TAX REFORM AND FISCAL POLICY

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Washington D.C. 2031

December 2, 2011

Abstract: Tax design faces unparalleled difficulties in many advanced economies, to restore credible and sustainable fiscal positions and enhance growth—and doing so, in some cases, with great urgency and in circumstances of considerable social stress. This paper focuses on the redesign and rebalancing of core instruments that, ultimately, must bear much of the brunt in meeting these challenges. It firsts to assesses the merits of the VAT in this context, including by developing and beginning to apply a methodology for diagnosing weaknesses in design and implementation so as to find revenue in ways likely to be less distortionary and fairer than raising the standard rate from levels that are in many cases already very high. It then explores the currently fashionable idea of a 'fiscal devaluation'—a shift from social contributions to the VAT—which advocates see as one of the few options available to troubled eurozone countries. We find evidence that in countries with fixed exchange rates this may improve the trade balance, with quite sizable short-run effects. As theory predicts, the effects appear disappear in the long run, so that the case for such shifts rest largely on their potential to accelerate adjustment to deeper underlying problems.

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I. INTRODUCTION

In the aftermath of the financial crisis and in the midst of sovereign debt tensions—amounting to full-blown crisis in some eurozone members—fiscal policy in many advanced economies is a high stakes game played under severe constraints. The over-arching need is for substantial fiscal consolidation, to both reduce levels of public debt and provide space to address looming pension and (especially) health expenditure needs associated with aging.[1] Figure 1, setting out an illustrative adjustment path for the average advanced economy, illustrates the scope of the former challenge. At the same time, fostering growth remains imperative. For the shorter term, several countries face immediate and severe unemployment problems: above-average fiscal deficits are found along with above-average unemployment rates in the US, France, Portugal, Greece, Ireland, Slovak Republic and Spain (Figure 2). For these countries, rapid fiscal consolidation risks impeding economic recovery and raising unemployment, while slow adjustment risks losing market confidence, triggering higher spreads and inducing a nasty circle of higher spending and worsening deficits. Over the medium and longer terms, growth is critical to improving the debt dynamics, reducing the relative scale of adjustment needed. And underlying poor growth performance in many countries are structural problems that are especially pronounced in some of the troubled eurozone countries, and made evident in their sustained trade deficits: Greece and Portugal, for instance, ran trade deficits prior to their crises in the order of 11 percent of GDP.

Figure 1: **Fiscal Consolidation in Advanced Economies**
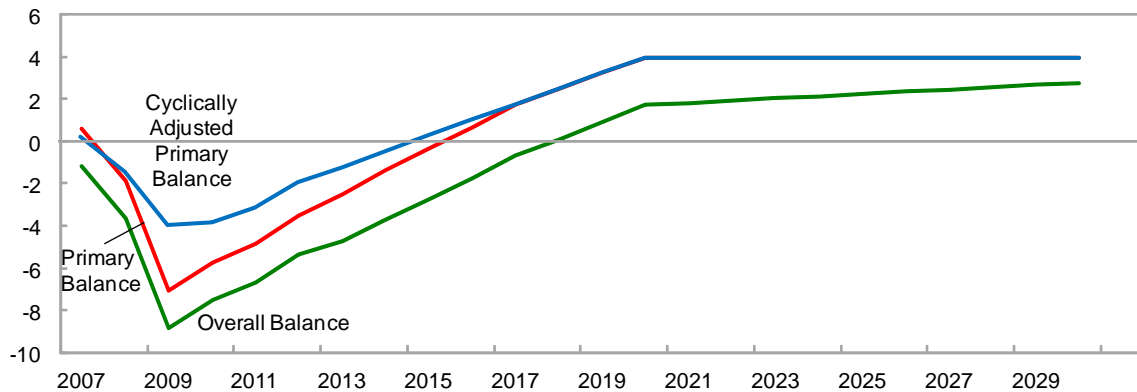
Source: IMF (2011)
Note: Figure shows a path of average balances that would reduce gross public debt to the lower of 60 percent or the pre-crisis level (and net debt to 80 percent of GDP in Japan).

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[1] Public health care spending in advanced countries is projected to increase, on average, by about 3 percent of GDP over the next 20 years and by 6.5 percent over the next 40 years (IMF, 2010). Public pension costs are expected to rise by 2.4 percent of GDP during the next 50 years in Europe (European Commission, 2009).

