Value Added Tax: Onward and Upward?

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1. Introduction

The most important tax development of the last half century has undoubtedly been the rise to prominence of the value-added tax (VAT).[1] This tax has taken center stage almost everywhere (with the significant exception of the United States) and has become a revenue mainstay for many countries. The success of the VAT reflects a variety of factors: its high revenue potential, its relative simplicity and logic from an administrative perspective, its impact on economic efficiency, trade, and growth, the ease with which its relatively mild consequences on income distribution and equity may be mitigated, and the fact that fewer and relatively less complex political economy issues than often arise with respect to other potential revenue producing taxes seem to afflict its introduction and development.

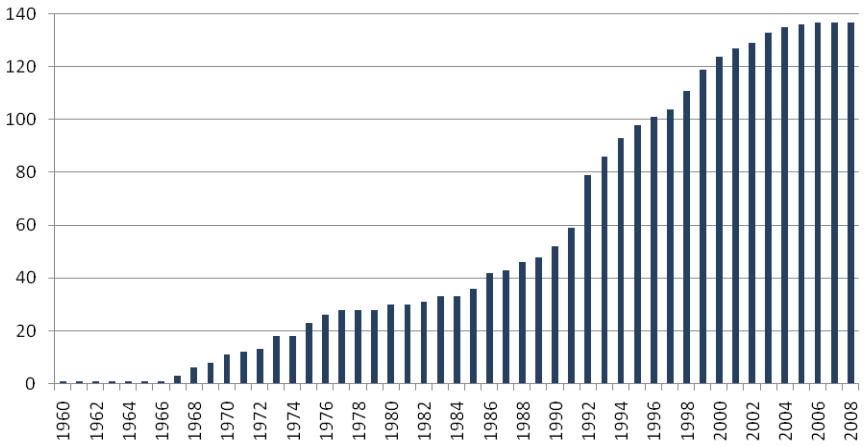
After taking place for decades almost out of sight of the academic world, more recently these properties of the VAT -- and of course the dramatic expansion of its use in rich and poor countries alike over the years --have begun to attract considerable attention in the tax policy and economics literature.[2] We do not attempt to cover all developments in this paper. Our objective is considerably more modest. Following a brief review of the spread of VAT in the next section, the major new contribution of the paper is the detailed analysis in Sections 3 and 4 of how well the VAT has actually performed from several perspectives. In the balance of the paper, we turn to a much briefer consideration of several important policy issues that arise with VAT, concluding with a closer look at some administrative challenges, in particular the issue of fraud, Although some in Europe have argued that this may prove to be the Achilles' heel of the VAT, we conclude that, on the whole, those fears are as overstated as the more fundamental objections to VAT frequently voiced in the United States and increasingly beginning to appear, in more sophisticated language, in some recent academic literature.[3]

2. The Rise of the VAT

Figure 1 tells the story: beginning with a few pioneers in the 1960s, the VAT began to spread around the world. By 1992 about 80 countries had adopted it; by 2008, at least 136 countries had a VAT. Since then, still more countries have joined the VAT ranks: in 2009, for example, Laos adopted a VAT and Pakistan is now considering doing the same. Interestingly, in some countries VATs are also now becoming important sub-national taxes, notably in India and Canada. At the national level, however, with the exception of some countries in the Middle East – where the Gulf Cooperation Council has for some time been considering adopting a VAT -- and a few small islands, almost every country, with the notable exception of the United States, has now introduced some form of VAT.

[1] VATs in different countries may of course have many different names, among which the most popular in recent years is the more easily comprehensible label Goods and Services Tax (GST).
[2] See, for example, Chelliah et al. (2001), Ebrill et al. (2001), and Bird and Gendron (2007).
[3] 'American exceptionalism' is mentioned briefly in Section 6 below but not discussed in detail here. As an academic critique, see e.g. Emran and Stiglitz (2005).

Figure 1. Number of countries with the VAT



Source: Ebril et al. 2001 and various sources

Norregaard and Khan (2007) provide a useful review of the main factors often said to have led to the popularity of the VAT. For example, from both an administrative and an economic perspective, VAT may be considered a particularly efficient way to tax consumption because revenues are collected throughout the chain of production. As a result, the revenues are likely to be more secure than in the case of another form of tax that reaches approximately the same base -- the retail sales tax (RST). RSTs – now found only in most U.S. states and a few Canadian provinces – have the unfortunate characteristic that all revenue is lost if there is evasion at the final retail stage, and it is precisely this stage that is most difficult to control. Moreover, in principle VAT is considerably more economically efficient than any form of pre-retail stage sales taxes (such as turnover taxes or taxes imposed at the manufacturing or wholesale level) because unlike those taxes VAT does not result in cascading and distortions of production choices. Yet another positive attribute of adopting a VAT in many countries, particularly poorer countries, is that doing so has often proved to be a catalyst for reforming tax administration more generally, for example by extending the self-assessment method usually considered integral to VAT to income and perhaps other taxes.

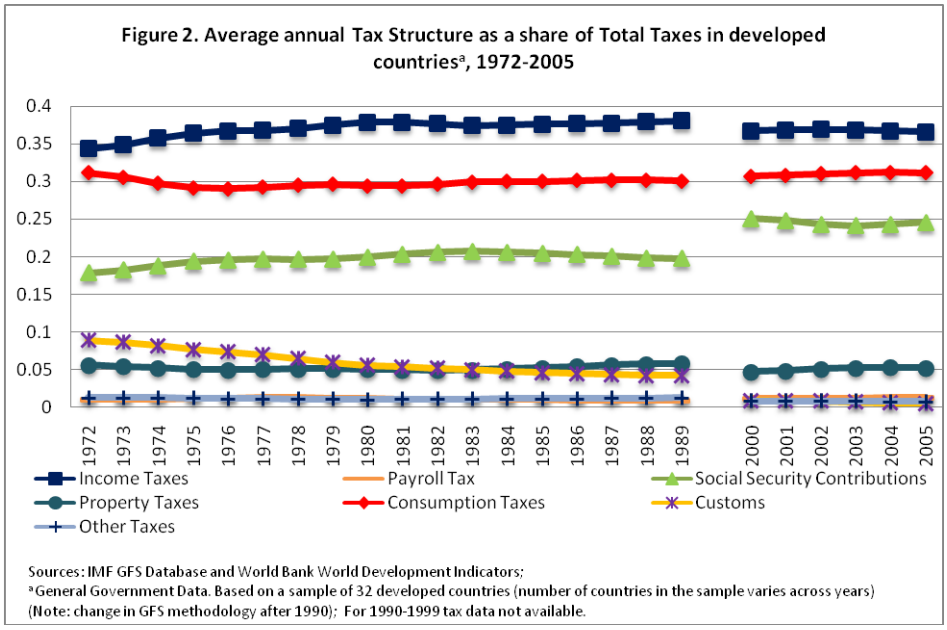
Of course, each of the 'silver linings' associated with VAT is itself accompanied by a possible cloudy outcome. For example, if the crediting chain of the VAT is broken, not only may production decisions be distorted but the final incidence of the tax becomes uncertain. Similarly the prospective efficiency gains associated with VAT may be achieved in many cases only by incurring substantial administrative and compliance costs and may sometimes be accompanied by possibly adverse distributional consequences. Finally, since refunding input taxes borne by outputs is an integral feature of a VAT not only are any weaknesses in the administrative system put under more strain but failures become much more obvious.

In a rigorous recent analysis, Keen and Lockwood (2010) find that a country is less likely to adopt a VAT the larger is its agricultural sector and the more open its economy. These results are not unexpected: agriculture is notoriously 'hard to tax' under any regime while on the other hand international trade provides an attractive and accessible alternative tax base. Interestingly, countries with lower past revenue to GDP ratios – although they might be presumed to have a greater 'need' for revenues – were also found to be less likely to adopt a VAT. On the other hand, given the role IMF advice and assistance has played in spreading the VAT gospel around the world, it is not surprising that Keen and Lockwood (2010) find that a country's participation in a non-crisis IMF program also increases the likelihood of VAT adoption, as does the 'yardstick competition' effect of having neighbors that have already done so. Perhaps the most striking result of this recent study, however, is that income per capita is no longer a significant determinant for VAT take-up: rich or poor, almost everyone has now taken the VAT leap.

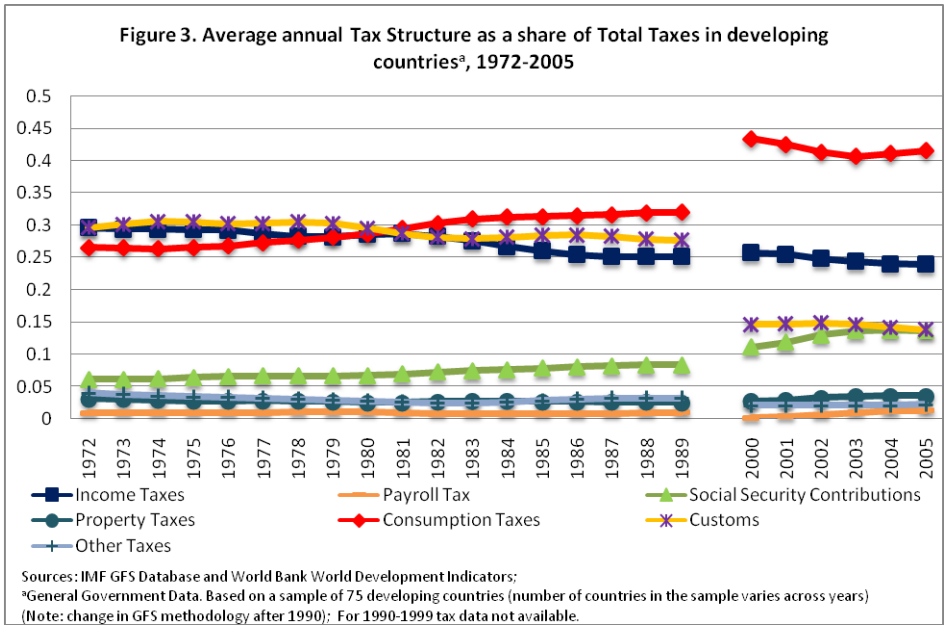
Not only do VATs now exist in most countries, but they provide a sizable share of revenues in many of them. The picture is different in developed and developing countries, however. As Figure 2 shows, for example, consumption taxes have long been the second key pillar of the tax systems of developed countries, following income taxes and in turn being followed by social security taxes as the third pillar.[4] This chart masks the growing importance of VAT, however, because the composition of consumption taxes in developed countries changed drastically over this period. In 1965, for example, almost two-thirds of consumption tax revenue in OECD countries came from excises and other specific consumption taxes; by 2003, this share had fallen to little more than one-third.[5]

[4] The break in the data between 1990 and 2000 is due to reporting irregularities and a sizable drop in the number of observations. The same observation applies to Figure 3.

[5] The unweighted average share of general consumption taxes – essentially the VAT -- in OECD countries rose from only 35.9% of all consumption taxes (13.6% of tax revenues and 3.8% of GDP) in 1965 to 62.2% of consumption taxes (18.9% of tax revenues and 6.8% of GDP) in 2006 (OECD, 2008).



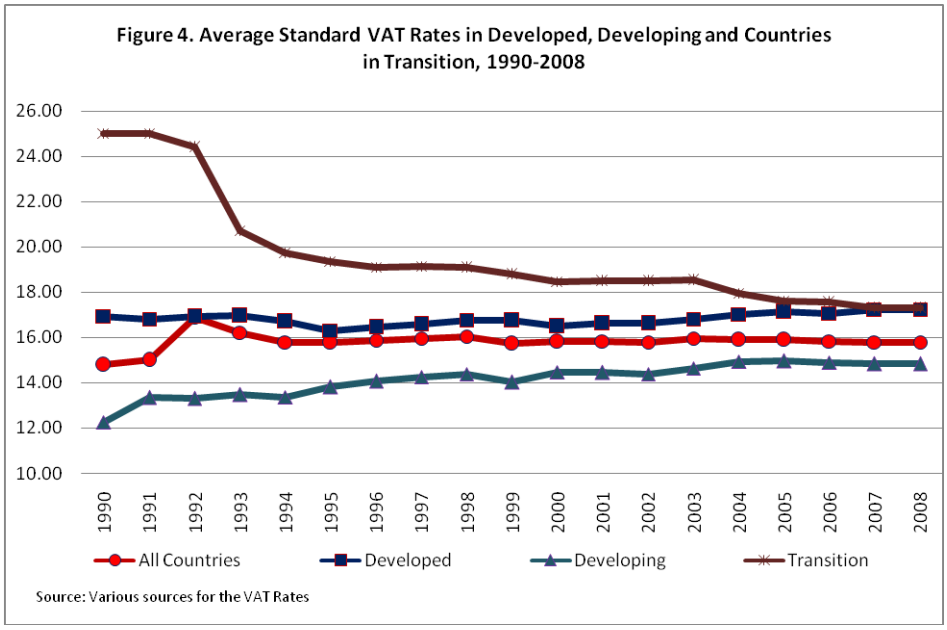
The growing importance of the VAT is even more obvious in developing countries, as shown in Figure 3. In recent decades, trade liberalization has resulted in a substantial decline in the once dominant customs duties, which are now more or less tied with payroll taxes for third place. However, the increase in VAT revenues has more than compensated for this decline to the point where, as Figure 3 shows, consumption taxes are now significantly more important in revenue terms in many developing countries than income taxes, and in most the growth is almost entirely attributable to VAT.



One reason revenues may increase is because rates do. In some countries, VAT rates have indeed risen since VAT was first introduced. On the whole, however, as Table 1 shows, although the average standard rate has increased slightly over the last two decades it has not moved much from the range of 16 to 17 percent. Of course, there are more noticeable trends among different groups of countries. For example, while the average standard rate has decreased sharply in transitional countries, it has trended upward, especially over the last decade, in both developing and developed countries, especially the latter, as shown in Figure 4.

Table 1. Average Standard VAT Rates in Developed, Developing and Countries in Transition (Based on IMF classification)

	Advanced Countries			Developing Countries			Countries in Transition			Unweighted
Year	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Average
1990	16.93	3.00	24.50	12.26	5.00	22.00	25.00	25.00	25.00	14.79
1991	16.81	3.00	25.00	13.36	5.00	35.00	25.00	25.00	25.00	15.01
1992	16.91	3.00	25.00	13.30	5.00	35.00	24.39	5.00	30.00	16.88
1993	16.96	3.00	25.00	13.46	5.00	23.00	20.71	8.00	30.00	16.21
1994	16.70	3.00	25.00	13.37	5.00	23.00	19.74	8.00	28.00	15.79
1995	16.30	3.00	25.00	13.80	5.00	23.00	19.35	8.00	25.00	15.76
1996	16.44	3.00	25.00	14.07	5.00	23.00	19.10	8.00	25.00	15.87
1997	16.56	3.00	25.00	14.26	5.00	23.00	19.15	8.00	25.00	15.96
1998	16.77	3.00	25.00	14.38	5.00	23.00	19.08	8.00	25.00	16.05
1999	16.73	3.00	25.00	14.02	3.00	23.00	18.78	8.00	25.00	15.72
2000	16.49	3.00	25.00	14.46	2.00	23.00	18.46	10.00	25.00	15.82
2001	16.62	3.00	25.00	14.46	2.00	23.00	18.48	10.00	25.00	15.84
2002	16.62	3.00	25.00	14.38	2.00	23.00	18.48	10.00	25.00	15.78
2003	16.80	4.00	25.00	14.65	2.00	23.00	18.53	10.00	25.00	15.96
2004	17.02	5.00	25.00	14.93	5.00	25.00	17.95	10.00	20.00	15.89
2005	17.14	5.00	25.00	14.97	5.00	23.00	17.61	10.00	20.00	15.89
2006	17.07	5.00	25.00	14.89	5.00	23.00	17.54	10.00	20.00	15.84
2007	17.24	5.00	25.00	14.84	5.00	22.00	17.29	10.00	20.00	15.79
2008	17.24	5.00	25.00	14.83	5.00	22.00	17.29	10.00	20.00	15.79



Tax theory definitely lends little or no support to a uniform consumption tax rate as ideal. Nonetheless, in order to reduce compliance and administrative costs and improve economic efficiency, most expert advice has long recommended a single standard VAT rate, with zero rating only for exports. Perhaps reflecting greater susceptibility to outside advice, many developing countries have in fact adopted such systems. However, on the whole, most developed countries impose more than one rate, often largely on equity grounds (Norregard and Khan 2007). This outcome is a bit curious, given that the equity case for favorable rates for certain items is presumably stronger in developing countries. Nonetheless, such arguments continue to resonate in many developed countries also. For example, a recent report from Copenhagen Economics (2007), although arguing for uniform VAT as a superior approach, notes four possibly persuasive arguments for reduced VAT rates in certain circumstances. Two of these arguments – that a reduced VAT may increase efficiency by increasing productivity or by reducing structural unemployment – are efficiency-based; the other two – that a reduced VAT may enhance equity by improving the income distribution or by making particular products more accessible to the entire population – take the more traditional equity route. Yet another argument for differential rates that has recently found favor with some is the desirability of shifting taxes, including VAT, off 'green' goods and onto 'environmentally damaging' ones.

