of an integrated VAT system with a new federal ICMS that would be collected, together with a revised state ICMS, on the same basis as a unified VAT at a uniform national rate. This system will consist of a federal rate and a uniform state rate similar to

the 'harmonised' VAT system in Canada or the proposed 'common' VAT system (1996) in the European Commission. After considerable debate, the state ICMS was substantially revised to eliminate significant elements of taxation on exports and investment in the existing system, with the federal government guaranteeing that no state would lose revenue as a result of the change.

A good administrative system assisted by mutual trust and a high degree of negotiation between the different levels of government is thus necessary where the destination principle is applied. The theoretical case for the destination (residence) principle is strong but not absolute. The ease with which some commodities or capital goods can be moved means that a significant element of origin (source) taxation is always inescapable. However, there seems to be consensus in favour of maintaining as much of the destination principle as possible (possibly supporting it by use of restrictions on distance sales); also because of a fear of transfer-pricing problems that potentially arise when VAT is levied by the origin principle<sup>3</sup>. Fiscal or tax adjustments should always be handled in line with economic circumstances in a particular country. Developing countries' needs normally differ significantly from developed countries' needs and therefore issues like tax compliance become even more important.

## **2.2 Base broadening and tax compliance**

The most controversial issues relating to the introduction of VAT with a broad base, which taxes all consumption expenditures, are equity and inflation. It is evident from previous studies that the broad-based VAT does have impact on lower-income households and this is something that has arisen in all countries where it has been introduced. It is of particular importance in developing countries where there is considerable inequality of income distribution. Many countries use exemptions and zero-rating to reduce the regressivity of VAT, but end up making the system more complex. Many politicians think inflation is inevitable with the

introduction of VAT, and if the public is not aware, business people can increase prices and cause a misleading association between the introduction of VAT and inflation. Previous empirics have shown that there is not necessarily a corollary between the introduction of VAT and the persistent increase of prices year after year (inflation). If anything, the assumption should be that an equal-yield VAT substitution will have little or no effect on the rate of change in the consumer price index (CPI).

VAT also has the advantage of removing distortions by enhancing tax neutrality in international trade as far as cascading is concerned. Otherwise, VAT on all consumption might in the short term help exports, but after prices or exchange rate adjustments, it will not have any effect on imports and exports. Since VAT gives full credit for capital goods, unlike cascading tax, it favours investment over consumption, thus increasing GDP because of improved production efficiency. In accordance with the OECD practice worldwide, which gives a reasonable indicator of 'international best practice', VAT should be on a broad basis (including goods and services), a credit (invoice) system and the destination principle should hold. The administrative ideal of only a few rates has been achieved in South Africa with only one standard rate and a zero rate. The rate has also been relatively low and increased from ten to 14 per cent, which is still within the recommendation of the World Bank (1991) of between ten and 20 per cent for developing countries. In 1996, the VAT base was broadened to include most fee-based financial services. The VAT system tends, however, to be more regressive in nature with a few exemptions and zero-ratings still in place. The Katz Commission (1994: 133) recommended against the further erosion of the VAT base through zero-rating or exemptions, and targeted poverty relief and development programmes as priority instead, and furthermore, that higher VAT rates on luxury goods or a multiple VAT rate system should be avoided. The main reason behind the latter recommendation was that such a system would not reduce regressivity, would have high administration and compliance costs and would not have much additional revenue potential.

In the end, an optimal system of commodity taxation can only be secured if the loss of economic efficiency with VAT is minimised through uniform rates or a few rates applied to the broadest possible base, or a compromise will have to be made between administrative costs and equity. This case is even further strengthened if a system of income and expenditure support for the poor is already in place. A broad-base VAT also means that the necessary increase in tax rates is smaller than for specific commodity taxes like excise taxes, and the risk of distorting specific markets is correspondingly lower. The World Bank (1991: 6) recommends setting three or four selective tax rates on luxuries and non-essentials, with the rate ascending according to the item's role in the consumption of the rich.