Figure 2: Deficits and Unemployment in Advanced Economies
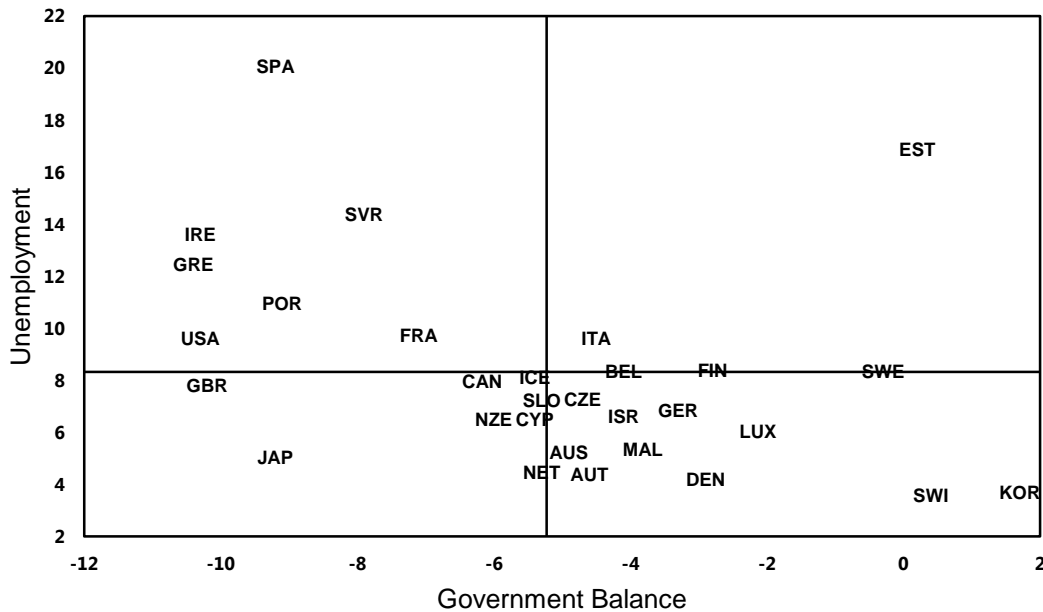
Source: IMF World Economic Outlook database.
Notes: Data refer to 2010, except for Ireland where the projected deficit in 2011 is taken.

All this poses substantial challenges for the detailed design of a wide range of tax and expenditure policies. For the latter, the core challenges are to reparameterize public pension schemes and, conceptually much harder, limit rising health costs. On the tax side—the focus of this paper—the need is to identify reforms that strengthen the fiscal position while being, if not growth-promoting, at least minimally distortionary and growth-retarding, while respecting equity concerns.

Options include some new, or under-developed tax instruments. Carbon taxes or (largely equivalent) the auctioning of emissions rights could raise significant revenue—around 0.6 percent of GDP for some proposals in the U.S., for instance—while mitigating climate damage and providing incentives for the development and deployment of cleaner technologies. New taxes on the financial sector—whether on transactions (the 'FTT'), on financial activities (a 'FAT'—essentially a form of VAT) or on some subset of bank liabilities—could also serve a dual purpose. They could raise significant revenue: the European Commission estimates that its proposed FTT would raise around €50 billion per annum, and the IMF (2010b) that the base of a FAT could be around 4 to 6 percent of GDP in many advanced economies. And they could also address market failures or distortions, whether in terms of systemic risk or, for the FAT, those arising from the exemption of financial services under the VAT. Some argue for a 'flat tax'—a perennial favorite in the U.S. political debate—sometimes holding this out as a way to enhance revenue by cutting tax rates; the evidence from the much-regarded Russian experience, however, is that the

subsequent revenue increase was not due to the reform itself, though there may have been some increase in compliance (Ivanova et al., 2005; Gorodnichenko et al., 2009).

The purpose here is not to review the full range of tax options to support fiscal sustainability: this is done, for instance, in IMF (2010a) and Cottarelli and Keen (2011) and, on financial sector taxes, in IMF (2010b) and European Commission (2011). The focus is instead on some of the core instruments that, ultimately, will have to bear the brunt of adjustment and in the redesign of which can be seen real prospects for meeting the consolidation, growth and structural challenges. These are the VAT and social contributions.

Section II focuses on the VAT. This has already emerged as a focus of consolidation efforts in the EU, and its greater use or introduction are widely viewed as leading options (indispensible, in the views of some) for fiscal sustainability in both Japan and the U.S., respectively. The aim is to assess the merits of the VAT in achieving consolidation, growth and fairness objectives and, more particularly, to develop and begin to apply a methodology for diagnosing weaknesses in VAT design and implementation so as to find ways to these ends that are likely to be less distortionary, including through non-compliance, and fairer than raising the standard rate from levels that are in many cases already very high.