3. VAT Performance

VATs are now found almost everywhere and have become important components of revenue systems in most countries. But how well have VATs actually performed? We consider several aspects of this question in this and the next section. Although some fundamental features (use of

the invoice-credit method, self assessment, the destination principle, etc.) are common to most VATs, other important features of VAT structure (rates, exemptions, use of zero rating, etc) differ sharply from country to country as of course does the efficiency and effectiveness with which the tax is implemented. Unsurprisingly, therefore, VATs differ greatly across countries with respect to how productive they are in raising revenues.

Three related measures of VAT productivity may be found in the literature: (i) the VAT efficiency ratio; (ii) the C-efficiency measure; and (iii) what has sometimes been called the VAT gross collection measure. All three measures calculate efficiency as the ratio of actual VAT collections in the country to the potential revenues that would be derived from applying the standard VAT rate to, respectively, three potential tax bases: GDP, total consumption expenditure, and private consumption expenditure. The formulas for these three measures can be written as:

$$VAT\ Efficiency\ Ratio = \frac{VAT\ Revenue\ Collection}{Standard\ VAT\ Rate * GDP}$$

$$C - Efficiency\ Ratio = \frac{VAT\ Revenue\ Collection}{Standard\ VAT\ Rate * Total\ Consumption\ Expenditure}$$

$$VAT\ Gross\ Collection\ Ratio = \frac{VAT\ Revenue\ Collection}{Standard\ VAT\ Rate * Private\ Consumption\ Expenditure}$$

In principle, a VAT with no exemptions, a single rate, and full compliance should result in efficiency ratios of close to 100 percent (IMF 2010). In practice, of course, many VATs are very far from this possible goal. In fact, none of these measures gets close to the actual tax base on which the VAT falls, even though given the exclusion of investment and most public consumption from the VAT base in most countries, the VAT gross collection measure should be closer than the C-efficiency ratio and definitely closer than the VAT efficiency ratio, based as it is on GDP. In addition the use of the standard VAT rate to compute potential revenues ignores the existence of multiple rates, some lower than the standard rate and some higher; exemptions and zero rating provisions are also ignored. The potential revenue of a VAT in any country thus depends to a considerable extent on political decisions made in determining the VAT base. The actual revenues then depend further upon how fully that potential base is actually reached, which in turns depends upon two interrelated factors -- the level of tax compliance (tax morale) and the effectiveness of the tax administration.

Table 2 shows these three 'efficiency' measures for 74 countries using three year averages for two periods, for the early 1990s and the three most recent years available in the 2000s. [6] The change in the three efficiency measures between these two periods is also reported in Table 2.

[6] The years used for the three averages are indicated in the last two columns of Table 2; the actual years used vary by country depending on data availability. To a large extent, the three measures move together: the simple correlation between the VAT Efficiency and C Efficiency ratios is 0.92 and that between the VAT Efficiency and the VAT Gross Compliance ratios is 0.89.

Despite the use of three year averages, these data remain noisy and the various measures show considerable jumps for some countries. Sometimes, of course, these changes may reflect changes in legislation, as for example seems to be the case at least to some extent in the case of the Netherlands and Belarus. In other cases, as in Cyprus and Jamaica, it is hard to think of any simple explanatory factor. The range between 'high' and 'low' performers on the various measures is astounding. Considering only the Gross Compliance Ratio in the most recent period, for instance, the range is from a low of 10 in Brazil to a high of 114 in Luxembourg (and an incredible 112 in Côte d'Ivoire). Countries that fail to rebate input taxes (and hence tax production as well as consumption) as well as countries that reap substantial revenues from increased rates on e.g. fuel or have a large tourist or transit consumption base to tap may of course score high on this measure, which may explain Luxembourg's performance. Brazil's apparent poor showing is equally explicable since the VAT data clearly refer only to the very limited national VAT and not the much more important state VATs. Sometimes countries such as Estonia and Singapore appear to be consistent high performers, as might be expected: but then so is Côte d'Ivoire, which makes one wonder what these numbers are really measuring. Overall, one thing is clear: all the figures in Table 2 need to be interpreted with considerable caution given the noise in the data. One way to facilitate the interpretation of the trends in Table 2 is to graph the average evolution of the VAT efficiency measures by region. Figure 5 does this for the gross collection ratio.

Regardless of which of the three measures we examine, broadly similar patterns emerge across these regions. The general trend is toward a consistent improvement over the last two decades, particularly for Eastern Europe and North Africa and the Middle East. The most striking exception is Sub-Saharan Africa, where a significant drop in VAT efficiency (however measured) in the first half of the 1990s has not since been reversed. With respect to the average VAT efficiency, for example, it is between 35 and 40 percent in most regions with the striking exceptions of Eastern Europe at 45 percent and Sub Saharan Africa at 25 percent. While the ratios are generally higher for the C-efficiency ratio (about 5 percentage points higher) and the VAT gross collection ratio (about 10 percentage points higher), the pattern is the same in all cases. As Figure 5 shows, for example, for the VAT gross collection ratio the average figure for most regions of the world is between 60 and 65 percent, with the outliers being again Eastern Europe at over 70 percent and Sub-Saharan Africa at 40 percent.

Despite the defects of these measures, one message thus comes through clearly. In almost every country, the revenue productivity of VAT could be improved. This could be done in two quite different ways. First, VAT structure could be strengthened by increasing the base; second, VAT administration and compliance could also be strengthened. IMF (2010) suggests that the main way VAT can be strengthened in developed countries is through changing VAT structure, while in most cases developing countries need to emphasize the longer and harder road of improving tax administration and compliance.[7] As Bird and Gendron (2007) point out, it seems likely that some less developed countries may have adopted a VAT before they were ready to administer it: as suggested by Ebrill et al. (2001) the VAT, like the income tax, is best administrated through 'self-

[7] Similar distinctions have been made within groups of countries. For example, Glenday and Hollinrake (2005) in analyzing VAT performance among the Southern African Development Community (SADC) Member States, observe that that the lowest per capita income countries tend to have the weakest tax capacities and lowest VAT efficiencies.

assessment,' and it is far from clear that countries that have had great difficulty in administering income taxes are likely to do much better in administering a VAT. On the other hand, as we argue

Table 2. Levels and Changes in VAT Efficiency Ratio (three year average)

	VAT Efficiency (%)			C-Efficiency (%)			VAT Gross Compliance Ratio (%)				
	Initial Three Years*	Last Three Year*	Difference	Initial Three Years	Last Three Years	Difference	Initial Three Years	Last Three Years	Difference	Initial Three Years	Last Three Years
Albania	32.8	37.3	4.5	36.5	43.0	6.5	41.3	48.6	7.4	1996-98	2002-04
Argentina	10.0	12.7	2.7	12.0	17.2	5.3	12.4	20.5	8.0	1990-92	2002-04
Armenia	29.9	36.8	6.9	33.5	44.7	11.1	37.3	51.5	14.2	2003-05	2006-08
Australia	31.3	37.8	6.6	43.2	54.7	11.5	56.4	72.0	15.6	2000-02	2005-07
Austria	26.1	29.4	3.3	34.3	40.7	6.4	46.8	54.4	7.6	1995-97	2005-07
Bangladesh	18.9	19.5	0.6	23.2	24.5	1.4	24.7	26.3	1.7	2001-03	2006-08
Belarus	28.1	53.2	25.1	38.9	74.2	35.3	51.4	102.9	51.4	1992-94	2005-07
Belgium	32.8	32.9	0.1	43.1	43.7	0.6	59.1	62.5	3.3	1990-92	2005-07
Bolivia	32.7	43.7	11.0	35.7	55.8	20.1	41.5	68.7	27.3	1990-92	2005-07
Brazil	10.4	6.3	-4.1	13.2	7.9	-5.3	17.0	10.5	-6.5	1990-92	2006-08
Bulgaria	37.3	57.8	20.5	42.4	67.5	25.2	51.2	83.4	32.3	1994-96	2006-08
Canada	34.6	37.9	3.4	42.0	50.9	8.9	59.0	68.5	9.5	1991-93	2005-07
Chile	40.7	41.6	0.9	55.8	61.8	6.0	64.9	74.1	9.2	1990-92	2006-08
Colombia	33.4	28.9	-4.5	43.8	33.5	-10.3	49.9	44.1	-5.8	1990-92	1998-00
Congo, Republic of	21.5	15.1	-6.4	33.4	33.0	-0.4	48.9	49.7	0.7	1997-99	2003-05
Costa Rica	26.2	42.1	15.9				36.1	63.0	26.9	1990-92	2005-07
Côte d'Ivoire	64.3	67.7	3.4	75.8	85.4	9.6	104.4	111.6	7.2	1990-92	2005-07
Croatia	14.4	47.3	32.9	17.7	56.8	39.2	22.2	72.7	50.5	1998-00	2005-07
Cyprus	89.2	30.5	-58.7	123.7	43.8	-79.9	177.8	63.0	-114.8	1992-94	2005-07
Czech Republic	10.4	7.8	-2.6	13.0	9.8	-3.3	15.5	10.9	-4.6	1993-95	2005-07
Denmark	39.3	41.1	1.8	51.9	55.0	3.0	77.9	84.6	6.7	1990-92	2005-07
Egypt	32.0	34.2	2.2	37.5	41.1	3.7	44.0	47.7	3.8	2002-04	2006-08
El Salvador	37.8	53.2	15.4	39.2	51.2	11.9	43.7	56.4	12.7	1998-00	2005-07
Estonia	71.5	49.1	-22.4	94.8	67.9	-26.8	125.0	88.7	-36.3	1992-94	2005-07
Finland	34.6	38.3	3.6	45.7	52.5	6.8	65.7	74.7	9.0	1994-96	2005-07
France	36.7	36.1	-0.5	46.2	45.2	-1.0	64.2	63.8	-0.4	1990-92	2005-07
Georgia	19.7	55.1	35.5	20.0	60.6	40.5	22.1	76.6	54.4	1997-99	2005-07
Germany	23.9	19.8	-4.1	31.2	25.9	-5.3	41.6	34.0	-7.6	1990-92	2005-07
Greece	33.6	37.8	4.1	36.7	42.9	6.3	43.9	52.8	8.9	1995-97	2005-07
Honduras	42.7	49.4	6.7	47.8	51.8	4.0	57.6	62.2	4.6	2003-05	2006-08
Hungary	26.0	42.4	16.5	33.3	55.6	22.3	38.7	64.1	25.4	1990-92	2005-07
Iceland	40.3	42.2	1.9	49.8	52.0	2.2	66.7	74.2	7.5	1990-92	2006-08
Indonesia	36.3	39.0	2.7	55.9	51.8	-4.1	64.4	57.9	-6.5	1990-92	2002-04
Ireland	21.9	35.8	13.9	28.5	58.4	29.9	36.7	78.2	41.5	1990-92	2005-07
Israel	66.3	62.2	-4.0	73.6	76.0	2.4	109.3	109.6	0.3	1990-92	2006-08
Italy	25.3	28.2	2.9	33.0	35.7	2.7	43.3	47.9	4.6	1995-97	2005-07
Jamaica	69.1	44.1	-25.1	85.5	47.5	-38.0	99.8	55.9	-44.0	1992-94	2005-07
Kazakhstan	18.3	31.8	13.5	21.5	57.2	37.3	25.4	74.8	49.5	1997-99	2006-08
Korea	37.6	41.9	4.2	60.0	61.1	1.1	73.9	77.3	3.4	1990-92	2005-07
Latvia	47.7	44.3	-3.4	55.9	55.1	-0.8	75.2	70.1	-5.1	1994-96	2005-07

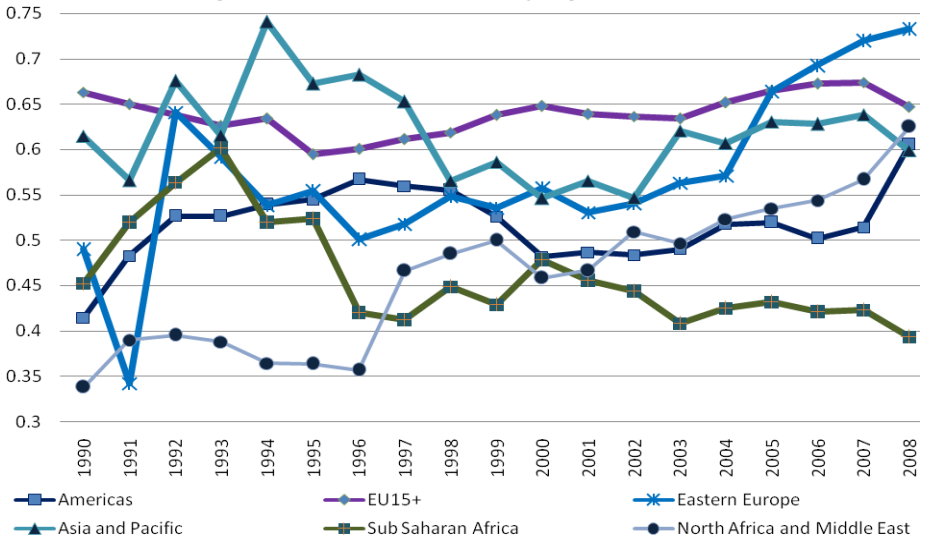
* "Initial Three Years" and "Last Three Years" refer to the first and last three years in the sample for which we have data available for a specific country