Another more recent experience of the Zambian government could also serve as example. The government undertook a comprehensive review of both the tax system and customs duties, with the intention of significantly broadening the base of taxation. A considerable number of exemptions in both taxes and customs duties were eliminated, and the emphasis shifted from specific consumption taxes like excise duties, to sales taxes in the form of VAT introduced during 1995. The Zambian authorities achieved higher revenues (tax revenue reached 31.5 per cent of the GDP in 1999), despite significant cuts in customs duties and marginal tax rates. The Zambian experience is reminiscent of Argentina's experience with tax reform in the beginning 1990s. The government implemented radical changes in answer to successive crises, and the lack of political resolve to enforce tax laws progressively eroded the tax structure and administration. Revenue only reached 11 per cent of GDP in 1989, compared to 14 per cent in 1985. The strategy was thus to improve the quality and quantity of revenue mobilisation by eliminating taxes that were easy to collect but growth inhibiting, such as export taxes and taxes on financial transactions. Instead the focus would be on a few major taxes like VAT and on overhauling the tax administration. The strategy was highly successful, and the ratio of tax revenue to GDP rose to 16 per cent in 1993.

Argentina's VAT went from being one of the least revenue productive<sup>4</sup> in the world to being highly productive (Shome, 1995). The tax-base was broadened and evasion was cut sharply. Businesses failing to make timely or correct declarations were promptly closed for three days. In 1990, 700 taxpayers were penalised in this way. In 1992, the number rose to 12,000. This had a strong impact on VAT compliance. New invoicing requirements and controls were introduced, and expanded information on VAT taxpayers helped improve collection of other taxes by permitting tax inspectors to cross-reference tax data. Since the second half of 1992, the Government has increasingly focused on using the tax system to improve enterprise competitiveness. Foreign trade taxes have been lowered and in the drive to improve the cost structure of the economy as a whole, the federal government has also started encouraging provincial governments to reduce or eliminate local taxes that impinge directly on enterprise costs. Although the Argentine VAT system is not flawless, it does hold important lessons in terms of base broadening and tax evasion.

Administration considerations have exerted a considerable influence on the structure of VAT in developing countries. Seeing that a single-rate VAT is easier to administer than a multiple-rate VAT, several developing countries have opted for the former. The complexity of administering full exemptions (zero-rating) has led most developing countries to restrict them to exports. Small business taxpayers have been dealt with by exempting those with gross sales below a certain threshold or by taxing them under a simplified system. Because of the difficulty of taxing services, most developing countries impose VAT only on selected services. Once the VAT system is in place, administrative constraints tend to distort some of its features. Moreover, VAT does contain an element of self enforcement that is lacking in other types of GST, which reduces tax evasion.

In summary, a VAT system normally entails more administrative costs and it is therefore important that the introduction of such a system involves careful planning and that governments already have the administrative capacity in place to maintain the system. An effective VAT

system, if implemented correctly, can thus eliminate any discrepancies that might exist in terms of bookkeeping for tax purposes, limit tax evasion and ensure maximum revenue (economic efficiency).

### 3

## Economic efficiency

### 3.1 The meaning of economic efficiency

Economic efficiency can be defined as the most efficient way of utilising existing resources. As already defined in terms of VAT, it means that efficient and productive taxes should deliver large amounts of revenue without distorting consumer or producer choice, investment and saving. A broad-based VAT does not discriminate between present and future consumption and is, therefore, neutral between consumption and savings. Thus, in relation to general sales taxes (GST), VAT is an efficient method of collecting large and buoyant revenue for the government. GST imposes double taxation on capital and intermediate goods (especially those goods produced by capital intensive industries, which effectively bear a higher rate of tax). Since taxation is embedded in the price of goods, this may contribute towards inflation and distort producer choices. As a result, exports will also be harmed. Taking into consideration the above distortions caused by GST, replacing GST with VAT ought to improve economic efficiency. However, it is difficult to quantify the impact of a VAT adoption on economic efficiency.