The strong evidence that labor taxation is harmful for employment (see for instance Nickell and Layard, 1999; Bassanini and Duval, 2006; OECD, 2011) —although there are several subtleties in this relationship and interactions with labor-market institutions are important— has led to increased interest in reducing labor taxation in general and social contributions in particular. So too has the perception that high labor costs are a key structural problem in several of the troubled eurozone countries, with reduced labor costs seen as a way to ease and accelerate the needed adjustment. Measures of this sort have featured in stimulus programs and indeed in 2010 eight OECD countries reduced their social contribution rates for employers. The difficulty, of course, is that cutting social contributions runs counter to consolidation objectives, and is quite simply not affordable in many of the countries in the upper left of Figure 2. The question then is whether there exist 'tax shifts' combining such a cut with increases in revenue from other sources that do not offset the beneficial labor market and competitiveness effects. In Europe, this has led to prominent proposals for 'fiscal devaluations' in the form of a revenue-neutral (or revenue-enhancing) shift from social contributions to the VAT. This was a major element, for instance, of Portugal's initial arrangement with the IMF. Section III explores the theoretical case for tax shifts of this kind, provides what appears to be the first empirical analysis of whether and how these and other tax shifts might affect trade performance, and discusses some of the detailed design issues that arise in practice.

Conclusions are set out in Section IV. We find, broadly speaking, that there is indeed considerable scope for higher revenue from the VAT, even in countries, such as many in the EU, that already feature high VAT rates—and this can be done in ways that do not impede growth in either short or long runs, and which are sensitive to equity concerns. The evidence also suggest that revenue-neutral shifts from the employers' social contribution towards the

VAT in countries with fixed exchange rates may well improve the trade balance, with quite sizable short-run effects. As theory predicts, the effects appear disappear in the long run, so that the case for such shifts rest largely on their potential to accelerate adjustment to deeper underlying problems.

II. THE ROLE OF THE VALUE-ADDED TAX IN FISCAL CONSOLIDATION

The VAT has already played a prominent part in fiscal consolidation efforts in Europe: between 2009 and 2011, 13 of the 27 EU member states raised their standard rate of VAT; in the two years to 2008, in contrast, only one did so.[2] And the increases are in several cases substantial: Greece and Portugal, for instance, raised their standard rates by 4 and 3 percentage points respectively, to 23 percent. Further increases in standard VAT rates now look problematic for many European countries, including in terms of increased risk of non-compliance, and indeed EU rules impose a maximum of 25 percent.[3]

In other prominent fiscally challenged countries, however, the situation is the converse. The possibility of substantially increasing revenue from the VAT is technically clear in both Japan and the U.S.: at 5 percent, the former has almost the lowest VAT rate in the world,[4] and the latter remains the only OECD country without a VAT. But attempting to realize this potential has proved close to politically suicidal.

This section considers the place of the VAT in fiscal consolidation, and how the very different obstacles in Europe and the no/low VAT countries could be overcome.[5]

A. The Case for the VAT

There is a large literature on the comparison between consumption and income-based taxation, which need not be reviewed here.[6] To some extent, it is for present purposes beside the point: almost all countries have both, and—even leaving aside standard optimal tax theoretic considerations—do so for good practical reasons: to diversify compliance risks and

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[2] As a stimulus measure, the U.K. preannounced a temporary reduction in the standard rate from 17.5 to 15 percent in 2009; it was subsequently raised to 20 percent. The exception noted is Germany, which increased the standard rate by 3 points in 2006.

[3] Some have found evidence of Laffer-type effects for the VAT: Matthews (2003), for instance, reports an estimated revenue-maximizing VAT rate in the EU of around 19 percent.

[4] Iran has the lowest, at 3 percent.

[5] More issues of design and implementation arise than can be discussed here. For a sense of these, see: on general design issues arising under EU VAT rules, Crawford et al (2010) and Cnossen (2003); on Japan, Keen et al (2011); on the U.S., the papers in *Tax* Law Review (2010), Vol. 28

[6] See for instance Auerbach (2006) and Banks and Diamond (2010).

exploit economies of scope in application.[7] Empirically, there is evidence that, at least in the OECD, heavier reliance on consumption rather than income taxation is associated with faster growth (Kneller et al, 1999).

But the case for the VAT over alternative forms of consumption taxation—notably the retail sales tax (RST)—is still sometimes questioned, at least in the US. When each functions well, they are equivalent in taxing only final consumption, and both then have the appeal of excluding intermediate transactions from tax, consistent with the Diamond-Mirrlees (1971) result that production efficiency is a necessary condition for Pareto-efficiency.[8] The difference arises when enforcement is imperfect. Suppose, for instance, that a retailer fails to remit tax. Under an RST, no tax is collected at all; under a VAT, however—more precisely, under the invoice-credit form of VAT that is the norm (tax being charged on all sales, whether to consumers or businesses, but credited or refunded to registered businesses)—the tax collected on purchases by the retailer remains. In this sense revenue is thus more secure under the VAT. This comes at some cost to production efficiency, of course, but with a presumption that the consequent input-taxation is not too bad a substitute for the missing taxation on value-added at the final stage.[9]