	VAT Efficiency (%)			C-Efficiency (%)			VAT Gross Compliance Ratio (%)				
	Initial Three Years*	Last Three Year*	Difference	Initial Three Years	Last Three Years	Difference	Initial Three Years	Last Three Years	Difference	Initial Three Years	Last Three Years
Lithuania	35.6	43.6	8.0	40.3	52.2	9.4	52.2	67.1	14.9	1993-95	2006-08
Luxembourg	35.3	38.2	2.9	62.1	77.4	15.3	85.6	113.7	28.1	1999-01	2005-07
Madagascar	7.9	10.1	2.1	8.3	20.3	11.9	9.0	22.6	13.6	1994-96	2005-07
Malta	44.6	43.1	-1.5	53.7	52.0	-1.7	71.6	68.3	-3.3	1995-97	2005-07
Mauritius	38.9	44.4	5.5	51.5	52.8	1.2	63.4	63.5	0.0	1998-00	2005-07
Mexico	28.5	21.9	-6.6	35.7	28.1	-7.6	40.3	32.7	-7.7	1990-92	1998-00
Moldova	46.8	70.5	23.7	48.5	62.3	13.8	57.2	76.4	19.2	1997-99	2006-08
Mongolia	43.3	46.3	3.0	49.5	72.9	17.3	61.4	90.6	29.2	1998-00	2005-07
Morocco	30.7	39.6	8.9	37.1	51.7	14.6	46.5	67.4	20.9	1990-92	2006-08
Nepal	24.0	29.5	5.5	27.9	32.8	2.1	31.2	37.3	6.1	1997-99	2006-08
Netherlands	84.8	41.3	-43.5	115.7	57.2	-58.5	169.9	87.1	-82.9	1990-92	2005-07
New Zealand	48.9	51.1	2.1	64.5	66.0	1.5	83.8	86.6	2.9	2001-03	2005-07
Nicaragua	22.7	38.6	15.9				24.8	45.9	21.1	1991-93	1999-01
Norway	36.6	31.5	-5.1	50.8	52.6	1.8	72.9	78.0	5.1	1990-92	2006-08
Pakistan	13.9	24.6	10.7	16.4	28.9	12.5	19.7	32.4	12.7	1990-92	2005-07
Panama	32.9	12.9	-20.0				57.1	21.0	-36.1	1990-92	1999-01
Peru	25.0	33.4	8.4	29.8	46.1	12.0	32.7	53.1	20.3	1990-92	2005-07
Poland	29.7	36.6	6.9	37.2	45.7	8.5	48.6	59.9	11.3	1994-96	2005-07
Portugal	39.4	39.5	0.1	48.0	45.9	-0.6	61.8	60.5	-1.3	1997-99	2005-07
Romania	32.6	21.8	-10.8	41.8	26.1	-15.7	50.2	30.6	-19.6	1993-95	2005-07
Russia	24.3	30.2	5.8	34.3	45.8	11.5	47.1	61.7	14.7	1994-96	2006-08
Singapore	49.0	36.3	-12.7	95.3	72.6	-13.1	114.8	91.7	-23.1	1994-96	2005-07
South Africa	42.4	53.9	11.5	52.0	66.0	-0.6	68.1	86.7	18.6	1991-93	2005-07
Spain	34.7	21.3	-13.5	44.5	28.1	-16.4	57.3	37.0	-20.3	1990-92	2005-07
Sweden	30.7	25.5	-5.2	39.2	33.3	-5.9	60.7	51.4	-9.2	1990-92	1997-99
Switzerland	50.2	51.5	1.2	69.7	72.1	2.4	83.4	86.0	2.7	1995-97	2005-07
Tajikistan	27.6	32.2	4.6	33.2	37.7	4.5	37.5	41.8	4.4	1998-00	2002-04
Thailand	45.1	52.3	7.2	70.1	78.1	8.0	82.9	95.5	12.6	1992-94	2006-08
Trinidad and Tobago	32.0	23.7	-8.2	45.7	41.4	-4.3	55.5	52.6	-2.9	1993-95	2005-07
Tunisia	15.6	36.9	21.3	19.8	47.6	27.8	25.0	58.4	33.4	1990-92	2006-08
Ukraine	32.4	45.3	12.9	42.4	63.6	21.2	57.8	84.9	27.2	1999-01	2006-08
United Kingdom	37.4	36.9	-0.5	44.9	43.1	-1.8	59.6	57.4	-2.2	1990-92	2005-07
Uruguay	26.1	45.2	19.1	31.5	56.0	24.5	36.8	65.0	28.2	1990-92	2005-07
Venezuela, Rep. Bol.	22.7	38.3	15.5	29.5	62.4	25.8	32.5	77.2	44.8	1993-95	2003-05
Average	34.6	37.3	2.7	44.8	49.5	4.3	56.7	62.9	6.2		
Max	89.2	70.5	35.5	123.7	85.4	40.5	177.8	113.7	54.4		
Min	7.9	6.3	-58.7	8.3	7.9	-79.9	9.0	10.5	-114.8		

* "Initial Three Years" and "Last Three Years" refer to the first and last three years in the sample for which we have data available for a specific country

Source: IMF GFS 2010; World Development Indicators; Various Sources for the standard VAT rates

Figure 5. Gross Collection Ratio by Region, 1990-2008



Source: IMF GFS 2010; World Development Indicators; Ebrill et al. 2001; various sources for standard VAT rates

below, difficulty is not impossibility and even a bad VAT is often likely to be better than the possible alternatives in even the poorest countries.

Despite the 'noisy' nature of the various VAT efficiency measures, the existence of a new set of numbers inevitably leads to attempts to identify the main determinants of the variations across countries and over time. A number of recent papers have examined this question. Aizenman and Jinjarak (2008) use data from a panel of 44 countries over 1970–99. They focus on the roles of political economy (greater polarization and political instability) and structural factors (such as urbanization, agriculture share, openness) to explain differences in C-efficiency of the VAT. They find that increases in the durability of the political regime and the ease and fluidity of political participation lead to higher VAT collection efficiency as do increases in urbanization and trade openness. On the other hand, a larger share of agriculture significantly decreases VAT efficiency, as Buettner et al. (2006) also find. More recently, De Mello (2009), using cross-section data for OECD and non-OECD countries, finds that C-efficiency increases with lower VAT rates, as well as with lower shares of administrative costs in tax revenues (as a proxy for the efficiency of the tax administration),[8] more pro-competition regulatory frameworks in product markets (measuring non-tax incentives for noncompliance), trade openness and better country governance indicators

[8] As OECD (2009) demonstrates, however, administrative cost ratios are at best very questionable measures of tax administrative efficiency: for a fuller exploration of this question, see Vazquez-Caro and Bird (2010).

(regulatory quality, rule of law, and government effectiveness).[9] Overall, de Mello (2009) finds no discernible difference in VAT productivity between OECD and non-OECD countries in his sample.

These studies are interesting but far from conclusive given their inevitable reliance on proxies and the unclear interpretation of the various VAT efficiency measures. In particular, there are no good measures of tax administrative efficiency, and the various measures of VAT efficiency do not discriminate between differences in tax structure (rates and base) and changes in tax evasion -- for example, resulting from changes in tax morale or in the probability of evaders being caught or the size of penalties if they are. While we cannot deal with these problems fully, we can build to some extent on previous research both by expanding the sample of countries and time period covered and by introducing refinements in the estimation methodology. In particular, we use data for 107 countries,[10] covering the period 1990 to 2008.[11]

As the dependent variable we use alternatively the three different measures of VAT efficiency: (i) VAT efficiency ratio; (ii) C-efficiency ratio; and (iii) VAT gross collection ratio. In terms of estimation methodology, applying the Fixed Effects estimator to the panel data would produce inefficient estimates due to presence of autocorrelation and heteroskedasticity. By using the lagged dependent variable as an additional explanatory variable-- given that this year efficiency ratio is likely to depend on last year's-- we can address the problem of first order autocorrelation; however, the problems of second order autocorrelation and heteroskedasticity remain. Therefore, we apply the Arellano-Bond (1991) difference GMM estimator.[12]

Basically, to cope with the time-invariant country characteristics (μ_i), the difference GMM uses first differences to transform equation

$$Y_{it} = \alpha_1 Y_{i,t-1} + \beta_1 X_{it} + \mu_i + u_{it} \quad (1)$$

into

$$\Delta Y_{it} = \alpha_1 \Delta Y_{i,t-1} + \beta_1 \Delta X_{it} + \Delta u_{it} \quad (2)$$

where Y_{it} is one of the three efficiency ratios, X_{it} includes potential determinants of the efficiency ratio, such as, GDP per capita, population, share of agriculture in GDP, share of imports in GDP, share or urban population in total population, number of years since the introduction of the VAT,

[9] In an early study, Agha and Haughton (1996) found the number of years since VAT to be a significant determinant of VAT efficiency, but a more recent study by Aizenman and Jinjarak (2008) found this variable did not turn out to be significant. In contrast to Aizenman and Jinjarak (2008), De Mello (2009) did not find urbanization to be significant, perhaps because most countries in the sample were already highly urbanized. In another study, McCarten (2006) found indexes of government's capacity to control corruption and the cost of registering a new business to have some explanatory value with respect to C-efficiency, while (using a smaller sample of transitional countries) the prevalence of bribery was found to be negatively related to the same measure.

[10] The list of countries is in Appendix I.

[11] The panel is unbalanced since we were not able to collect data on all variables for all countries and periods in the sample.

[12] The Arellano-Bond estimator is designed for small-T large-N panels, as is a case with our sample (ideally, T=19, N=92 to 107). This estimator was first proposed by Holtz-Eakin, Newey and Rosen (1988).

domestic consumption of crude petrol, domestic consumption of alcohol, education index, business concentration (measured as a the average number of employees per registered company in manufacturing), a dummy variable for developed countries, and tax morale. These variables and their sources are described in Table A.1 and the descriptive statistics are provided in Table A.2, both in the Appendix. Finally, u_{it} is the error term. Note that the first-difference lagged dependent variable $\Delta Y_{i,t-1}$ is instrumented with its past levels.

The results of the estimation are provided in Table 3. The estimated coefficients for population, used as a proxy for the size of a country, suggest that country size is positively associated with the collection efficiency. This effect, however, does not seem to be economically important - one percentage point increase in population leads to between 0.013 and 0.031 percentage points increase in the VAT collection efficiency. The negative significant coefficient for the share of agriculture in GDP confirms previous findings-- in line with the hypothesis that a larger part of the agricultural activities might belong to the informal sector or otherwise be exempt-- on the negative effect of the size of this sector on collection efficiency. However, in contrast to earlier studies, our estimates suggest that a higher degree of urbanization is associated with less efficient VAT collection. Urbanization may affect collection efficiency through two distinct channels. On the one hand, higher urbanization may reduce the cost of monitoring tax compliance, implying overall higher tax compliance.[13] On the other hand, because people live close to their neighbors in urban agglomerations, informal transactions can become more feasible reducing tax collections of both indirect and direct taxes. Our results on urbanization may perhaps be interpreted as suggesting the latter effect is stronger.[14] One percentage point increase in share or urban population leads to between 3.4 and 7.7 percentage points lower VAT collection efficiency. In principle, higher tax morale should be positively correlated with the VAT collection efficiency. However, this effect may be complex and dependent on such factors as the country's level of economic development and the number of years since the VAT was introduced. Even though in some specifications we do not obtain statistically significant coefficient on tax morale and its interaction terms, we find them jointly significant. On particular, our results suggest that developed countries with the same number of years of experience with the VAT experience stronger positive effects from tax morale on the VAT collection efficiency; one percentage point increase in tax morale leads to between 1.3 and 2.4 percentage point higher increase in VAT collection in developed than in developing countries.

[13] The same phenomenon, associated with financial development, rather than urbanization – though the two are highly correlated – is seen in e.g. Gordon and Li (2009).

[14] Given the common association with higher degrees of informality and lesser development, which itself is usually considered to be associated with lesser urbanization, this may seem odd. On the other hand, as De Ferranti (2004), Chen (2005) and others have pointed out, there is increasing evidence in a number of developing countries that the level of informal activities in urban areas is large and increasing. This phenomenon may also provide a possible explanation for the differential effects of tax morale in developed and developing countries discussed next. Obviously, however, there is still much to be sorted out here.

Table 3. Determinants of VAT Efficiency Ratios

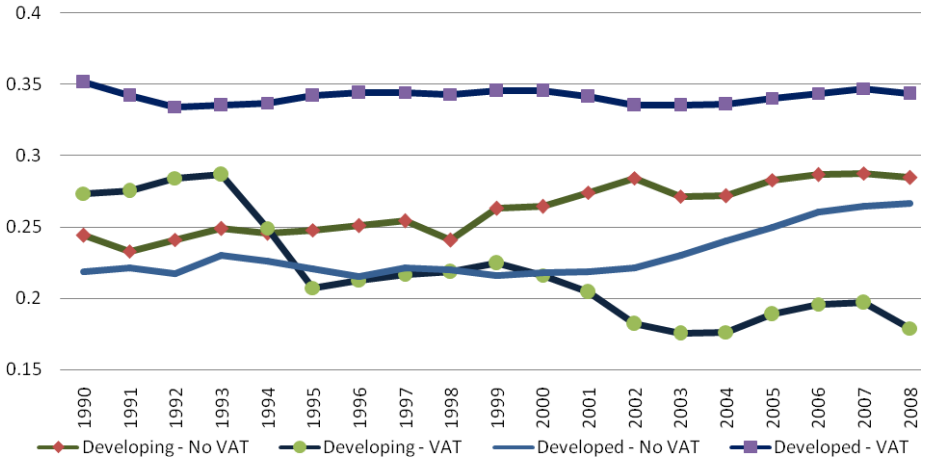
	Y = VAT Efficiency		Y = C-Efficiency		Y = VAT Gross Compliance	
	(1)	(2)	(3)	(4)	(5)	(6)
Y_{-1}	0.356**	0.526***	0.392***	0.534***	0.158	0.483***
	(0.150)	(0.089)	(0.139)	(0.093)	(0.143)	(0.094)
Ln(GDP pc)	-0.016	-0.021	-0.010	-0.022	0.041	-0.036
	(0.032)	(0.024)	(0.040)	(0.034)	(0.062)	(0.046)
Ln(Population)	1.875***	1.351**	2.236***	1.769*	3.114***	2.688**
	(0.566)	(0.672)	(0.720)	(0.907)	(1.035)	(1.305)
Agriculture	-3.266***	-2.386**	-3.737***	-3.069**	-5.118***	-4.518**
	(0.905)	(0.988)	(1.145)	(1.343)	(1.612)	(1.929)
Ln(Imports)	0.108	0.062	0.163	0.112	0.305	0.171
	(0.113)	(0.070)	(0.141)	(0.097)	(0.191)	(0.135)
VAT Experience	-0.002	-0.003	0.000	0.001	-0.011	0.003
	(0.005)	(0.008)	(0.007)	(0.011)	(0.010)	(0.015)
Urban	-6.289**	-3.440**	-7.748**	-4.830**	-7.143	-7.182***
	(2.913)	(1.427)	(3.482)	(1.926)	(4.962)	(2.700)
Petrol Consumption	6.349	5.617	8.332	7.042	13.527	10.115
	(6.225)	(5.610)	(7.795)	(7.658)	(10.311)	(10.676)
Education	0.268	-0.606	-0.119	-0.968	-0.509	-1.838
	(1.229)	(0.844)	(1.507)	(1.199)	(2.055)	(1.623)
Tax Morale	-1.094***	-0.759	-1.517***	-1.112	-1.510*	-1.691*
	(0.411)	(0.480)	(0.547)	(0.701)	(0.780)	(0.946)
Tax Morale * Developed	1.467***	1.263***	1.856***	1.762***	1.440	2.379***
	(0.509)	(0.487)	(0.656)	(0.652)	(0.922)	(0.903)
Tax Morale * Experience		0.001		-0.004		-0.003
		(0.022)		(0.031)		(0.042)
Business Concentration	-0.195**	-0.096	-0.200*	-0.107	-0.278*	-0.178
	(0.088)	(0.063)	(0.107)	(0.086)	(0.148)	(0.123)
Alcohol Consumption	0.087**	0.025	0.096**	0.031	0.146**	0.049
	(0.038)	(0.024)	(0.048)	(0.032)	(0.064)	(0.046)
Observations	368	368	368	368	368	368
Number of id	39	39	39	39	39	39
Corr(Y, Yhat) squared	0.058	0.052	0.033	0.03	0.044	0.033
F statistics	F(14, 354)= 5.86 Prob>F=0.000	F(15, 353)= 6.68 Prob>F=0.000	F(14, 354)= 6.01 Prob>F=0.000	F(15, 353)= 7.96 Prob>F=0.000	F(14, 354)= 5.04 Prob>F=0.000	F(15, 353)= 7.02 Prob>F=0.000
Sargan Test (p-value)	0.111	0.499	0.221	0.291	0.262	0.257
AR(2) Test (p-value)	0.248	0.978	0.309	0.804	0.394	0.786
Standard errors in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

4. VAT and revenue

Although many different objectives such equity and even efficiency may weigh in the minds of tax policy makers, revenue considerations are usually to the fore. The rapid rise to success of the VAT suggests that it is likely to be a good revenue-raiser. Indeed, the VAT has sometimes even been dubbed a "money machine" – a tax that might make it all too easy to expand revenues and the size of government.[15] However, it is not that easy to say just what has happened to overall tax revenues in countries that have introduced a VAT. In many, for example, VAT introduction was accompanied by other changes in tax policy and administration, making it difficult to isolate the effects exclusively due to the VAT.