The positive impact on productive efficiency arising from the exclusion of intermediate activities from the tax base should, in principle, be reflected in a higher level of GDP. An alternative to the direct empirical identification of efficiency gains is to look for testable implications of the supposed relatively low-efficiency cost of raising revenue through VAT. One possibility is that the government with a VAT raises more total revenue than would

otherwise be the case. It is possible to investigate this by looking at the variation in the ratio of tax revenue for all taxes to GDP between those countries with and without a VAT. This approach enables the effects of the VAT to be investigated empirically without specifying any particular alternative. Thus the question asked here is not whether VAT is preferable to the existing sales taxes, but rather whether the addition of a VAT to the armoury of instruments at the disposal of the authorities appears to improve the overall efficiency of the tax system. This issue has not been studied intensively. We are therefore attempting here to combine this approach with the so-called 'efficiency ratio' approach. Moreover, the 'efficiency ratio' or 'productivity ratio', defined as the ratio of VAT revenues to GDP divided by the standard rate (expressed as a percentage), has been used as a summary indicator of the performance of VAT. This is a useful gauge of the extent to which VAT bears uniformly upon a broad base. A low ratio, in particular, is taken as the primary evidence of erosion, either by exemption and reduced rates within the tax law, or by imperfect enforcement.

The average efficiency ratio in Table 2 is 33 per cent, implying that a one-point increase in the standard rate is associated with an increase in the share of VAT revenues to GDP of approximately 0.33. The efficiency ratio in Western Europe is higher than elsewhere, while the ratio is lowest in Africa. Although the efficiency ratio is widely used for evaluating VATs, we recognise its limitations (in part due to errors in the measurement of GDP). The appropriate benchmark against which to gauge a given VAT would therefore typically entail a consumption-type VAT levied at a uniform rate. The 'C-efficiency ratio', defined as the ratio of the share of VAT revenues in consumption to the standard rate, could therefore also be used (Ebrill *et al.*, 2001). The two efficiency ratios can thus convey different impressions. In this paper, we only use South Africa as a proxy to show the differences in these ratios.

**Table 2**  
Efficiency ratios by region

Region	Efficiency ratio (%)**
Africa	24
South America	}
Central America	} 36
North America	}
Asia	32
Australasia	32
Western Europe	37
Eastern Europe	36
Middle East	32

Source: \* IMF, 2001 and OECD, 2001

\*\* Authors' calculations

**Table 3**  
Efficiency ratios in South Africa (%)

Year	Efficiency ratio	C-efficiency ratio
1991	40.29933	65.37805
1992	34.29377	54.51238
1993	38.92648	62.96946
1994	41.87606	67.70997
1995	41.32197	66.0237
1996	40.02494	64.30585
1997	41.10531	65.33831
1998	41.20136	65.30584
1999	42.0436	66.74791
2000	41.88306	66.58651
2001	42.86538	68.68416
<b>Total</b>	445.8413	713.5621
<b>Average</b>	40.53102	64.86929

Source: Authors' calculations (IFS)

As shown in Table 3, although the efficiency ratio in South Africa is much lower than, for example, in New Zealand (69 per cent), it is similar to the Brazilian (42 per cent) and European countries (37 per cent). It is also the highest efficiency ratio in Africa. The average efficiency ratio in South Africa indicates that a one-point increase in the standard rate is associated with an increase in the share of VAT revenues to GDP of approximately 0.40. VAT

has proven to be a very stable and productive source of revenue in South Africa, with an average annual increase of 4.69 per cent of total tax revenue (reaching 26 per cent of total tax revenue in 2004) and 1.29 per cent of GDP (6.6 per cent of GDP in 2004).

One of the most comprehensive studies done in a South African context is probably that of Kearney (2003). She calculates not only the efficiency ratio that broadly corresponds with our calculation, but also the C-efficiency ratio (only for household consumption expenditure) for South Africa. Although her methodology differs slightly from ours in terms of the C-efficiency ratio, her findings reiterate the importance of VAT as revenue source, and the fact that the VAT base can be regarded as relatively broad and has been steadily increasing over the years.

In the next section, we extend and verify the analysis by discussing the empirical results of our research on the revenue raising capability (productivity) of VAT, in a developing context.

### 3.2 Empirical evidence

To emphasise, it is difficult to quantify the impact of a VAT adoption. Ebrill *et al.* (2001) is among the few existing studies analysing the effects of a VAT adoption in a developing context. Various other topics have been researched, e.g. the estimation of the effective tax rate on consumption (Lucas, 1990; Razin and Sadka, 1993; Mendoza *et al.*, 1994) and the VAT base (Zee, 1995; Jenkins & Kuo, 2000). However, these issues are not dealt with in this paper, mainly due to data constraints in some of the developing countries. The analysis mainly concentrates on the effects of a VAT system on tax revenues raised.