The structure of the VAT also introduces an element of self-enforcement into the system: if firm A's supplier is VAT-complaint, that reduces A's gain from not being VAT compliant it (because registering would enable that tax to be reclaimed); and if A's customer is VAT-compliant, A has an incentive to register and charge tax because that customer will be able to reclaim the tax A charges them, and along the way A can reclaim the tax it has been charged on its own inputs. The point should not though be over-stated: if A's customer is not VAT-complaint, then A has an incentive not to comply either.[10] Nonetheless, given also other haphazard features of RSTs in practice—including particular difficulty in taxing services (largely excluded from most state VATs in the US) and a tendency to levy substantial charges on business inputs[11]—the technical superiority of the VAT, at least when substantial

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[7] Boadway and Pestieau (1994) show that with imperfect compliance it is generally optimal to deploy both a sales tax and a wage tax even under circumstances under which, with full compliance, they would be equivalent. A further practical consideration is that information obtained from one tax can be used to help enforce the other: opposition against the VAT in many countries often comes from small traders whose primary fear is that it improves the effectiveness of the income tax.

[8] The conditions for the Diamond-Mirrlees theorem are strong—including perfect competition and the ability to tax rents at any rate—but few simple rules emerge when they fail, leaving it as the practicable first guide to policy design.

[9] Newbery (1986) shows that it may be optimal to tax intermediate goods when not all final goods can be taxed.

[10] The possibility of 'bad' VAT chains forming is analyzed by de Paula and Scheinkman (2006), who find evidence of such an effect in Brazil.

[11] Ring (1989) found that around 40 percent of revenue from state sales taxes in the U.S. was collected from sales to businesses.

revenue must be raised,[12] seems clear. A rule of thumb has been that non-compliance difficulties make RSTs unworkable at rates of more than 10 percent.[13]

There are some signs that these theoretical merits of the VAT have to some extent been realized in practice. If the VAT is indeed a particularly efficient form of taxation, as these and other considerations suggest, one would expect countries with a VAT—since they have a lower marginal social cost of raising revenue—to collect more tax revenue, else equal, than these without. The evidence is that, for high income countries, this is indeed be the case (Keen and Lockwood, 2006 and 2010).

B. Diagnosing the VAT

In practice, VATs differ widely in their design and implementation, as can be seen from Table 1 summarizing key features of those current in the OECD. The final column reports an handy indicator for assessing the performance of a VAT. This is its 'C-efficiency,' E^C, defined as the ratio of the revenue it yields to the product of consumption and the standard rate of VAT, τ_s:

$$E^C \equiv \frac{Actual\ VAT\ revenue}{\tau_s \times Consumption} \quad . \tag{1}$$

For a perfectly enforced VAT levied at a single rate on all consumption, C-efficiency would be 100 percent. But this is no more than a convenient benchmark. A VAT, for instance, that did not refund exporters the tax charged on their inputs could score a very high E^C even though it consequently acts in part as a tax on exports rather than on consumption.

Despite these and other conceptual limitations,[14] the C-efficiency ratios reported in Table 1 are suggestive. Two observations stand out. First, C-efficiency in many European countries is very low, with the example of New Zealand—held in the highest esteem by VAT specialists—showing scope for a significant increase. That means that considerably more revenue could be raised from the VAT even without increasing the standard rate. If Italy, for instance, were to increase its C-efficiency to the level found in France, it would increase its VAT revenue by about 1.2 percent of GDP. Second, C-efficiency is, in contrast, rather high in Japan: a significant increase in revenue is likely to require increasing the standard rate.

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[12] A fuller account of the comparison between the VAT and RST is in Cnossen (1987).

[13] While figures cited for a federal VAT in the U/S. are often lower than this (6.5 percent for the Domenici-Rivlin plan (Bipartisan Policy Center, 2010), for instance), state and local sales taxes (ranging from around 4 to 12 percent where present) need to be added.

[14] These are discussed in Ebrill et al. (2001) and OECD (2011).

Table 1. Key features of OECD VATs, 2008

Country	Standard Rate	Reduced Rates[2]	Revenue (percent of GDP)	C-efficiency
Australia	10.0	0.0	3.4	49
Austria	20.0	10.0/12.0	7.8	61
Belgium	21.0	0.0/6.0/12.0	7.0	49
Canada[3]	5.0	0.0	2.7	74
Chile	19.0	-	8.9	75
Czech Republic	20.0	10.0	7.1	59
Denmark	25.0	0.0	10.1	62
Finland	22.0	0.0/8.0/13.0	8.4	58
France	19.6	2.1/5.5	7.0	49
Germany	19.0	7.0	7.1	55
Greece	19.0	4.9/9.0	7.2	46
Hungary	25.0	5.0/18.0	7.7	57
Iceland	25.5	0.0/7.0	9.1	54
Ireland	21.0	0.0/4.8/13.5	7.1	55
Israel	16.0	-	7.8	68
Italy	20.0	4.0/10.0	6.0	41
Japan	5.0	-	2.5	67
Korea	10.0	0.0	4.3	65
Luxembourg	15.0	3.0/6.0/12.0	5.8	93
Mexico	16.0	0.0	3.8	35
Netherlands	19.0	6.0	7.2	60
New Zealand	12.5	0.0	8.6	98
Norway	25.0	0.0/8.0/14.0	7.3	57
Poland	22.0	0.0/7.0	7.9	49
Portugal	20.0	5.0/12.0	8.4	51
Slovak Republic	19.0	10.0	6.9	54
Slovenia	20.0	8.0/8.5	8.5	68
Spain	16.0	4.0/7.0	5.3	46
Sweden	25.0	0.0/6.0/12.0	9.3	58
Switzerland	7.6	0.0/2.4/3.6	3.7	77
Turkey	18.0	1.0/8.0	4.9	35
United Kingdom[4]	17.5	0.0/5.0	6.4	46