A good point to start is taking a look at the raw data. The great increase in the number of countries worldwide that have adopted a VAT (Figure 1) has been accompanied by a mild growth in the tax revenues to GDP ratio but, as Figure 6 shows, if we compare tax ratios among developed countries that have and have not adopted a VAT and developing countries that have and have not adopted a VAT, the story seems a bit different. The much higher ratio for developed countries with a VAT than for developed countries without a VAT seems compatible with the VAT 'money machine' story. However, the tax ratio is lower for developing countries with a VAT than for developing countries without a VAT. Moreover, while the ratio has increased over the last decade for developing countries without a VAT, it has declined for developing countries with a VAT. This is not quite compatible with the 'money machine' story.

Figure 6. Total Revenue Collection* as a share of GDP, Countries with versus Countries without VAT, Developed versus Developing Countries, 1990-2008

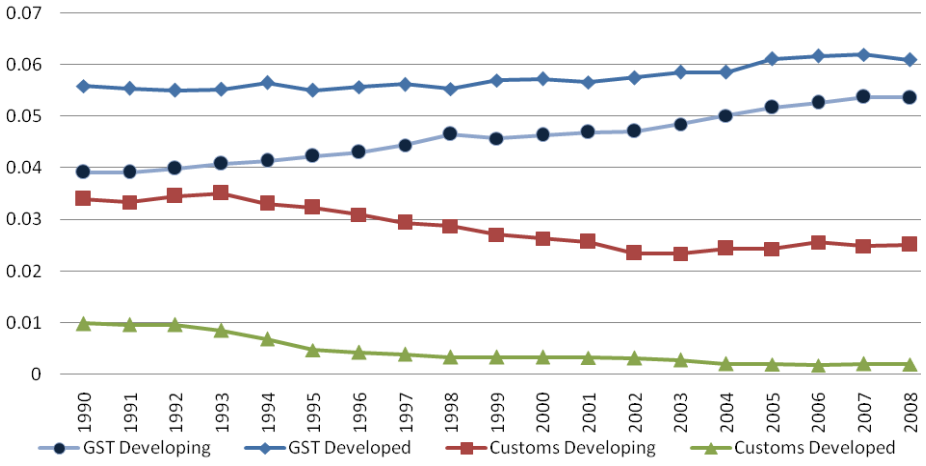


Source: IMF GFS 2010; World Development Indicators
* Central Government Revenues

[15] President's Advisory Panel (2006, 192).

Part of the explanation for these divergent trends may lie in the fact that the adoption of the VAT in developing countries in recent years has often been accompanied not only by the elimination of other general consumption taxes such as turnover and general sales taxes but, most importantly, by significant reforms in trade policies including major reductions in average tariffs. As Figure 7 shows, customs duties have declined significantly in developing countries. However, there is considerable diversity across different regions, and sub-Saharan Africa stands out both because customs duties are not only double the average level in other regions but also remain more important than VAT in revenue terms.

Figure 7. General Sales Tax (GST) and Customs Duties Collection* as a share of GDP, Developed versus Developing Countries, 1990-2008



Source: IMF GFS 2010; World Development Indicators; Ebrill et al. 2001
* Central Government Revenues

A number of studies have examined the impact of VAT on revenues. For example, Aizenman and Jinjarak (2006) studied the impact of globalization (measured by trade openness and financial openness) on different taxes including the VAT and conjectured that if globalization works to cut fiscal revenue from traditional taxes (tariffs and seigniorage), this would set in motion forces to increase revenues from such "hard to collect" taxes as VAT and income taxes. They concluded that globalization factors were responsible for about two-thirds of the 12 percent drop of the 'easy to collect' tax revenues to GDP in developing countries and about a fifth of the 16 percent increase of the ratio of the 'hard to collect' taxes to GDP.

Keen and Lockwood (2006) focus specifically on the 'money machine' argument. On the basis of a panel data set for OECD countries (excluding the U.S.) they find evidence that the VAT does indeed appear to have been a 'money machine' in the sense that countries with a VAT tend to raise more revenue, all else equal, than do those without it, although they also found that VAT did

not appear to have resulted in any increase in government size in a statistical sense in part because the revenue that it raises has to some degree been offset by reduced revenues from other taxes. They interpret these results as suggesting that VAT use has been more driven by its greater effectiveness as a tax instrument than by a desire to finance bigger government. In a more recent paper, Keen and Lockwood (2010) use an unbalanced panel of 143 countries over 26 years to explore much the same issues. Their point of departure is that access to a more efficient tax instrument should lead an optimizing government to increase the ratio of total revenues to GDP. Empirically, their approach consists in adding a dummy variable for the presence of a VAT (and several interaction terms) to a conventional 'tax effort' regression framework to examine whether those variables have a statistically significant impact on the tax revenue to GDP ratio.[16] They find that the adoption of a VAT is associated with a long run increase in the overall revenue to GDP ratio of 4.5 percent. However, interpreting this result is complicated because the interaction terms of the VAT take-up dummy with income levels and openness are positive and significant while the dummy variable for take-up itself now takes a negative sign. Nonetheless, when all these effects are taken into account, numerical simulations suggest that in most countries adopting a VAT increased revenues; however, for Sub-Saharan Africa the evidence is mixed.

Using our panel data for 107 countries over the period 1990 to 2008, we build on Keen and Lockwood (2010) to examine the question of whether the introduction of the VAT has on average has led to an increase in revenue collections, with special attention to differences in the experience of developing and developed countries. Because this type of estimation gives rise to an array of econometric challenges, our approach is to proceed with different steps involving different estimation methodologies. This incremental approach not only allows for more transparency in the handling of the econometric issues but also provides a series of robustness tests for our estimates. We will first discuss the results for the whole sample in Table 4 and next the results obtained when the sample is split between developed and developing countries.

As a first step, columns 1 and 2 in Table 4 present the results obtained by applying the Fixed Effects Estimator to the entire data panel. However, these results are likely to be inconsistent due to three main problems: (1) the potential endogeneity of the VAT dummy variable (since the decision to introduce a VAT may be driven by the desire to increase revenue collections); (2) autocorrelation; and (3) heteroskedasticity.

To resolve the endogeneity problem, we apply the Instrumental Variable Fixed Effects estimator in columns 3 and 4 of Table 4, where column 3 presents the results obtained without the interaction terms involving the VAT dummy. To address the endogeneity of the VAT dummy, we instrument it with three instrumental variables: (1) the percentage of countries in region *k* that have implemented a VAT in year *t* (regions are defined on the basis of Ebrill et al. 2001); (2) dummy variable =1 if country *i* was in a non-crisis IMF program (SAF, PRGF) in year *t*; and (3) dummy =1 if country *i* was in a crisis IMF program (SBA, EFF) in year *t*.[17]

[16] To control for a potential endogeneity bias (since the adoption of a VAT may also be related with the desire to raise overall tax effort), the VAT dummy is itself explicitly estimated in a separate take-up regression equation.
[17] The information on the IMF programs is obtained from Dreher (2006, updated February 2010).

Table 4. Effect of the VAT Introduction on Revenue Collection, Dependent Variable: Revenues / GDP

	FE		IV FE I		IV FE II		IV + Regional Dummies		GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Revenues/GDP$_{-1}$					0.727***	0.726***	0.942***	0.933***	0.940***	0.932***
					(0.043)	(0.046)	(0.017)	(0.016)	(0.016)	(0.016)
D_{VAT}	0.004	0.152***	-0.032*	-0.189	0.000	0.000	0.030*	0.114**	0.028*	0.120**
	(0.007)	(0.044)	(0.019)	(0.271)	(0.012)	(0.138)	(0.016)	(0.051)	(0.015)	(0.051)
Ln(GDP pc)	0.045***	0.051***	0.048***	0.022	0.004	0.002	0.001	0.001	0.001	0.001
	(0.009)	(0.010)	(0.010)	(0.019)	(0.007)	(0.011)	(0.003)	(0.003)	(0.003)	(0.003)
Openness	-0.027***	-0.026***	-0.026***	-0.023**	0.007	0.007	0.003	0.001	0.003	0.001
	(0.010)	(0.010)	(0.010)	(0.011)	(0.007)	(0.007)	(0.002)	(0.002)	(0.002)	(0.002)
Agriculture	-0.041	0.085	-0.111*	-0.186	-0.088*	-0.072	0.000	0.021	-0.001	0.029
	(0.060)	(0.067)	(0.061)	(0.197)	(0.046)	(0.104)	(0.030)	(0.035)	(0.030)	(0.034)
Ln(Population)	0.043	0.051	0.093**	0.069	-0.021	-0.017	-0.001	0.005***	-0.000	0.005***
	(0.038)	(0.038)	(0.046)	(0.046)	(0.029)	(0.025)	(0.003)	(0.002)	(0.003)	(0.002)
Federal	0.228	0.235	0.416*	-0.183	-0.014	0.056	0.002	-0.004**	0.002	-0.004**
	(0.200)	(0.199)	(0.228)	(0.148)	(0.027)	(0.119)	(0.003)	(0.002)	(0.003)	(0.002)
Age Dependency	-0.146***	-0.138***	-0.110**	-0.137***	-0.051	-0.049	0.015	-0.002	0.013	-0.004
	(0.041)	(0.042)	(0.046)	(0.047)	(0.034)	(0.031)	(0.014)	(0.012)	(0.014)	(0.011)
Urban	-0.074	-0.051	-0.134	-0.069	0.078	0.080	0.004	0.015**	0.004	0.015**
	(0.113)	(0.110)	(0.121)	(0.132)	(0.069)	(0.072)	(0.006)	(0.007)	(0.006)	(0.007)
Education	-0.162***	-0.141***	-0.163***	-0.177***	-0.025	-0.022	0.011	0.014	0.013	0.017
	(0.043)	(0.043)	(0.045)	(0.058)	(0.030)	(0.033)	(0.015)	(0.014)	(0.014)	(0.013)
Ln(GDP pc)* D_{VAT}		-0.013***		0.018		0.000		-0.009**		-0.009**
		(0.004)		(0.024)		(0.012)		(0.004)		(0.004)
Agriculture* D_{VAT}		-0.177***		0.051		-0.032		-0.118**		-0.128**
		(0.052)		(0.208)		(0.108)		(0.053)		(0.051)
Constant	-0.996	-1.216*	-1.915**	-0.366	0.396	0.279	-0.027	-0.089**	-0.027	-0.097**
	(0.714)	(0.718)	(0.871)	(0.500)	(0.535)	(0.306)	(0.026)	(0.043)	(0.025)	(0.042)
Country Dummies	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO
Regional Dummies	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
Observations	1157	1157	1157	1113	1075	1075	1075	1075	1075	1075
R-squared	0.91	0.92	0.91	0.91	0.96	0.96	0.94	0.95	0.94	0.95
Sargan-Hansen			0.067	0.092	0.984	0.982	0.499	0.354	0.571	0.616

Test (p-value)										
AR(2) Test (p-value)	0.000	0.000	0.000	0.000	0.881	0.905	0.049	0.392	0.163	0.351
Heteroskedasticity Test (p-value)	0.000	0.002	0.000	0.010	0.026	0.054	0.258	0.092	0.215	0.105
Robust standard errors in parentheses										
* significant at 10%; ** significant at 5%; *** significant at 1%										
Note: Base category= “Small Islands”, including Cyprus, Iceland, Malta, Seychelles, and St. Kitts and Nevis										
[1] Original 15 EU countries plus Norway and Switzerland										

Column 4 shows the results obtained by applying the Instrumental Variable Fixed Effects estimator when the interaction terms with the VAT variable are included. Because the VAT dummy is an endogenous variable, we also have to obtain instrumental variables for the interaction terms. Because it is difficult to find good instruments for the interaction terms, we fist estimate the reduced form of the VAT equation and then predict the VAT variable and interact it with the exogenous variables. We then use these "predicted" interaction terms as instrumental variables for the original interaction terms in the equation.[18] Basically, we want to estimate the following structural equation

$$Total\ Revenue = \alpha_1 D_{VAT} + \beta_1 Z_1 + u_1 \quad (1)$$

where

$$D_{VAT} = \alpha_2 Total\ Revenue + \beta_2 Z_2 + u_2 \quad (2)$$

After substituting (1) in (2) for Total Revenues, equation (2) becomes

$$D_{VAT} = \pi_1 Z_1 + \pi_2 Z_2 + v_2 \quad (2')$$

which we estimate by applying the Probit Estimator and predict $\widehat{D_{VAT}}$. This predicted variable is the one interacted with the exogenous variables to instrument for the interaction terms.[19]

Because the autocorrelation and heteroskedasticity problems are not resolved by applying the Instrumental Variable Fixed Effects estimator, we add the lagged dependent variable as an explanatory variable to equations 3 and 4 and estimate them using the same procedure. These results are shown in columns 5 and 6 of Table 4. This resolves the problem of autocorrelation but not the one of heteroskedasticity. To deal with this problem, we apply the GMM estimator, which is efficient in the presence of the arbitrary heteroskedasticity to address for this issue. However, when the GMM estimator is applied in equations 5 and 6 of Table 4, it does not produce full rank estimated covariance matrix of moment conditions, preventing the calculation of the optimal weighting matrix for the GMM estimation. We, therefore, re-estimate these equations with the GMM estimator but including regional dummies instead of country dummies (columns 9 and 10 of Table 4). For comparison purposes, we also present the results obtained by re-estimating equations 5 and 6 using the Instrumental Variable estimator when regional dummies are included instead of country dummies (Columns 7 and 8).

As the results in column 10 of Table 4 suggest, countries having a VAT in their tax structure have, on average, a higher share of total revenue in GDP of 12 percentage points than those countries that do not have it. This point estimate is almost three times larger than that in Keen and

[18] See, for example, Wooldridge (2002, pp. 236-237).

[19] In STATA, equation $Total\ Revenue = \alpha_1 D_{VAT} + \beta_1 Z_1 + \gamma_1 D_{VAT} * Z_1 + v_1$ is estimated using command $ivreg$ rather than estimating first stage and second stage regression manually, because the second stage leads to incorrect residuals ($\widehat{v_2} = Y - \hat{X}\widehat{\beta_{2SLS}}$), rather than correct ones ($\widehat{v_2} = Y - X\widehat{\beta_{2SLS}}$). Using command $ivreg$ avoids this problem (Davidson and MacKinnon, 2004; Baum, 2006).