Ebrill *et al.* (2001) sampled a cross-section of 183 developed and developing countries, 99 with a VAT and 84 without. Since the impact of a VAT may depend upon which measure of aggregate revenue is considered, the analysis included the relationship between the VAT and three different measures of aggregate revenue: general government revenue and grants; general government revenue; and a central tax, in which the VAT is presumed to be appropriately levied.

The *dependent variable* was in each case the logarithmic transformation of the ratio of one of the three measures of aggregate revenue to GDP. The *independent variables* were: the logarithmic transformation of the GDP per capita (or share of agriculture), openness, and a simple dummy variable reflecting the presence of a VAT. Regional dummies and interaction terms that allow, in particular, for the impact of VAT to vary with the level of development (measured by GDP per capita), the importance of trade and by region were also incorporated. The regions were: Sub-Saharan Africa, Asia and Pacific, EU (plus Norway and Switzerland), Central Europe and the Baltic States, Russia and other states of the former Soviet Union, North Africa and Middle East, the Americas and the Small Islands. Ebrill *et al.* (2001: 29) found the following results:

- *General government revenue and grants:* There was some evidence that the presence of a VAT is associated with a higher ratio of general government revenue and grants. While all countries gained revenue from the presence of VAT, the *more developed countries gained most*. A revenue loss associated with the presence of a VAT was greater when international trade (openness) was more important. All regions, except the Americas and the Small Islands, raised significantly less revenue than did the EU. The VAT dummy was insignificant, although there were strong effects apparent in the interactions with income and trade importance.
- *General government tax revenue:* There was *weaker evidence* that a VAT is associated with a higher ratio of general tax revenue. There was a gain only in Asia and the Pacific at a 10 per cent level of significance. A positive interaction between the presence of a VAT and the level of per capita income was found. The interaction with international trade was found to be insignificant, while the VAT dummy itself became negative and almost significant at a 10 per cent level.

- *Central government tax revenue:* Apart from a couple of interaction terms with regional dummies, there was *no sign of any marked effects* on central tax revenues. The results did, however, suggest that the central government shares any revenue gain associated with the presence of a VAT with lower levels of government, by vacating other tax bases.

Although the Ebrill *et al.* (2001) estimation comprised both developing and developed countries, it lacked country-specific effects. We estimate a similar model utilising the method of pooled least squares on a (balanced) panel. We concentrate only on general government tax revenue as a *dependent variable*. The model is built on a cross-section of 24 different countries, selected randomly but ensuring a combination of developed and developing countries over a 30-year (1970-2000) period. Data is derived from the IMF database (International Financial Statistics, IFS). Seventeen countries have a VAT and seven do not have any VAT. In order to grasp the different stages of development, the study is divided into four main estimations according to the different country-income groupings (World Bank, 2003). Whilst the first estimation comprises the 24 countries and gives a general result (the complete panel), the remaining four estimations give specific results for the four different income groups.

### 3.3 The model

The discussion thus far suggests a general empirical model explaining the impact of a VAT on tax revenue adopting the following simple format:

$$\ln t_{it} = \beta + \beta_1 \ln p_{it} + \beta_2 \ln o_{it} + \varepsilon_{it} \quad (\text{A})$$

$$\ln t_{it} = \beta + \beta_1 \ln p_{it} + \beta_2 \ln o_{it} + v + \varepsilon_{it} \quad (\text{B})$$

$$\ln t_{it} = \beta + \beta_1 \ln p_{it} + \beta_2 \ln o_{it} + v + \beta_3 v \ln p_{it} + b_4 v \ln o_{it} + \varepsilon_{it} \quad (\text{C})$$

where  $i$  is the country and  $t$  represents the year. The question is estimated in logarithmic form. The dependent variable,  $t_{it}$ , is the tax share measured as tax revenue to GDP of each country. The independent variables are the following:  $p_{it}$  is the real GDP per capita of each country and  $o_{it}$  is the openness of the country to

international trade. The VAT dummy variable is represented by  $v$ .