Source: OECD (2011).

[1] Rates applicable on 1 January 2008. Special rates applying to regions are not shown.

[3] Newfoundland and Labrador, new Brunswick, and Nova Scotia have harmonized their provincial sales taxes with the federal Goods and Services Tax and levy a rate of GST/HST of 13 percent. Other Canadian provinces, with the exception of Alberta, apply a provincial tax to certain goods and services. these provincial taxes apply in addition to GST.

[4] The standard rate of VAT was temporarily reduced from 17.5 percent to 15.0 percent for the period 1 December 2008 - 31 December 2009 inclusive and reverted to 17.5 percent with effect from January 2010.

But low C-efficiency can arise from either poor implementation, poor policy design, or both. While, as in the case of Italy above, it can quickly indicate scope for improvement—in the sense of increasing revenue without raising the standard rate—in itself it gives little clue how to do it.

For this, more is needed. To this end, it is shown in Appendix A that C-inefficiency can be decomposed as

$$E^C = (1 - policy\ gap) \times (1 - compliance\ gap) \qquad (2)$$

where (formal characterization of these terms being in the appendix) the 'compliance gap' reflects the difference between actual VAT collected and that theoretically due, while the policy gap relates to aspect of design. The policy gap in (2) can in principle be further decomposed as

$$(1 - policy\ gap) = (1 - rate\ differentiation) \times (1 - exemptions) \qquad (3)$$

where the first term reflect departures from a uniformity rate structure and the second the impact of exemptions.[15]

Equations (2) and (3) in principle provide and elegant decomposition of C-efficiency that could be a powerful tool for diagnosing VAT performance. In practice, however, and perhaps surprisingly, the information required is rarely available. Table 2 assembles information from disparate sources that at least provides an illustration.

Table 2. Decomposing C-efficiency

Country	C-efficiency	Compliance gap	Policy gap	Rate differentiation	Exemptions
Austria	61	13	30	14	19
Belgium	50	12	43	19	30
Denmark	63	7	33	0	33
Finland	60	5	36	10	29
France	51	7	45	22	30
Germany	54	14	37	8	31
Greece	44	29	38	21	22
Ireland	67	4	30	28	3
Italy	41	27	44	25	26
Luxembourg	89	2	9	26	-23
Netherlands	58	6	38	17	26
Portugal	52	8	43	22	27

[15] Some VAT terminology is needed here. Under both 'exemption' and zero-rating, no VAT is charged on sales; the difference is that input tax can be recovered under zero-rating but not under exemption (sometimes referred to for this reason as 'input taxation'). Exemptions levied other than at final sale tend to increase tax revenue, since the unrecovered tax cascades into the tax paid on the further sales, so that the exemption effect in (3) may in principle be negative.

Spain	57	8	38	32	10
Sweden	55	4	43	14	34
United Kingdom	48	15	44	22	28

Sources: C-efficiency (for 2004) from Table 5.14 of European Commission (2011); Compliance gap (for 2006) from Reckon (2009); Rate differentiation from Table 5 of Mathis (2004). Incompleteness of coverage reflects gaps in the last of these.

What emerges is that the primary issue in these countries is in design, rather than implementation—which to some extent runs counter, for instance, to the emphasis often placed on issues of 'carousel'[16] and other forms of fraud and evasion in the EU. There are some cases, most notably Greece and Italy, in which noncompliance seems far higher than in peer groups, and so naturally attracts attention as an area for improvement. Elsewhere, however, it is the scope for improving the uniformity and coverage of the VAT's design that stands out.

As between the two elements of the policy gap, the significance of exemptions suggested in Table 2 is both striking and surprising. Being calculated as a residual, it seems in part to reflect estimated noncompliance that in many countries seems almost implausibly low. The calculations of the rate differentiation effect also require closer evaluation. Other estimates for the U.K. for example, suggest that the statutory rate dispersion effect is 48 percent and the exemption effect is 8 percent. It is thus the rate structure—and above all the zero-rating of food and other items, which takes almost half of consumer spending out of the VAT base—that should be the focus of attention in considering any further increase in revenue from the VAT. What is perhaps most shocking, however, is that the information needed for this kind of exercise is generally not available, even, it seems, within government,

C. Obstacles

There is then clearly a case for many advanced economies to look at the VAT for a substantial part of their consolidation needs. While significant changes have been made in Europe, these have focused largely on raising the standard rate, tending if anything to reduce C-efficiency rather than increase it.[17] And in Japan and the United States, no changes have yet been made. This section considers some of the key obstacles to these seemingly sensible reforms that the analysis above points to.