Table 5. Effect of the VAT Introduction on Revenue Collection, GMM, Developed versus Developing Countries, Dependent Variable: Revenues / GDP

	Developed Countries		Developing Countries	
	(1)	(2)	(3)	(4)
Revenues/GDP_{-1}	0.885***	0.903***	0.934***	0.929***
	(0.259)	(0.047)	(0.020)	(0.020)
D_{VAT}	-0.517	-0.114	0.022	0.106*
	(3.371)	(0.495)	(0.015)	(0.058)
Ln(GDP pc)	-0.049	-0.010	-0.002	0.001
	(0.313)	(0.024)	(0.004)	(0.006)
Openness	0.005	-0.000	0.006*	0.004
	(0.035)	(0.002)	(0.004)	(0.004)
Agriculture	0.912	-2.157	-0.014	0.015
	(6.526)	(4.926)	(0.034)	(0.040)
Ln(Population)	0.038	0.004	0.002	0.005*
	(0.244)	(0.004)	(0.004)	(0.003)
Federal	-0.086	-0.006**	0.004	-0.001
	(0.513)	(0.003)	(0.003)	(0.003)
Age Dependency	-1.269	0.064	0.002	-0.006
	(8.463)	(0.094)	(0.015)	(0.013)
Urban	0.102	-0.017	0.010	0.013
	(0.763)	(0.032)	(0.009)	(0.008)
Education	1.124	0.102	0.007	0.012
	(6.840)	(0.145)	(0.014)	(0.013)
Ln(GDP pc)* D_{VAT}		0.005		-0.009*
		(0.027)		(0.005)
Agriculture* D_{VAT}		2.019		-0.095**
		(5.001)		(0.046)
Americas	-0.154	-0.021*	-0.011**	-0.013***
	(0.898)	(0.012)	(0.005)	(0.005)
EU15+2[1]	0.072	-0.008		
	(0.517)	(0.009)		
Eastern Europe	-0.060	-0.020**	-0.005	-0.010**
	(0.305)	(0.009)	(0.004)	(0.004)
Asia and Pacific	-0.111	-0.004	-0.006	-0.011**
	(0.667)	(0.006)	(0.007)	(0.005)
Sub-Saharan Africa			0.008	-0.000
			(0.009)	(0.005)
North Africa and Middle East				
Constant	-0.051	0.044	-0.023	-0.084*
	(0.576)	(0.336)	(0.028)	(0.045)
Observations	372	372	703	703
R-squared	0.89	0.95	0.929	0.932
Sargan-Hansen Test (p-value)	0.966	0.479	0.815	0.722
AR(2) Test (p-value)	0.880	0.820	0.325	0.472
Heteroskedasticity Test (p-value)	0.935	0.383	0.652	0.235
Robust standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Lockwood (2010). However, this estimate assumes that countries have equal levels of economic development and size of their agricultural sector. To capture the possible different effects of the presence of a VAT in countries with different levels of economic development, Table 5 shows the results for developed and developing countries separately. These results (columns 2 and 4 in Table 5) suggest that the positive effect of the VAT on total revenue collections is significant only in the developing countries. Developing countries having a VAT in their tax structure have, on average, a higher share of total revenue in GDP of 11 percentage points than those countries that do not have it. In developed countries, on the other hand, this effect does not seem to be significant, which differs from Keen and Lockwood (2010).

As already mentioned, whether or not the introduction of a VAT leads to an overall increase in revenues, it may result in some substitution for other perhaps less efficient revenue instruments such as customs duties. A commonly recommended policy package in recent decades has been to introduce a VAT to compensate for the revenue reduction owing to by tariff reform has received some attention in the literature. Keen and Ligthart (2002) provide a theoretical rationale for this strategy.[20] Buettner et al. (2006) studied 21 developing and transition countries where WTO accession with trade liberalization policies was accompanied by an introduction of a VAT system over the period 1990 to 2004 and found that both developing and transition countries were indeed able to restructure their revenue sources along these lines, with developing in general being able to raise from VAT more than they lost from tariff reform. More recently, however, Baunsgaard and Keen (2009) looked at the same question for 117 countries over the last 32 years. While they also found that revenue substitution (VAT for customs duties) was complete for high income countries and also, in the long run, for middle income countries, for low income countries the evidence is more mixed, with considerable variation in country experience and full replacement being problematic in many cases.

Using our sample, we re-examine this question – to what extent reduction in customs duties may be offset through the introduction of a VAT – as well as looking at how other important tax sources have adjusted to the introduction of a VAT. An appropriate approach to doing so is to use Zellner (1962)'s Seemingly Unrelated Regressions (SUR) to capture the efficiency due to the correlation of the disturbances across equations (Baltagi, 2005). The SUR approach both gains efficiency in estimation by combining information from different equations and also allows us to impose and/or test restrictions on the parameters in different equations.[21]

Using our panel data for 107 countries over the period 1990 to 2008, a first set of empirical results is presented in Table 6. The results in columns 4, 5 and 6 in Table 6 suggest that among countries with equal level of trade openness, share of agriculture in GDP, urbanization, quality of bureaucracy and political durability, countries that have implemented a VAT have higher income tax yields (5.8 percentage points) as well as higher general sales collection (around 2.4 percentage

[20] However, using a Cournot duopoly model the same authors also showed that the strategy of coordinated tariff and domestic tax reform which is welfare-improving under perfect competition may be undesirable in a setting of imperfect competition (Keen and Ligthart 2005).

[21] Applying the OLS would yield unbiased and consistent estimates for each separate equation only. The Seemingly Unrelated Regression approach takes into account the variability across equations and yields BLU (best, linear, unbiased) estimates.

points) and lower customs duties collection (2.9 percentage points). However, the coefficient for general sales tax is only statistically significant when the VAT interaction terms are excluded from the estimating equation (column 2).

In the case of income taxes, the effect of the VAT is reduced with higher shares of agricultural sector and urbanization - one percentage point increase in agriculture and urbanization reduces the effect of the VAT on income tax collection by 0.13 and 0.08 percentage points, respectively. In the case of customs duties, one percentage point increase in agriculture and urbanization shares reduces the effect of the VAT by 0.11 and 0.02 percentage points, respectively. Higher political durability decreases the effect of VAT on customs duties collection by 0.01 percentage points and the quality of bureaucracy increases the effect of the VAT on custom duties collection by 0.27 percentage points.

Table 6. The effects of the introduction of the VAT on customs duties, income taxes, and general consumption taxes (narrowly defined). Seemingly Unrelated Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
	Income	GST	Customs	Income	GST	Customs
D_{VAT}	-0.238	2.932***	-0.547***	5.838***	2.390	-2.885***
	(0.314)	(0.237)	(0.114)	(2.049)	(1.567)	(0.687)
Openness	-0.213	0.477***	0.093	0.525	0.286	0.255
	(0.216)	(0.163)	(0.079)	(0.598)	(0.457)	(0.201)
Agriculture	-12.363***	-2.270*	0.838	-4.224	-1.930	-4.182***
	(1.551)	(1.171)	(0.565)	(2.888)	(2.209)	(0.969)
Urban	-3.548***	1.472***	-1.971***	2.750	0.742	-3.750***
	(0.685)	(0.518)	(0.250)	(1.820)	(1.392)	(0.610)
Bureaucracy	1.399***	0.051	-0.229***	1.082***	-0.062	0.120
	(0.133)	(0.101)	(0.048)	(0.414)	(0.316)	(0.139)
Political Durability	0.012***	-0.012***	-0.006***	0.011	-0.013**	-0.012***
	(0.003)	(0.003)	(0.001)	(0.007)	(0.005)	(0.002)
Openness*VAT				-0.987	0.229	-0.265
				(0.642)	(0.491)	(0.215)
Agriculture*VAT				-13.017***	-2.546	11.258***
				(3.566)	(2.727)	(1.196)
Urban*VAT				-7.714***	0.753	2.439***
				(1.963)	(1.501)	(0.658)
Bureaucracy*VAT				0.254	0.047	-0.275*
				(0.438)	(0.335)	(0.147)
Political Durability*VAT				0.004	0.003	0.010***
				(0.008)	(0.006)	(0.003)
Constant	6.057***	1.683***	3.578***	1.593	2.493*	4.739***
	(0.780)	(0.589)	(0.284)	(1.903)	(1.455)	(0.638)
Observations	914	914	914	914	914	914
R-squared	0.377	0.280	0.293	0.397	0.286	0.419
Breusch-Pagan test of independence	chi2(3) = 39.754, Pr = 0.0000			chi2(3) = 31.356, Pr = 0.0000		
Standard errors in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

As Table 7 shows, the results are not as consistent when we adopt a more expansive definition of income taxes, to include payroll and social security contributions, as well as a more expansive definition of general sales taxes to include excise tax revenues. Using the full specification when the interaction dummy variables for the presence of VAT (columns 4-6 in Table 7), the only statistically significant coefficient is for customs duties. That is, including social security contributions and excise duties into the analysis results in the introduction of a VAT having no different effects on income taxes (or taxes on goods and services) in countries with similar levels of trade openness, share of agriculture in GDP, urbanization, quality of bureaucracy and political durability. However, the introduction of the VAT continues to have a positive significant effect on income tax plus social security revenues collections when the dummy interaction variables are excluded (column 1 in Table 7).

Table 7. The effects of the introduction of the VAT on customs duties, income taxes, and general consumption taxes (broadly defined, including social security revenues and excises). Seemingly Unrelated Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
	Income +SS	GST + Excises	Customs	Income +SS	GST + Excises	Customs
D_{VAT}	2.246***	9.484	-0.841***	-0.562	-4.698	-2.695***
	(0.573)	(7.553)	(0.123)	(4.253)	(57.569)	(0.914)
Openness	2.373***	-8.220	0.166	1.002	2.267	0.602**
	(0.533)	(7.027)	(0.115)	(1.236)	(16.737)	(0.266)
Agriculture	-19.218***	5.976	2.134***	-7.403	8.709	-3.893***
	(3.411)	(44.953)	(0.733)	(6.728)	(91.070)	(1.445)
Urban	0.186	18.182	-1.360***	5.286	-1.641	-3.219***
	(1.376)	(18.129)	(0.296)	(3.394)	(45.939)	(0.729)
Bureaucracy	2.767***	7.419**	-0.287***	-0.704	0.876	-0.153
	(0.236)	(3.109)	(0.051)	(0.793)	(10.740)	(0.170)
Political Durability	0.007	-0.168**	-0.005***	0.046***	-0.009	-0.010***
	(0.006)	(0.080)	(0.001)	(0.013)	(0.171)	(0.003)
Openness*VAT				1.657	-11.381	-0.625**
				(1.379)	(18.670)	(0.296)
Agriculture*VAT				-18.654**	-8.748	8.667***
				(7.859)	(106.373)	(1.688)
Urban*VAT				-6.266*	20.738	1.936**
				(3.723)	(50.393)	(0.800)
Bureaucracy*VAT				3.660***	7.104	-0.106
				(0.833)	(11.270)	(0.179)
Political Durability*VAT				-0.044***	-0.198	0.007**
				(0.015)	(0.201)	(0.003)
Constant	3.134*	-13.965	3.412***	6.731*	0.475	5.018***
	(1.601)	(21.095)	(0.344)	(3.943)	(53.378)	(0.847)
Observations	797	797	797	797	797	797
R-squared	0.387	0.016	0.289	0.420	0.017	0.327
Breusch-Pagan test of independence	chi2(3) = 67.462, Pr = 0.0000			chi2(3) = 56.164, Pr = 0.0000		
Standard errors in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

Table 8. Developing Countries. The effects of the introduction of the VAT on customs duties, income taxes, and general consumption taxes (broadly defined, including social security revenues and excises). Seemingly Unrelated Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
	Income +SS	GST + Excises	Customs	Income +SS	GST + Excises	Customs
D_{VAT}	1.081*	4.286***	-0.720***	-8.349*	2.022	-2.642**
	(0.573)	(0.397)	(0.159)	(4.310)	(3.001)	(1.203)
Openness	3.070***	1.892***	0.222	2.445**	2.456***	0.632*
	(0.523)	(0.363)	(0.146)	(1.169)	(0.814)	(0.326)
Agriculture	-11.063***	6.630***	0.978	-10.104*	6.883	-3.816**
	(3.141)	(2.177)	(0.875)	(6.050)	(4.213)	(1.689)
Urban	-0.102	1.837*	-1.398***	-3.215	-2.276	-3.225***
	(1.362)	(0.944)	(0.379)	(3.715)	(2.587)	(1.037)
Bureaucracy	1.223***	0.364**	-0.070	-1.374*	0.129	-0.084
	(0.267)	(0.185)	(0.074)	(0.807)	(0.562)	(0.225)
Political Durability	-0.022*	-0.003	-0.003	-0.031	0.032*	-0.013*
	(0.012)	(0.008)	(0.003)	(0.028)	(0.019)	(0.008)
Openness* D_{VAT}				1.254	-0.083	-0.623*
				(1.326)	(0.923)	(0.370)
Agriculture* D_{VAT}				-4.741	-2.622	7.146***
				(7.110)	(4.951)	(1.985)
Urban* D_{VAT}				3.607	5.589**	1.798
				(4.020)	(2.800)	(1.123)
Bureaucracy* D_{VAT}				2.960***	0.149	0.025
				(0.854)	(0.595)	(0.239)
Political Durability* D_{VAT}				0.018	-0.046**	0.012
				(0.031)	(0.021)	(0.009)
Constant	5.453***	0.312	3.093***	13.657***	1.848	4.898***
	(1.651)	(1.144)	(0.460)	(3.979)	(2.770)	(1.111)
Observations	554	554	554	554	554	554
R-squared	0.152	0.227	0.11	0.188	0.252	0.143
Breusch-Pagan test of independence	chi2(3) = 151.881, Pr = 0.0000			Chi2(3) = 160.195, Pr = 0.0000		
Standard errors in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

Finally, as Baunsgaard and Keen (2009) show, the evidence on the potential revenue consequences of the introduction of a VAT is especially problematic in the poorer countries. We therefore ran separate sets of regressions for the sub-sample of developing countries using both the narrow and broad definitions of income taxes and general consumption taxes, although only the latter is shown here, in Table 8. In terms of direct effects, the presence of a VAT, as captured by the coefficient for the VAT dummy variable, tends, as expected, to decrease revenues from the customs tariff and to increase revenues from general consumption taxes. However, the positive

effect of the presence of VAT for income tax collections is now very weak, with the coefficient for the VAT dummy being positive only for the broad definition of income taxes (Table 8) and even then significant only at the 10 percent level. There is thus little empirical evidence in support of the common assertion that the introduction of VAT does much to reinforce compliance with income taxes in developing countries. This conclusion does not change much when we take into account the interaction terms between VAT presence and such country features as openness, shares of agriculture and urban population, quality of bureaucracy and durability of political regime.

5. Improving VAT

Despite its spread and success throughout the world the VAT is by no means a perfect tax. As IMF (2010) recently noted, for example, the 'gap' in VAT coverage displayed by the various VAT efficiency measures discussed earlier may be usefully divided into two components: the coverage gap (the extent to which some of the potential tax base is excluded by design features of the tax) and the administration gap (the extent to which the tax is not effectively administered). Like any tax, the VAT now in place in most countries can almost always be improved, sometimes substantially. In this section we discuss briefly and selectively some aspects of three paths to VAT improvement – structural change, administrative change, and what may perhaps be called political change. To begin with, however, it seems worth taking a brief look at what may be called 'VAT economics' in part because -- despite the virtually world-wide triumph of VAT -- as yet we have surprisingly little solid knowledge of some critical factors with respect to the economic effects of VAT.