The model is summarised into three columns, namely A, B and C. The *priori expectation* for column A is a significant positive relationship between the tax share (measured as ratio of tax revenue to GDP) and each of the independent variables: real GDP per capita in \$ (calculated as the ratio of GDP to population) and the importance of international trade openness (measured as the average of the ratios of imports and exports to GDP). The positive impact of *income* on the GDP share of taxes is well known. Leuthold (1991) and Tanzi (1992) attribute the positive impact of the importance of *international trade* to the administrative ease of collecting revenues on imports and exports as they cross national borders. Since the aim is to see the role of the *VAT variable* in the context of tax revenue performance, column B adds a simple dummy variable ( $v$ ) reflecting the presence of a VAT:  $v$  takes the value of one if a VAT is present throughout the year, or zero otherwise. Column C reports a more general specification incorporating *interaction terms* that allow in particular the impact of a VAT to vary with the level of development and trade openness.

The estimated model reported as a whole in Table 4 is found to be significant. Even though a positive impact of income on the GDP share of tax was expected, the result found here was the opposite. The expected positive result is found in the impact of international trade. As shown in column B, the role of the VAT variable in the context of tax revenue performance proves to be positively significant, showing that VAT did improve the tax revenue performance of these countries. Another striking feature that emerges from the estimation in column C is that even though the simple VAT dummy now becomes insignificant, strong effects are apparent in the interaction with income and importance of international trade. A revenue gain is associated with the presence of a VAT,

and this is greater the higher the level of per capita income and interaction with trade importance. In the former case, while all countries gain revenue from the presence of VAT, it is the more developed countries that gain more. Although the  $R^2$  is quite low (57 per cent), this fit tends to improve when dividing the countries into the different income groups.

Proceeding to the four individual groups, we find the expected positive impact of income on the GDP share of taxes and the importance of international trade, both in the case of *low-income and lower-middle* income groups. The dummy variable  $v$  is negatively related, showing that its introduction results in a loss of revenue. There can however be various explanations for this result – the two most important reasons could be the following: (1) The administrative difficulties with VAT collection; and (2) the high threshold for developing countries (most of the businesses are informal with very low-income turnovers) could drain the tax base for VAT. The revenue gain improves for middle-income groups as shown in Table 4, because of a higher per capita income and higher importance of international trade. The  $R^2$  delivers the best result (fit) for the low-income group (71 per cent), i.e. 71 per cent of the tax share is being explained by the explanatory variables.

Another interesting result is found in terms of the high-income group. The VAT dummy variable is now positively related to tax revenues, being negative for other income groups (see Column B). This could be attributed to revenue productivity and thus a more efficient operation of VAT systems in these countries. While the positive relationship with the level of per capita income persists, a negative effect is found in relation to the importance of the international trade, possibly pointing to a higher degree of competition, also in terms of taxes. The  $R^2$  delivers the best result (fit) here, i.e. 82 per cent of the tax share is being explained by the explanatory variables for the high-income group.

**Table 4**  
Regressions (VAT) explaining general government tax revenue

<b>General</b>	<b>A</b>	<b>B</b>	<b>C</b>
Constant	-0.13 (-4.94)*	-0.17 (-6.46)*	-0.05 (-1.65)
Lnp	-0.04 (-6.64)*	-0.04 (-6.55)	-0.09 (-8.76)*
Lno	0.67 (28.50)*	0.67 (28.86)*	0.62 (23.77)*
V		0.09 (5.66)*	-0.12 (-1.74)
Vlnp			0.07 (5.74)*
Vlno			0.02 (0.26)
Observations	744	744	744
R <sup>2</sup>	0.53	0.55	0.57
<b>Low-income group</b>			
Constant	-0.88 (-12.99)*	-0.87 (-13.22)*	-0.87 (-12.99)*
Lnp	0.18 (7.11)*	0.18 (7.41)*	0.18 (7.23)*
Lno	0.44 (17.70)*	0.45 (18.44)*	0.45 (18.39)*
v		-0.07 (-3.52)*	-0.65 (-1.14)
vlnp			-0.13 (-0.42)
vlno			0.21 (0.96)
Observations	217	217	217
R <sup>2</sup>	0.69	0.71	0.71
<b>Lower middle-income group</b>			
Constant	-0.19 (-2.61)*	-0.18 (-2.63)*	-0.20 (-2.46)*
lnp	0.02 (1.37)	0.01 (0.88)	-0.02 (-1.42)
lno	0.76 (8.93)*	0.70 (8.17)*	0.52 (5.76)*
v		-0.07 (-2.67)*	0.33 (2.19)*
vlnp			0.79 (4.28)*
vlno			0.06 (2.58)*
Observations	124	124	124
R <sup>2</sup>	0.41	0.44	0.55
<b>Upper middle-income group</b>			
Constant	-0.04 (-5.78)*	-0.41 (-5.84)*	-0.42 (-2.38)*
lnp	-0.04 (-3.39)*	-0.03 (-2.99)*	-0.07 (-1.84)
lno	0.31 (4.39)*	0.25 (2.34)*	-0.10 (-0.43)
v		-0.07 (-0.87)	0.35 (1.66)
vlnp			0.04 (1.02)
vlno			0.79 (3.14)*
Observations	124	124	124
R <sup>2</sup>	0.15	0.15	0.37