Distributional issues and rate differentiation

One obstacle common to both European circumstances and those of Japan and the U.S. is the perception that the VAT is a particularly regressive tax. This is much less true, of course, if

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[16] Explained and discussed, along with VAT noncompliance issue more generally in Keen and Smith (2009).

[17] Items have also in some cases been moved from standard to reduced rates, amplifying the departure from uniformity.

regressivity is assessed relative not to current income but to current expenditure, the latter being a better indicator of lifetime welfare to the extent that it reflects permanent income: see for instance Metcalf (1994). More fundamentally, however, it is the distributional effect of the tax-spending system as a whole, not of any individual component, that ultimately matters. And advanced economies generally have much better instruments with which to pursue their distributional objectives than differential rates of commodity taxation. The best way to help the poor and vulnerable is not by setting a low tax rate on, say, food—the largest monetary benefit from that goes to the rich, since they spend a larger absolute amount on food than the poor even though it is a lower share of their budget—but by supporting them through targeted transfers.

Take, for example, the U.K. Figure 3 shows the distributional impact of eliminating zero-and reduced rates (unifying them at 17.5 percent) but at the same time increasing a range of social benefits. The three lowest income deciles are winners from the package. Moreover, revenue—net of the increased social support costs—is increased by about £11 billion: about 14 percent of initial VAT revenue.

Figure 3: Distributional impact of a VAT reform package in the U.K.
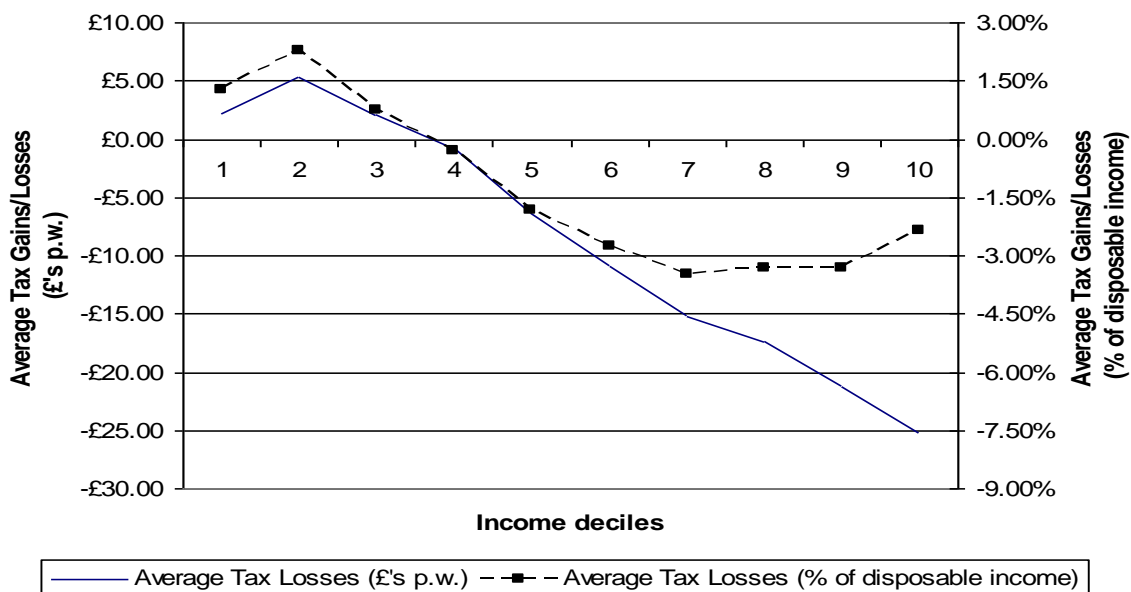
Source: Crawford et al (2001).

As in this example, dealing with the distributional implications of VAT reform may well reduce the net revenue finally available for consolidation or other purposes. In Japan too, for instance, the revenue gain for increasing the VAT rate would be reduced by automatic indexation of pension benefits. The key point, however, is that the basic concern is essentially misplaced for most advanced economies—but is deeply entrenched nonetheless.

While the reform shown in Figure 3 addresses the distributional concerns, it does raise marginal effective tax rates on earned income—reflecting the impact of the full tax-benefit

system—in the lowest deciles: tighter targeting of social support has a cost. And it does alter relative consumer prices and hence demand patterns. The question then is whether rate differentiation might have served a useful efficiency role in reconciling revenue needs with work incentives.