VAT Economics

Growth. As noted earlier, the VAT is usually considered to cause fewer distortions in the economy and thus be more efficient than income taxes or other forms of general consumption tax. Since one reason for this greater efficiency is because savings and investments decisions are in particular unaffected by the presence of a VAT, it follows that choosing a VAT to finance part of public expenditures can be considered a pro-growth choice (Keen and Ligthart 2002). As Martinez-Vazquez et al. (this volume) show, the empirical evidence appears to support the belief that wider reliance on the VAT (and other taxes on consumption) as opposed to direct taxes may indeed result in faster economic growth. As Smart and Bird (2009) show in a study of several Canadian provinces, investment and growth also respond positively when a VAT – a better consumption tax – replaces a less efficient tax such as an RST that imposes (as most RSTs do) significant fiscal burdens on capital goods.[22]

The beneficial effects of VAT on economic growth have not gone unquestioned in the literature. As Piggott and Whalley (2001) noted, both self supply and informal sector activities become tax preferred as VAT base broadening occurs. Using 1994 Canadian data from the substitution of the manufacturer's sales tax (MST) by the goods and services tax (GST), they found that the consumption of substitutable market production (such as restaurant meals) was reduced in

[22] Studies demonstrating the importance of this common characteristic of real-world RSTs have been carried out in both Canada (Kuo, McGirr and Poddar. 1988) and the United States (Ring 1999)

favor of less efficient household production (consumption of own food), thus reducing welfare.[23] Emran and Stiglitz (2005) in effect extend this argument in the form of a theoretical model of the effect of replacing trade taxes by VAT in developing countries with a large informal sector. Owing to the incomplete coverage of VAT due to the existence of a large informal sector, their results suggest that, under conditions they consider plausible, replacing an import tariff by a VAT that falls disproportionately on the formal sector may reduce welfare. Taking a different tack, Hines (2004) suggests that increasing consumption taxes will foster the expansion of the (presumably less productive) informal sector provided that, as seems plausible, the labor-intensity of production in that sector is greater than in the formal sector. On the other hand, such an increase may obviously expand employment, as was noted recently in Copenhagen Economics (2007).[24]

Two offsetting arguments have been put forward in the literature. First, as Keen (2008) has observed, the evidence is that VAT actually functions, in part, as a tax on the informal sector because it falls on their purchases from formal sector businesses as well as on imports.[25] Second, as Auriol and Warlters (2005) note, even governments aware of such problems may nonetheless choose to impose higher taxes, including VAT, on the formal sector of the economy. This is simply because, with their relatively weak tax administrations, the best way for them to raise revenue may be to increase barriers to entry to the formal sector, thus creating 'rents' that may then be taxed. We return briefly to the question of informality later.

Trade. More prominent than either growth or welfare in the original adoption of VAT in Europe was the argument that trade would be facilitated by turning the various sales taxes then existing in the member states of the nascent European Union into true destination-based consumption taxes both by 'untaxing' exports (and removing hidden subsidies) and by placing the taxation of imports and domestic production on a level playing field. While the theoretical necessity for this step in a world of at least imperfectly flexible exchange rates is still debated by some, on the whole VAT's effects on trade have been considered to be largely beneficial, with economists applauding the level playing field for imports and governments generally paying more attention to the removal of barriers to exports.[26]

As with growth, however, the superiority of VAT in promoting trade has not gone uncontested. For example, as Ebrill et al. (2001) note, the model underlying the argument in the previous paragraph (e.g. Feldstein and Krugman 1989) is based on such strong assumptions as uniform taxation and the absence of both revenue and intergenerational wealth effects – assumptions that are invariably violated in practice. The effect on trade of replacing other taxes by a VAT inevitably depends heavily upon the relative size of various elasticities and marginal reactions. Unfortunately, the empirical literature reaches no clear conclusions on these matters. Using a sample of 136 countries in 2000, Desai and Hines (2005), for example, conclude not only

[23] Other papers on household production reach similar results: see e.g. Boadway and Gavhari (2006).
[24] Sorensen (1997) found that this almost Gandhian argument favoring informality on employment grounds may have welfare benefits in some circumstances.
[25] Some evidence in support of this argument may be found, for example, in Glenday and Hollinrake (2005).
[26] The state of the theory is rather neatly shown in the contrasting results reported in Keen and Ligthart (2002) and Keen and Ligthart (2005). There is nothing wrong with either of the models examined in these papers. The problem is that no one has a good handle on which, if either, best models reality. As we discuss next, so far the empirical examination of this issue has not advanced matters much.

that countries relying on VAT have fewer exports and imports (relative to GDP) than countries without a VAT but also that the negative correlation between VAT and trade (the sum of exports and imports) is stronger for low income countries. 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 and persists with the inclusion of income and geographic controls. Desai and Hines (2005) conjecture that these effects may arise, first, because VAT tends to be imposed at higher rates on traded goods than on non-traded goods, and, second because many countries collect VAT promptly on imports, but fail to provide VAT export rebates in a timely and complete fashion. The result is thus that in some ways a VAT continues to have tariff-like effects, reducing trade, as Edmiston and Fox (2006) have also argued.

In contrast, Keen and Syed (2006), using a panel data set for OECD countries from 1967 to 2003 to examine the effect of the VAT on export performance, support the view that the VAT is inherently trade neutral. Ligthart and van der Meijden (2010) go further in their study of the revenue, efficiency and distributional implications of offsetting tariff reductions by increases in destination-based consumption taxes so as to leave consumer prices unchanged: they find that such reforms would increase government revenue, imports, and exports.

Base broadening. The 'economic' component of improving VAT in practice generally comes down to some form of structural reform to broaden the tax base. As noted earlier, it is common (IMF 2010) to argue that many countries can and should expand VAT revenues – and, not so incidentally, simultaneously improve the economic efficiency of their tax systems – by broadening the tax base. Once again, however, most statements to this effect rest more on assertion than on evidence. Consider, for example, the three major sectors currently 'favorably' treated under most VATs: finance, housing, and the public sector. Is the case really so clear for including these sectors within the scope of the VAT? And if they are so included, would the effects be both economically beneficial and also yield revenue? We consider each of these sectors briefly in turn.[27]

Typically, the financial sector is exempt, apart from a few financial services. On average, a quarter of GDP in developed countries originates in the financial sector, while the corresponding figure is around 10 percent for developing countries (Zee, 2004). Excluding this large part of the potential base must, it would seem, both reduce revenues and also distort resource allocation. Various approaches have been proposed to allow the taxation of financial transactions under the VAT and some countries do so.[28] To sum up this complex issue rather cavalierly: it can be done; the logic of VAT suggests that it should be done; and if it is done, theory suggests that the result should be a reduction in tax-induced distortion.

On the other hand, since most financial transactions take place between businesses, and no one wants to tax 'pure' interest under a consumption tax, there is unlikely be much net revenue collected from extending the VAT to encompass all financial services. While developed countries like those in the EU should undoubtedly continue to explore this question and to expand the extent to which financial services are now taxed – as New Zealand and a few other countries (South Africa,

[27] Additional 'base broadening' issues -- VAT thresholds and the treatment of small business and 'equity-based' rate favoritism, zero-rating and exemption – are discussed briefly later.
[28] See e.g. the discussions in Boadway and Keen (2003), Gendron (2008), and Kerrigan (2010).

Australia, Singapore) have already done in various ways – it thus seems unlikely, as Bird and Gendron (2007) argue, that many developing countries should venture much further into these deep and difficult waters beyond taxing explicit fees charged for financial services.

The story is somewhat different with respect to taxing services provided by the public sector, not-for-profit activities, and charities (the PNC sector).[29] As Wassenaar and Gradus (2004) note, for example, failing to tax public provision of services like water and refuse removal while taxing such services when provided by the private sector biases market decisions. In principle, governments engaged in providing private services (whether through direct activities or public enterprises) should presumably both be subject to output tax and be able to claim input tax credits, as should other non-profit providers. Indeed, it makes allocative sense to require public bodies to pay VAT on the inputs they buy from the private sector even if their own outputs are not taxed so that budget decisions are made on a full (VAT-included) opportunity cost basis. Of course, governments may for policy reasons choose explicitly to offset such costs in part by 'rebating' VAT on such inputs; Canada does this to varying extents for local governments, providers of health and education services, and charities (Bird 2009). In the end, as this example perhaps suggests, the case for extending the VAT base into the PNC sector is not so much to increase or even to improve resource allocation within the private sector as to improve public sector budgeting decisions.

Perhaps the major component of consumption now not taxed in many countries that might result in a potential gain in VAT revenue – and that would also do much to reduce a particularly prevalent distortion in resource allocation – would be to extend the tax base to encompass real property more adequately. At present, housing, and more generally real property, is taxed to very different extents and in very different ways even within the EU, let alone across the VAT universe as a whole.[30] Most commonly, not only are the 'consumption services' received by owner-occupants exempt (as they are also from income tax) but so also are residential rentals. In many developed countries new buildings (and improvements) are subject to tax – in effect, a 'prepaid' VAT. But in many developing countries real property as a whole often goes virtually untaxed. There are, of course, administrative and political problems in extending VAT further into this sector, not least those arising from the existence of various special taxes (often at sub-central levels of government) on property transfers as well as property values. Nonetheless, both revenue concerns and significant administrative and economic arguments suggest that many countries could usefully consider how and to what extent they might improve the treatment of real property under their VATs.[31]

Sub-central VATs. A final topic that may perhaps be mentioned briefly under the heading of 'VAT economics' is that the case for VAT as a replacement for other forms of sales tax is not limited to the central government.[32] In a number of countries, notably such federal countries as the United States, Canada, Brazil, India, and Argentina, sales taxes constitute a major source of revenue for

[29] For a detailed exploration of this subject, see Gendron (2005).

[30] For example, OECD (2008) lists at least ten different ways in which 'supply of land and buildings' is treated in EU member states.

[31] The importance of the revenue base provided by the housing sector has recently been emphasized in Canada by Smart and Bird (2009).

[32] This topic may of course also be treated under both 'VAT administration' and 'VAT politics': for a discussion of all aspects of subnational VATs in Canada, see Bird and Gendron (2010).

regional (and in some cases local) governments. Indeed, in the U.S. case, state dependence on sales taxation has been a major reason that the national government has been reluctant to enter into serious consideration of a national VAT. In neighboring Canada, however, not only have VATs existed at both levels for some years, but the replacement in 2010 of long-standing RSTs by provincial VATs in two additional large provinces (Ontario and British Columbia), once again underlined how generally successful Canada's 'dual VAT' experience has been.[33]

Two other federal countries with (some form of) VAT at both levels of government, Brazil and India, have encountered many more problems, however. In both cases, one problem is that the national VAT is very limited in scope and hence unable to provide the 'sheltering' effect that Bird and Gendron (1998) argue helps make the regional VATs in Canada, which are imposed at rates set by the provinces on essentially the same base as the national VAT, work so well. Of course, as developing countries, both Brazil and India face much more difficult economic circumstances and have relatively lesser administrative capacity than Canada. Brazil, the pioneer (in 1967) of regional VATs, got around some potential problems by imposing the taxes on an origin basis; however, by doing so it paid a price in the form of both economic distortions and fraud. India, which launched its state VATs, is still to reform its central VAT and to determine how its 'dual VAT' system is to work – for example, how interstate trade is to be treated.[34] Argentina, as yet, remains with its long-standing system of a central government VAT and state gross receipts tax, just as the United States remains with no national VAT and most states (and many localities) with RSTs. In these and other countries, however, it seems likely that more will be heard in the future about sub-central VATs.[35]

VAT Administration

Is VAT easier or more difficult to administer than other general consumption taxes? In principle, not only should a perfectly functioning VAT collect the same revenue from the same base as a perfectly functioning Retail Sales Tax (RST) but the two taxes would also have the same taxpayer incidence and economic effects. However, in practice, the two taxes are likely to differ substantially in both coverage and administration. Few RSTs have succeeded in either taxing many service activities or excluding many business inputs from taxes (Smart and Bird 2009). The number of firms taxed may be larger or smaller under the VAT depending on the threshold level set for the VAT and the effectiveness with which the RST is applied, but on the whole, VATs, while cheaper to administer than income taxes (GAO 2008), appear to be more expensive to administer than RSTs.

[33] A detailed examination of the Canadian experience may be found in Bird and Gendron (2010). While as GAO (2008) notes, this system is not costless for either governments or business, the offsetting reduction in compliance costs owing to the single administration of the two taxes does not appear to have perceptibly increased costs either.

[34] For further discussion of these issues in both Brazil and India, see Bird (2009a). Canada deals with the problems mentioned by having one administration deal with both VATs, by using much the same 'deferred payment' system as in the EU for dealing with interstate trade, and, finally, by using what are in essence origin 'place of supply' rules for certain trade, notably in services, while avoiding the distorting public sector competition found in Brazil through an agreed revenue allocation system that allocates revenues to provinces on a statistically-determined destination basis. For further details, see Bird and Gendron (2010).

[35] For further discussion, see Bird (2010). We do not discuss here such local taxes as Italy's IRAP, Japan's local enterprise tax, or the new French replacement for the *taxe professionelle* – all of which in economic terms resemble VATs imposed on an origin base. to some extent: for an earlier treatment of such taxes, see Bird (2003).

However, since VATs generally not only encompass a broader base than most RSTs but also as a rule tend to be enforced more tightly, such comparisons tell us little.[36]

On the other hand, some administrative advantages commonly alleged for VAT are unpersuasive. For example, VAT is sometimes said to increase revenue security since the VAT is collected at each stage of the production-distribution chain while the RST is collected only at the point of the final sale of the commodity. This argument is invalid because under a properly functioning VAT the government only receives revenue once the final sale is made.[37] VAT collected at stages before the final sale – that is, the first sale to a non-registrant, whether a consumer or an informal producer -- is creditable against subsequent sales and hence generates no net revenue for government, except for a possible small 'cash flow' gain depending on the turnover period between various stages in the chain of transactions and the risk-free interest rate.

VAT has also been touted as being 'self–enforcing' because, under the transaction base invoice-credit system commonly employed, in principle each intermediate buyer has an incentive to make sure that the VAT has been properly charged by the seller so that a refund credit can be applied for. This advantage too is usually greatly overstated. In reality, VAT is definitely not self-enforcing for a number of reasons. Since VAT is not in fact enforced on a transaction basis but on an accounts basis, the real advantage of the 'chain' of VAT transactions is to provide an evidentiary trail that the tax administration may follow both to check the validity of the output and input taxes reported by the business in question and also to detect prior or subsequent gaps that may exist in the chain. Of course, to reap any gains from this process actual cross-checking and auditing is required: nothing happens automatically.

Moreover, since in many countries purchasers are not legally liable if they fail to verify that those who sell to them actually paid the VAT shown on the input invoices for which they claim credit, there is not much incentive for them to do so. Recently web-based technology has for the first time, made instantaneous verification of the VAT status of sellers (and purchasers) possible, as we discuss further below. Prior to this development, in most countries it was highly unlikely that firms accepting 'false' VAT invoices on purchases and claiming credits as a result would be prosecuted.

Finally, the existence of a chain of VAT transactions has recently been argued by some to be more of a danger than a gain to the revenue. Under a VAT as usually administered, when a firm issues a VAT invoice it in effect creates a potential claim on the public budget. No country is short of those who can and will devise schemes to exploit this potential weakness by issuing false invoices, claiming false credits, and even (when, as with exports, there is zero-rating) claiming false refunds, as we discuss next.