Constant	1.22 (8.55)*	1.37 (10.18)*	1.56 (9.61)*
lnp	-0.35 (-9.20)*	-0.43 (-11.54)*	-0.48 (-10.58)*
lno	0.66 (16.22)*	0.51 (11.56)*	0.47 (9.48)*
v		0.19 (6.75)*	-0.71 (-2.19)*
vlnp			0.19 (2.39)*
vlno			-0.25 (-1.41)
Observations	279	279	279
R <sup>2</sup>	0.78	0.81	0.82

Notes: Values in parentheses indicate t-statistics

\* Significance at 5 per cent level

Low-income group: Kenya, Mali, Zambia, Zimbabwe, Ethiopia, India, and Lesotho

Lower middle-income group: Egypt, South Africa, Peru and Iran

Upper middle-income group: Argentina, Brazil, Chile and Malaysia

High-income group: Iceland, Canada, New Zealand, Australia, Sweden, United Kingdom, Israel, USA and Switzerland

A final observation needs to be made in terms of Table 4. As already hinted, the revenue gain associated with the presence of a VAT gets larger the higher the level of per capita income. This is clear when comparing the low-income and the high-income group. While the coefficient of the dummy variable ( $v$ ) is found to be significantly negative in terms of the low-income group (pointing to a tax revenue loss in these countries), it is significantly positive in terms of the high-income group (showing a revenue gain for these countries). This is no surprise, as most developing countries depend on international trade, and the lack of a well-organised and efficient administrative capacity can lead to a loss in revenue. In general, the adoption of a VAT is associated with higher revenues for countries where the per capita income is higher and international trade is more important.

#### 4

### Conclusions and policy implications

Existing empirical evidence has shown that the share of VAT revenues in GDP exceeds that of the PEST in developing countries. The VAT system also tends to perform better in developed countries than in developing countries. Apart from revenue performance, issues such as the

efficiency and fairness with which a government raises revenue, and the costs incurred in doing so, also justify attention.

It is hard to gauge directly the extent to which the spread of the VAT has increased the *efficiency* with which productive resources are allocated. In this paper, indirect signs of an efficiency gain are found in the form of an increase in the ratio of tax revenue to GDP. As studies show that GDP per capita and international trade have an impact on the ratio of tax revenue to GDP, these factors, together with the dummy and interaction variables, are taken into account in the regression analysis. A quick review of the regression results indicates that the ratio of the tax revenue to GDP is larger when the level of per capita income is higher. While all countries gain revenue from the presence of VAT, it is significantly more in developed countries. The dummy VAT is found to be negative for low- and lower middle-income groups, showing a revenue loss associated with the introduction of a VAT on its own without the interaction variable, international trade. The interaction with trade openness is an insignificant factor in the general regression analysis, but is significantly positive for the lower- and upper middle-income groups. This proves the importance of trade for VAT revenues, and also that VAT combined with

interaction variables is conducive to higher tax revenues in comparison to the PEST in these countries. This is not surprising, as most developing countries depend on international trade, and there is an ease of collection at the point of importation. If international trade plays a minor role in developing countries, there will be a loss of revenue because of the lack of well-organised administrative systems to collect the VAT.