Broadly, a reduced rate of taxation on some commodity or activity can be justified on efficiency grounds if it is a substitute for untaxed work effort, whether in the home or marketplace.[18] Existing empirical knowledge gives little reason, however, for confident differentiation on these grounds. Food itself (eaten at home), for example, seems from results in Crawford et al. (2010) to be, if anything, a candidate for higher rather than lower taxation. An argument can be made for some reduced rates on these grounds: for child care for instance due to its complementarity to working and—an argument that has led the European Commission to a low reduced rates for a few such items—labor-intensive services. But these are minor items, and experience in the EU is that the reduced rates have done little to increase compliance or employment.[19] The presumption for uniformity under the VAT is thus strong on efficiency grounds too.

Political economy

Despite these strong counterarguments, the popular perception of the VAT as inherently regressive persists, impeding both base-broadening in Europe and rate-raising or introduction in Japan and the US, as does a willingness to use reduce rates more generally. It would be comforting to believe that resistance of this kind will be overcome by education and transparency. But these points have been well-known, to key policy makers are least, for many years and yet no real progress has been made.

Quite why resistance is so deep remains somewhat mysterious. Perhaps it is the very costliness of supporting the poor through reduced rates that makes doing so a way for politicians to signal the depth of their concern for the vulnerable. In any event, something more than enlightenment seems needed for progress to be made.

One recurrent idea is to earmark the proceeds of a reformed VAT to some valued purpose. Burman (2009), for instance, proposes earmarking the proceeds of a VAT in the US to health care costs; and in Japan it has been suggested to earmark the proceeds from an increased rate to social security spending. Earmarking is, however, unattractive in standard public financial management terms: either it genuinely constrains spending on the favored item, in which case it impedes efficient resource allocation, or it does not, in which case it is "An exercise in ….misleading taxpayers rather than expanding democracy" (IFS, 1993) These disadvantages

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[18] Crawford et al (2011) provide a summary of the theory on commodity tax differentiation and an analysis of the efficiency arguments for rate differentiation.

[19] Copenhagen Economics (2007)

may in principle be outweighed if earmarking secures approval for some tax measure that would otherwise be blocked by voters distrustful of government.[20] Empirically, however, little is known about the causes or consequences of earmarking. Simple correlations for the U.S. states—the only case, it seems, in which good data on the extent of earmarking are available—raise more questions than they answer: Panel A of Figure 4, for instance, shows that revenue is lower in states that earmark more (so that earmarking does not seem to be used to squeeze out an increase in already high revenues). And panel B shows that—contrary to the idea that "The prevalence of earmarking indicates a lack of confidence in the governmental system and the budgetary process"[21]—earmarking is actually higher where trust in the state government is higher.

Figure 4: Correlates of Earmarking in the U.S. States

A. With state revenue   **B. With 'trust'**
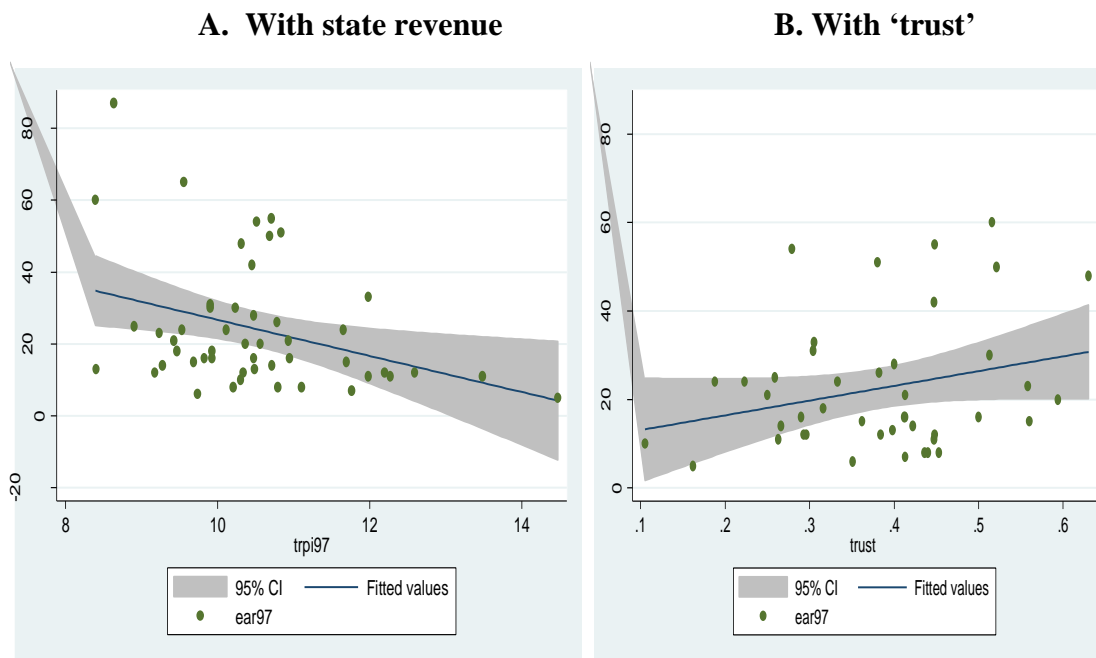
Notes: Earmarking data, for 1997, from Pérez (2008); state revenues (in percent of personal income), for 1997, from Tax Policy Center http://www.taxpolicycenter.org/taxfacts/; trust indicator from Uslaner (undated).