VAT evasion. GAO (2008), drawing on the experiences of five developed countries (Australia, Canada, France, New Zealand, and the United Kingdom), recently emphasized in the real world any and all VAT designs have compliance risks. All five countries are concerned about illegitimate businesses submitting fraudulent refund claims based on false paperwork. Particularly difficult to

[36] See the extended discussion of this point in Bird and Gendron (2007, chap. 3).
[37] This point was demonstrated clearly in OECD (1988).

deal with are so-called 'missing traders' who set up businesses for the sole purpose of collecting VAT on sales or sometimes simply to claim (often excessive) rebates on 'investments' in equipment and inventories that entitle them to a refund -- and then disappear with the proceeds. Such cases have proved particularly troublesome when cross-border transactions are involved. Attempting to deal with such problems either add complexity to tax design or requires substantial administrative resources; in either case, the result is likely to be increased administrative and compliance costs.

Keen and Smith (2006) describe the main types of fraud and evasion to which the VAT is liable, giving special attention to the risks that arise from the zero–rating of exports. Frauds such as non-registered taxpayers, misclassification of commodities, sales underreporting, omission of self-delivered commodities and the non-remittance of already charged tax are of course common to all sales taxes, especially those applied at the retail level. The main frauds peculiar to VAT are fraudulent claims for credit or refund such as credits claimed for VAT paid on purchases that are not creditable and especially credits generated by bogus (missing) traders – 'invoice mills' -- set up solely to generate invoices for VAT credits or refunds. The so-called 'carousel frauds' that have attracted so much attention in the EU are an example. In these frauds, firms combine two features of the VAT -- zero–rating of exports and the deferred payment mechanism adopted in the EU (in effect removing fiscal frontiers for imports also by collecting VAT otherwise due at the border on the next taxable transaction) with false invoices to defraud the revenue.

In an early study, Agha and Haughton (1996) examined VAT compliance for a group 17 OECD countries for 1987 and found that both multiple rates and a higher average rate were associated with lower compliance. On the basis of this slim data base, they went even further, suggesting that the longer a VAT had been in place the better compliance was, that an extra dollar spent on VAT administration would on average raise revenue by $12, and that the revenue-maximizing VAT rate was less than 25 percent. Few studies since have been quite as daring, as we noted earlier when reporting the much less conclusive results found in more recent and much more extensive studies with respect to the effect of the time of VAT adoption on VAT performance.[38]

Estimates vary concerning the actual level of VAT fraud in the EU (IVA 2007). Reckon (2009), in a study of the VAT gap in EU member states over the period 2000–2006 using national accounts data, found a fairly stable pattern in the size of the gaps between 2000 and 2004, followed by a decline between 2004 and 2006, with considerable variation from country to country. With the financial crisis, however, matters took a turn for the worse (IMF 2010): for example, in the United Kingdom, the VAT gap increased by 3 percentage points between 2007–08 and 2008–09. IMF (2010) estimates VAT evasion to be on average 0.7 percent of GDP in OECD countries and suggests that extra revenue equivalent to 0.8 percent of GDP could be collected in G-20 countries by reducing the VAT gap. Again, however, there is considerable inter-country variation. For example, the estimated VAT gap (the difference between actual and potential VAT revenues) was 20 percent in some (e.g. Mexico and Italy) but closer to 10 percent in others (e.g. France and Germany). Even larger gaps –

[38] Neither the issue of the revenue-maximizing rate nor the size of the revenue 'pay-off' of additional administrative outlays appears as yet to have been rigorously examined empirically, although see Edmiston and Bird (2006) for a rather casual estimate of the former in a particular country (Jamaica).

over 40 percent – have been estimated in some developing and transitional countries.[39] In a recent EU study, Reckon (2009) identified the perceived level of corruption as the most significant factor explaining the variation in the size of the gap.

There are many ways to cheat on any sales tax, and some of the frauds mentioned above are, in principle, more difficult to get away with when there is a VAT than is the case with other forms of (non-cascading) sales taxes. Although VAT fraud may be more obvious because it takes the form of explicit payments rather than simply lower revenues as with other forms of evasion, the net impact on the budget is the same in the end. The best way to deal with VAT refund fraud is similar to the best way to deal with most tax evasion: administer the tax better. From this perspective, as IVA (2007) recently noted, there are a range of possible solutions to controlling VAT evasion in the EU such as the increased use of technology to allow real-time declarations of transactions via VAT returns as well as improved administrative cooperation across borders.[40]

The correct treatment for VAT refunds is simply to pay legitimate claims promptly and not to pay fraudulent claims at all. The problem, of course, is how to distinguish the good from the bad. The answer is to be found not so much in special treatment of refund claims as in better administration of all aspects of the VAT system. Nonetheless, even in countries with well-established and experienced tax administrations like Germany, so much fraud has been uncovered in the form of illegitimate invoices that some have actually proposed that VAT refunds should not be paid unless satisfactory proof is shown that the input taxes claimed have been received by government (Sinn et al 2004). Since 2002, Germany has made the buyer legally liable for tax not paid by the seller. However, this provision had little effect because it is virtually impossible to prove that a buyer had any knowledge of a seller's intention not to pay the tax for which the buyer claims input tax credit.

Another common form of VAT fraud is, as noted earlier, to establish a bogus new firm that claims credits for inputs it does not actually buy and then disappears before it can be audited. Germany tried to deal this fraud by demanding some form of guarantee from new firms. But this measure too proved ineffective largely because firms were still able to make claims and go bankrupt before the authorities got around to acting. To avoid such problems, the scheme mentioned in the previous paragraph would have changed the law to require clear proof that all taxes claimed as input credits must actually have been paid. The scheme would require banks to remit the tax directly to the government at the time of sale through the device of an intermediate 'trust' account. At the same time the bank would issue a receipt to the seller for VAT paid, with this receipt serving as proof of the input tax claim. Alternatively, for cash payments, sellers would be

[39] See Gebauer, Nam and Parsche (2005) as well as the Latin American studies summarized in Bird and Gendron (2007, 60).

[40] On the use of technology to improve tax administration in general, see Bird and Zolt (2008). Early experiments with invoice-matching to control fraud in VAT were not effective (Choi 1990) but over time such a system became quite effective in Taiwan (Jenkins, Kuo and Sun 2003) and recently China has launched a full-fledged e-invoicing system to facilitate control (Winn and Zhang 2010). The importance of international cooperation in the EU context has long been obvious: for example, Bird and Gendron (1998) suggested that the EU needed a 'virtual VAT' that, like the federal VAT in Canada, would cover essentially the same tax base as that of the member states and hence facilitate joint control of cross-border transactions. With the recent strengthening of the VIES system and increased on-line cross-country access to VAT registration data, the EU is to some extent moving in this direction.

required to issue a tax receipt that demonstrates that the tax has been paid (either in the form of a verified credit-card like transfer to the government at the time of sale or by a prepaid 'tax stamp').

The complexity of such schemes probably makes them inadvisable in the conditions prevailing in most developing countries. Several alternative approaches have, therefore, been proposed to curb VAT refund fraud in such countries (Harrison and Krelove 2005). For example:

- The law might be changed, for example, to restrict zero-rating solely to exports to limit the potential range of legitimate refund claims. Similarly, any reduced rates should be high enough not to generate such claims except in highly unusual circumstances.
- Administrative procedures might be changed to ensure that export sales against which input tax claims are made are adequately supported by verified export entry forms.
- Refunds to new registrants might be made only after a mandatory six-month carry-forward of unused credits.
- Refunds might be limited only to firms in certain industries (as in China) or of a certain size (as is done in Québec with respect to credits for capital goods).

Such methods may indeed make fraud less likely or less attractive. Unfortunately, not only do they increase the degree of cascading in the tax—thus negating some of its alleged virtues—but they create yet more barriers to the creation of new formal-sector businesses (not least because interest is seldom paid on carried-forward or deferred credits). In the end, as usual when it comes to tax evasion, it is not really possible to 'design' most of the problem away. One must also be willing and able to uncover and punish those who defraud the revenue.

Closing the VAT Gap through Better Design. Evasion is of course only one part and by no means necessarily always the largest part of the 'VAT gap' shown in the performance measures discussed earlier. The other part of the gap is that attributable to inadequate base coverage. One aspect of this 'base gap' – sectoral exclusions or exemptions – was discussed above. Another important component may sometimes be that VAT exemptions (or zero-rating) are being used to reward political supporters or perhaps as an instrument of industrial or regional policy. Both factors appear to be at play, for example, in Ukraine (Bird 2008) and in Pakistan (Martinez-Vazquez and Richter 2009), and to some extent in Jamaica (Edmiston and Bird 2006). No doubt other countries could be added to this list, but a much more important question in most countries is the extent to which the informal sector is, or is not, captured in the VAT net and how this is done.

As Gordon and Li (2009) have recently emphasized, the level of financial development is a crucial factor in determining the extent to which countries can establish a secure revenue basis for public sector expansion. The other side of this coin is that the extent to which economic activity takes place in the largely unrecorded 'informal' sector is inversely related to the achievement of this goal.[41] In most countries a small number of VAT registrants, usually less than 10 percent account for

[41] For example, Alm, Martinez-Vazquez and Schneider (2004) estimate that on average the 'shadow economy' in both Africa and Latin America is 41 percent of GDP or more than twice the level found in OECD countries.

80-90 percent of VAT collections. Obviously, it is critical to keep a very close idea on these fiscal 'whales,' as much recent literature on tax administration has argued (Baer, Benon and Toro 2002). What has proved much more troublesome in VATs around the world is the question of how best to deal with the 'minnows' of the system -- small firms that are at least potential VAT taxpayers.

At least three distinct design issues arise in this respect. The first issue is where to set the threshold at which those engaged in business activities should be required to register for VAT. The second issue is, what, if anything, should be done to 'simplify' VAT procedures for small registrants. The third issue is how to make sure that those who are treated as 'small' for VAT purposes – that is, those excluded from the system or treated favorably within it -- really are small.

The threshold issue has been well discussed by Keen and Mintz (2004), who note that many countries have, somewhat oddly, set such low thresholds for VAT registration that their administrations end up being encumbered with a large amount of essentially useless work. Of course, it is not hard to speculate why countries may do this. For instance, since good tax administration rests on information – and for no tax is this truer than VAT -- it is obviously advantageous in principle to include as large a share of economic activity in the tax base as possible in order to be sure to capture the necessary information. Such an explanation would be more convincing, however, if there were more evidence that countries put such information to good use. In the real world, however, the very countries that set unduly low thresholds often provide many of those thus caught in the VAT net with escape routes through various simplified systems or, in some cases, simple neglect. On the whole, as Keen and Mintz (2004) conclude, there is much to be said, particularly in the context of most developing countries, for deliberately excluding at least some of the potential tax base by setting a fairly high threshold and then concentrating administrative efforts on ensuring that those larger firms within the VAT net comply.

A quite different approach to the perceived and real problems of dealing with small taxpayers is the so-called 'VAT withholding' found in some countries (e.g. Argentina). Under this system, the underlying assumption is that VAT will not be reported properly by small firms, regardless of whether they are registered or not. Hence larger firms (and public agencies) selling to or buying from such firms are required to 'withhold' an additional VAT on such sales or purchases in order to make up for the VAT those firms are supposed to collect (but are expected not to remit even if they do collect) on their own sales. Such 'dual price' systems usually appear to be imposed at rates that are both arbitrary and make no logical or administrative sense. No studies appear to exist of the extent to which such presumptively 'withheld' VAT is ever credited against VAT actually reported by the firms from whom they have been withheld, or of the net effect on revenue of such systems. On the whole, where this approach is in place it appears to amount to little more than a set of arbitrary presumptive levies that may be administered as part of the VAT but in reality have little or nothing to do with the proper administration and operation of the tax.

Of course, it has long been recognized that compliance costs are relatively more burdensome for smaller firms and hence constitute a potentially important barrier to entering the formal sector of the economy. In an attempt to alleviate these problems, some countries have attempted to alleviate the blow in various ways, not always with good consequences. Perhaps the most common approach is in effect to take out of VAT most of the very firms that the unduly low threshold has brought in by applying some form of turnover or presumptive levy to firms below a

(usually self-reported) threshold. The extreme version of this approach is the 'simplified' or 'unique' tax for small businesses found in some countries (Bird and Wallace 2004). This approach may sometimes have the not inconsiderable virtue of allowing new and potentially growing firms to escape from often arbitrary tax administrative practices (Engelschalk 2004). On the whole, however, not nearly enough attention seems to have been paid the (lack of) dynamics in such systems and the barrier their existence may erect to both revenue expansion and to the real expansion of the formal economy.

In the nature of the business of tax administration, not surprisingly, the customers are not very willing and often try to opt out of the system. Those who do so may include not only genuinely small businesses but also profitable large- or medium-sized businesses that only look small, as well as firms that are losing money but continuing to function by not paying over taxes such as VAT, for which in effect are supposed to be withholding agents. Tax administrations often have to choose whether to go after the larger firms who are already in the tax net, where potential tax revenue payback may be higher, or to pursue instead the less lucrative smaller taxpayers who are largely outside that net. Many have chosen, perhaps rationally, to spend little time on the small but instead to attempt to cope both with them and to some extent with the whole shadow economy issue by adopting some form of specific presumptive tax regime in lieu of VAT, often accompanied by other taxes as well.

Most discussion of the appropriate treatment of small firms (e.g. World Bank 2007) appears to assume that there is no difficulty in telling which firms are small. As with giraffes, it appears that one is supposed to know one when one sees one. This assumption may be dangerously wrong. For example, some recent studies suggest that in at least some countries not only has the informal sector been becoming more, not less, important but also that persons and enterprises at all income (and size) levels are engaged to varying extents in the informal sector (de Ferranti, 2004). In fact, many businesses seem to operate in both the formal and informal sectors at the same time. As mentioned earlier, however, although firms operating in the shadow economy may escape VAT liability on their sales they are also not able to reclaim credit for any VAT paid on inputs, which, to the extent such activities buy from the formal sector, implies that one way to tax them is through a VAT. On the other hand, as Emran and Stiglitz (2005) have argued, increasing taxation of the formal sector may expand, not reduce, the amount of hidden economic activity taking place to the extent that market-based activities may be able to disappear into the shadow sector.

In response to these problems, countries such as India have often engaged in various activities intended to chase 'shadows' back into the fiscal light. At one level, tax officials may simply walk along the street, sweeping hawkers and peddlers into the tax net, entering premises, checking records, and imposing penalties. A more sophisticated approach is to follow the audit trail down the productive-distributive value chain in each line of business, starting with those who are in the tax net and working outward on the assumption that it is difficult for even the most sophisticated evader never to have traceable contact with someone who is already known to the tax authorities. The existence of presumptions of various sorts in the VATs of many countries, whether in the form of presumptive gross receipts taxes in lieu of VAT, VAT withholding (as discussed above) or even simplified accounting systems, in effect constitutes formal recognition of the inability or unwillingness of the administration to apply the letter of the law to a large part of the potential taxpayer population. These measures – often touted as ways not only of raising some revenue from

this hard-to-tax population but also encouraging the growth of small informal businesses into larger regular taxpaying businesses-- may backfire badly.

In a detailed exploration of a unique micro-data base in Brazil, for instance, de Paula and Scheinkman (2009) show the key role of VAT enforcement in fostering 'chains of informality'. The more suppliers (and purchasers) in the chain are subject to an effectively enforced VAT, the less likely are others in the chain to operate informally. On the other hand, where informality is tolerated in one stage, it is likely to spread both upstream and downstream. Importantly from the perspective of the argument made here, the application of presumptive rates to links in a value chain has the same result as tolerating informality: it reduces both tax compliance and formalization. Every effort should be made to avoid breaking the information chain, rather than encouraging firms to do so, as simplified systems in effect do.