Administration considerations have exerted a considerable influence on the structure of VAT in developing countries. As a single-rate VAT is easier to administer than a multiple-rate VAT, several developing countries have opted for the former. The complexity of administering full exemptions (zero-rating) has led most developing countries in restricting them to exports. Small business taxpayers have been dealt with by exempting those with gross sales below a certain threshold, or by taxing them under a simplified system. Because of the difficulty of taxing services, most developing countries impose VAT only on selected services. Once the VAT system is in place, administrative constraints tend to distort some of its features. However, the system does contain an element of self-enforcement that is lacking in other types of GST, which reduces tax evasion.

#### 4.1 Policy implications

It is difficult to provide a generalised conclusion for developing countries as a group. If a country's foreign trade plays a major role, vertical integration of producers, manufacturers, wholesales and retailers is induced by turnover tax. Discrimination against investment goods is considered harmful, basic accounting is widespread and efficient and impartial tax administration has been achieved, then the country should introduce VAT and remove PEST. In the implementation of a VAT system, the following guidelines should be remembered:

- (1) Once a country has decided to build a new form of taxation based on a VAT, a series of suitable decisions are needed in order to define the VAT. The choices made will depend on country-specific circumstances. If foreign trade plays a minor role in a country, and three or more of the following features apply: small scale agriculture is important; retail trade is fragmented among very small sellers; vertical integration of producers is unlikely to be induced by turnover taxes; discrimination against investment goods is not considered harmful; and the economic units covered would make it difficult to record their internal transaction, then the country may do better to rely on a simple turnover tax or a single-stage VAT at the manufacturing or wholesale level.
- (2) Although VAT was implemented in order to substitute a number of PESTs, taxpayers regarded it as a very complex tax and as an additional burden in some countries. In order to dissipate some of the general concerns and to answer some of the questions surrounding the adoption of VAT, governments had to correctly inform the general public, and the potential taxpayers in particular, about the consequences of introducing a VAT. Apart from the need for a public relations exercise, there was a need for training tax officials regarding the new tax and acquainting taxpayers with the new system. A preparation and implementation timetable and project team devoted solely to VAT implementation should therefore be established before a new VAT is introduced.
- (3) The issue of VAT regressivity and inequity is not simple. It deserves a more thoughtful treatment than a simplistic use of exemptions and zero-rating. Instead of trying to amend and distort the VAT, its strengths should be exploited to generate revenue that will enable governments to assist the poor in more effective ways.
- (4) Even though the introduction of VAT is not inflationary, people have certain perceptions thereof. Government policies should thus take the following measures into consideration, namely: informing the public and traders about the expected effect of the VAT on prices; the use of price

control; offsetting adjustments in other taxes; the correct timing of the tax change-over; and generous provisions to ensure full credit for previously paid taxes on business and inventories.

- (5) The significant role of trade openness in explaining VAT yields is consistent with a key empirical feature of the VAT system: revenue collected on imports commonly accounts for a large proportion of total VAT revenue in developing countries. Securing VAT collections on imports is therefore generally a crucial part of ensuring effective collection of the tax throughout the chain of production. Since a simplified VAT system is cheaper than a more complex one, this implies that in many developing countries a simple VAT with a high threshold will be easier to maintain than the ones replaced in the first instance.

### Endnotes

- 1 The normal disclaimer applies. The authors would like to thank Prof Steve Koch, Dr Jurie van Tonder and Mr Adedeji Amusa for assistance rendered throughout this study, as well as the anonymous referees for invaluable comments.
- 2 Brazil levied a VAT payable on sales and transfers of goods (industry) in the form of a federal excise tax or then VAT (IPI or Imposto Sobre Produtos Industrializados) at various rates in accordance with the nature of the product (10 to 15 per cent and in certain cases over 300 per cent). A state sales and services tax or VAT on agriculture, industry, and other services (ICMS or Imposto Sobre Operacoes Relativas a Circulacao de Mercadorias e Servicos) of seven to 25 per cent is also levied. In addition, a municipal services tax, the ISS (Imposto Sobre Servicos) is levied on gross income by municipalities on a variety of industrial, commercial, and professional services.
- 3 Levying VAT on an origin basis effectively means charging the value that is added to a

product in different jurisdictions at the rates charged by those jurisdictions.

- 4 Revenue productivity of commodity/consumption taxes such as VAT or GST can be measured as follows: VAT/GST as percentage of GDP divided through the VAT/GST tax rate.

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