In practice, it is often difficult in many countries to distinguish between small firms who do not keep good books and records but are potentially (and legally) taxable and firms whose activities are clearly large enough to fall within the tax system but are tax evaders. Some in the latter group may be completely off the fiscal radar – the so-called "ghosts" – while others are more like 'icebergs,' in that the portion of their activities visible to the authorities may be miniscule compared to the hidden reality (Bird and Wallace, 2004). The introduction of 'special' regimes in VAT (or other taxes) in an attempt to cope with these circumstances inevitably results in the fragmentation of the tax system and is generally inherently inconsistent with good tax administration. Any time such a 'disconnect' is created between a special tax regime and the general tax system, problems are likely to emerge. It is, in the long run, no easier to have two national tax regimes than two national currencies because each regime constitutes an integral part of the other and affects the entire system.

Even the best 'special' tax regime, whether the intent is to supplement a normal VAT by replacing its complexities with a simplified regime for small business or to extend the reach of the tax further out into the shadow economy, must therefore include explicit transition arrangements to link the special regime to the more general tax system. In practice, however, such arrangements seem seldom to exist. A key problem is how to keep out of the (simplified) system large and medium enterprises that try to look like small enterprises and hide themselves from the taxman's eye – and almost invariably from the attention of any auditors.[42] The temptation to shelter from the fiscal blast within such systems is likely to be especially strong when, as is usually the case, the effective tax rates applied to those who make it to the 'safe harbor' of the simplified system are considerably lower than those in the normal tax system. Attempts to supplement a VAT by introducing a simplified system intended to help the small or to catch shadows may thus end up making matters worse particularly when, as is too often the case, firms once safely hidden in the 'small' sector can stay there almost indefinitely with little or no risk of audit or exposure.[43]

[42] For some (weak) evidence of such 'migration' into a simplified system, see Bird (2008).

[43] Since purchases from these taxpayers by regular VAT sellers cannot be used to claim input credits, an incentive exists for them to voluntarily (or under pressure from their customers) enter the VAT system. How effective this incentive is likely to be, however, is far from clear given the general difficulties in policing the fringes of the VAT system. For example, other registered sellers – some of whom themselves may be conducting significant 'shadow' business -- may agree to issue VAT receipts in their own name, a practice that seems not unlikely in the context of countries with large shadow economies and generally weak tax auditing capacity.

VAT Politics

Taxation is always in the end more a matter of politics and economics, and politics is more often concerned with fairness and distribution than it is with economic efficiency.[44] Certainly equity is always and everywhere a central issue in taxation. Equity issues may be approached at two different levels. First, one may consider the details of exactly how different taxes impose burdens on taxpayers who are in the same and different economic circumstances. Secondly, one may instead focus on the overall effects of taxation on the income and level of well-being of different people. Economists often tend to take the second approach. However, popular discussion of taxation usually takes the first approach, as shown by the many proposals to alter the rates and structures of particular taxes such as VAT. Sometimes such proposals may indeed improve horizontal and vertical equity within the limited group subject to the full legal burden of the tax. However, sometimes the same changes may actually exacerbate inequity more broadly considered.

Because the poor consume a higher proportion of their income than the rich, consumption taxes are generally considered regressive. Consumption taxes are less regressive on a lifetime rather than annual perspective, but given the relatively short life expectancies in many developing countries and the subsistence level at which many people in such countries live such refined arguments carry little weight. It is thus not surprising to find that many VATs provide for reduced rates or exemptions for 'basic' items such as some foods, passenger transport, medical services, and cooking fuel. The common response of the expert is that whatever small degree of progressivity such deviations from uniform treatment may achieve could be more effectively and fairly attained through small changes in the income tax or by adjustments in transfer payments. Again, however, the relevance of this response is arguable, if not largely irrelevant, in countries in which the poor do not as a rule suffer from income tax or benefit from transfers.

Although the equally conventional argument that there is unlikely to be much gain in imposing differential 'luxury' rates under a VAT given the efficiency and administrative costs to which such differentiation gives rise, seems more convincing—if desired, more can be done with less collateral damage through excise taxes on such commodities (Cnossen 2004). But, on the whole the conventional case for imposing VAT at a uniform standard rate and on as broad a base as possible in poor developing countries seems less than completely convincing. A uniform VAT is likely to increase the price of many goods essential to the poor (Ahmad and Stern 1987). Because the poor may consume a relatively small amount of such products, it is undoubtedly true that much of the benefit of such exemptions will go to the non-poor. Nonetheless, in view of both the relatively heavy tax burden from such taxes on the poor in some countries and the general inability of governments in those countries to provide offsets to increased tax burdens through other fiscal adjustments, some form of offset measures with the VAT may often seem warranted.

[44] Of course there is much more to VAT politics than the issue of fairness or regressivity discussed here. See, for instance, the discussion of the importance of tax visibility in Bird (2010a) as well as the broader discussion of the 'state-building' role of taxation (Brautigam, Fjelstad and Moore 2007)– the importance of designing and implementing taxes in such a way as to make different groups in society feel, correctly, that it is 'their' tax system thus fostering a 'high compliance' rather than a 'low compliance' system (Bergman 2003). Such interesting subjects must, however, be left for another day.

However, going to the logical conclusion of zero-rating for distributive reasons is unlikely to be advisable in countries already facing many difficulties with VAT refunds. Exemptions are similarly bad: they may both increase cascading and, by breaking the VAT chain, make effective enforcement more difficult. In the end, perhaps a reduced rate might be the best – or the least worst – approach; at least some form of this argument may be part of the rationale behind the common reduced rates found in many EU countries. On the whole, however, there are too many instances in which the items taxed (or not taxed) in different ways appear more to have been chosen arbitrarily rather than in any reasoned fashion to make one comfortable with this conclusion.[45]

As with all taxes, these issues must ultimately be decided through the political process, whether in developing or developed countries. Nonetheless, the fact remains that concerns about 'fairness' and the regressivity of the VAT have proved critical in both the adoption and the shaping of the VAT in many countries and that such matters cannot and will not be relegated to the whims (or reasoned conclusions) of tax policy designers. Although this issue has certainly been prominent in VAT discussions in many poor countries[46] the fact that the very poor are likely to remain largely outside the formal sector where the VAT operates, actually means that at least in some such countries VAT may be progressive (Jenkins, Jenkins and Kuo 2006). As in developed countries, however, where not only did 'fairness' play an important role in the initial adoption of VATs (Eccleston 2007) but the issue has again come to the fore as a result of proposals to raise VAT rates to deal with the deficits arising from the 2008 financial crisis, the distributional concerns aroused by VAT continue to require close attention from those concerned with tax policy in developing countries.

6. Onward and Upward?

Where does VAT go from here? Onward even into every little island and even oil-rich country, or so it seems. As Bird and Gendron (2006) note with respect to developing countries, all countries need taxes, most need a general consumption tax, and VAT, while not perfect, is the best such tax available. Indeed, as noted earlier, in at least some countries – Australia, Spain, Mexico, Argentina – regional governments too may gradually find their way onto the VAT bandwagon. Of course, whether 'American exceptionalism' can continue to withstand the worldwide rush to VAT remains to be seen, but this story is far too complex to tackle here.

Recently, the IMF (2010) has stressed VAT's revenue potential, noting, for instance, that introducing a VAT in the United States, and doubling the low VAT rate in Japan, could substantially raise revenues in those countries, just as strengthening tax compliance could do in many developing countries. It does not follow, however, that VAT in all or even most countries will over time come to account for a larger and larger share of revenues. As noted earlier, the evidence that VAT is a 'money machine' is far from clear or persuasive. As was also discussed earlier, in economic and administrative terms a case can indeed be made in many countries for increasing VAT rates, VAT bases, the effectiveness of VAT administration or perhaps even all three. However, it does not follow that countries will or indeed necessarily should do so. One reason lies in VAT politics in the

[45] Crawford, Keen and Smith (2010) show clearly how complex it can be to decide such matters rationally even in countries with capable administrations and ample data.
[46] See, for example, the cases cited in Bird and Gendron (2007, 24).

broadest sense: in countries in which popular support for the state often needs shoring up rather than shaking up, it is often far from clear that increasing VAT is always the way to go. A case can be made in many poorer countries, for example, that a critical ingredient in the creation of a sustainable and legitimate governance structure may lie more in strengthening the income tax than the VAT (Bird and Zolt 2010). Equally, a case can be made that many countries may have more to gain by strengthening and improving sub-central governments and that this too may often be best accomplished in ways other than simply bestowing VATs – or at least VAT revenues – on them (Bahl and Bird 2008).

IMF (2010) is right in the sense that, provided it can be administered adequately, in most countries VAT remains the most economically desirable and administratively effective way to collect an additional share of national income through a general consumption tax. However, in many countries the reality is that the VAT is not all that well designed and certainly not always well administered and, more importantly, that the political economy environment may be such as to make serious VAT reform, let alone VAT revenue expansion, much more difficult than some of the rather casual assertions in IMF (2010) appear to suggest. In the United States, for example, a VAT at 13 percent might indeed raise 6 percent of GDP (Graetz, 2005) but it is probably close to impossible that the net revenue gain from such a major reform would come even close to this level.[47] While much can certainly be done to improve VAT, and indeed to introduce it in the few countries, like the U.S., where it does not now exist, what happens in reality in any country is inevitably more dependent on political developments than on technical improvements in VAT design or administration.

In the end, with VAT as with all taxes, the 'NOSFA principle' (no one size fits all) is thus likely to prevail. Although the questions that must be answered in designing VAT and the problems faced in implementing it are in principle similar everywhere, the contexts (political, human resources, technological, etc.) within which these questions necessarily have to be answered differ significantly from country to country and indeed change over time in any one country. Countries may of course usefully learn much from the experience of others, and so they have. In the final analysis, however, as the development of VAT over the last half century has clearly demonstrated, the best answers and solutions for any country – those that will be accepted, sustained over time, and produce beneficial effects – must always and everywhere in the end be homegrown to fit their particular circumstances.

[47] See, for example, the discussion of the U.S. case in Gale and Harris (2010) as well as the state-level implications discussed by Duncan and Sedon (2010).

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Appendix I. Data

Our sample contains data for 107 countries between 1990 and 2008. However, we were not able to collect data on all variables for all countries in the sample over the 19 years period.

List of countries:

Afghanistan, Albania, Argentina, Armenia, Australia, Austria, Kingdom of Bahrain, Bangladesh, Barbados, Belarus, Belgium, Bhutan, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Chile, China, Colombia, Republic of Congo, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Egypt, El Salvador, Estonia, Finland, France, Georgia, Germany, Greece, Guinea, Honduras, Hungary, Iceland, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Japan, Kazakhstan, Republic of Korea, Kuwait, Latvia, Lebanon, Lesotho, Lithuania, Luxembourg, Macedonia, Madagascar, Malaysia, Maldives, Malta, Mauritius, Mexico, Moldova, Mongolia, Morocco, Myanmar, Nepal, Netherlands, New Zealand, Nicaragua, Norway, Pakistan, Panama, Paraguay, Peru, Poland, Portugal, Romania, Russia, Rwanda, Serbia, Seychelles, Singapore, South Africa, Spain, St. Kitts and Nevis, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Thailand, Trinidad and Tobago, Tunisia, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Vanuatu, Venezuela, Zimbabwe

Table A.1. Variables Description and Sources

Variable	Description	Source
Revenues	Total (Central Government) revenue collection to GDP	IMF GFS Database 2010, authors' calculations
Income Taxes	Income taxes (personal income tax, corporate income tax) to GDP	
Social Security Contributions	Social Security contributions to GDP	
Taxes on Goods and Services	Sum of the general sales taxes and excises duties to GDP	
General Sales Tax	General sales taxes to GDP	
Customs Duties	Customs duties collection to GDP	
VAT Efficiency Ratio	VAT collection/(Standard VAT rate*GDP)	World Development Indicators, IMF GFS Database 2010, various sources for the VAT rates, authors' calculations
C-Efficiency Ratio	VAT collection/(Standard VAT rate*Total consumption expenditure)	
VAT Gross Collection Ratio	VAT collection/(Standard VAT rate*Private consumption expenditure)	
D_{VAT}	=1 if the VAT is implemented	Ebrill et al. 2001 and various other sources
VAT Experience	Number of years since the VAT introduction	
Tax Morale	Share of population that declare express on taxes to be never justifiable	World Value Survey
Business Concentration	Average employment (in 000) in manufacturing (employment / number of establishments)	UNIDO Industrial Statistics Databases, authors' calculations
Imports	Imports share in GDP	World Development Indicators
Openness	(Imports + Exports) / GDP	World Development Indicators
Petrol consumption	Crude petrol per capita consumption (in 000 metric tons)	The UN Energy Statistics Database
Alcohol consumption	Alcohol per capita consumption (in liters)	World Health Organization
GDP pc	Current GDP per capita (in USD)	World Development Indicators
Agriculture	Share of agriculture in GDP	

Urbanization	Share of urban in total population	
Age Dependency	Age dependency ratio (dependents to working-age population)	
Education	Education Index (measures a country's relative achievement in both adult literacy and combined primary, secondary and tertiary gross enrolment)	United Nations World Development Indicators
Bureaucracy	Bureaucracy Quality (between 0 and 4 points, higher points being given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services)	International Country Risk Guide (ICRG) , The PRS Group
Political Durability	Regime Durability: T he number of years since the most recent regime change.	The Polity IV
Federal	= 1 if federal country	The World Bank
Developed	= 1 if developed country	The World Bank
Neighbors	Number of countries in the region having the VAT implemented (regions defined based on Ebrill et al. 2001)	Ebrill et al. 2001 and various other sources
IMF NCR	The IMF non-crises program (SAF, PRGF)	Dreher (2006, updated February 2010)
IMF CR	The IMF crises program (SBA, EFF)	

Table A.2 Variables Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Revenues	1469	0.276	0.101	0.046	0.662
Income Taxes	1369	0.060	0.042	0.000	0.224
Social Security Contributions	1127	0.062	0.050	0.000	0.209
Taxes on Goods and Services	1407	0.107	0.528	0.000	0.198
General Sales Tax	1345	0.051	0.030	0.000	0.156
Customs Duties	1368	0.022	0.039	0.000	0.384
VAT Efficiency Ratio	1084	0.357	0.142	0.002	0.962
C-Efficiency Ratio	1040	0.461	0.189	0.003	1.343
VAT Gross Collection Ratio	1084	0.589	0.261	0.003	1.959
Dvat	2033	0.724	0.447	0.000	1.000
VAT Experience	1248	15.057	11.084	0.000	48.000
Tax Morale	930	0.600	0.154	0.205	0.979
Business Concentration	1491	0.089	0.243	0.001	5.786
Imports	1958	0.445	0.253	0.001	2.156
Openness	1958	0.845	0.493	0.000	4.570
Petrol consumption	1490	0.002	0.005	0.000	0.038
Alcohol consumption	1942	5.787	4.212	0.000	21.600
GDP pc	1975	9,847.8	13,496.0	85.5	109,903.1
Agriculture	1862	0.125	0.117	0.000	0.659
Urbanization	2033	0.587	0.224	0.054	1.000
Age Dependency	1992	0.602	0.163	0.252	1.100
Education	1734	0.819	0.165	0.000	0.993
Bureaucracy	1599	2.540	1.101	0.000	4.000
Political Durability	1833	28.1	34.8	0.000	199.0
Federal	2033	0.187	0.390	0.000	1.000
Developed	2033	0.280	0.449	0.000	1.000
Neighbors	2033	0.677	0.244	0.000	0.960
IMF NCR	2033	0.032	0.176	0.000	1.000
IMF CR	2033	0.090	0.286	0.000	1.000