This is clearly an area in which understanding remains quite limited. There are certainly examples of tax systems that have become harmfully fragmented through excessive earmarking, as in Korea for instance. At a minimum, labeling may be important, as with the Domenici-Rivlin Commission calling their proposed VAT a 'Debt reduction Sales Tax.' If,

[20] Brett and Keen (2000).

[21] Goode (1984).

however, earmarking is ultimately the only way in which fundamental resistance to inherently sensible tax measures can be overcome, it may be a pragmatic price worth paying.

The most powerful force overcoming resistance to deep VAT reform, however, is likely to be dire fiscal need. In this setting, the EU specification of a maximum VAT rate—which seemed misplaced some years back, when the more evident concern was the risk of downward tax competition—has come to seem a useful commitment device for ensuring that, beyond some point, increased revenue needs will be met not by raising the standard rate but by base-broadening and improving implementation.

There is, it should be noted, a particular technical and political challenge in introducing a federal VAT in the U.S.: the interaction with existing state- and local-level sales taxes.[22] It might seem natural to convert those taxes into VATs too, but the VAT is not well-suited to implementation at lower levels in federal systems. This is because the zero-rating of exports (and bringing into tax at the border of imports) commonly relies on border controls not desired within federations.[23] It is no coincidence that several of the other prominent late-comers to the VAT—Australia and India—are both federal states. Technical solutions can be found, for instance in the form of a 'VIVAT,' under which all sales between registered businesses are taxed at a common, federation-wide rate, while lower levels add on an additional charge for sales to final consumers.[24] The massive variation in the bases and structures of current state and local sales taxes in the U.S. make this much harder said than done. Nonetheless, the main challenges are likely to be political, arising from the encroachment of the federal government in a tax area that is the traditional domain of the states.

But there is also an advantage for the U.S. to exploit. This is the possibility of avoiding mistakes others have made and of learning from intellectual advances made: perhaps the most prominent example being that the increasingly problematic exemption of financial services[25] now entrenched in the EU seems unlikely to be acceptable in the U.S. Perhaps the

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[22] Another striking feature of the political debate on VAT adoption in the US is the concern that it would prove a 'money machine.' This is explored in Keen and Lockwood (2006) who find some evidence that the VAT has indeed looked like an innovation leading to government growth, rather than a consequence of an increase in desired government size. Fiscal rules, however, seem a better way to impose aggregate constraints than foregoing the use of efficient tax instruments.

[23] These difficulties have come to the fore in the EU since the removal of internal fiscal frontiers, a prominent example being the 'carousel fraud' mentioned above; which, a thought developed furthest in Aujean (2011) the VIVAT described below could also go a long way to resolve.

[24] Keen (2001) proposes such a scheme operating across all state, McLure (2010) one operating across localities within states.

[25] Exemption results in over-taxation of business use of financial services (from unrecovered VAT on purchases by financial institutions) and under-taxation of use by final consumers (because of the exclusion of the value added by financial institutions). It is now understood how, at least in principle, how to bring financial services

most important lesson to learn, however, is again political: mistakes in VAT design, for example in providing of reduced rates on equity grounds, are extraordinarily hard to correct.

Aggregate Demand and Effects

A natural concern in raising the VAT, whether by widening the base or increasing the standard rate, is that there will be an adverse impact of on the level of activity through aggregate demand effects. Even apart from any confidence effects through an improved fiscal position, this may be overstated.

First, a pre-announcement of future VAT increases would be to expected stimulate current consumption, with the expectation of a jump in the price level leading consumers to bring forward their consumption. In effect, the expected increase in the price level tends to reduce the real return on saving, and so, though an intertemporal substitution effect, increase current consumption. There is indeed now substantial evidence of such frontloading of consumption in advance of a VAT increase. Ito and Mishkin (2006) find that before Japan increased its VAT rate in 1997 from 3 to 5 percent, consumers significantly accelerated their spending in the quarter before by about 1½ percent. In 2009, the U.K. temporarily reduced its VAT rate from 17.5 to 15 percent, before raising it to 20 percent in 2010. Crossley, Low, and Wakefield (2009) estimate that this was expected to boost consumer spending in 2009 by 1.25 percent. Also, German consumers who were anticipating a 3 percentage point VAT increase in 2007 brought forward their consumption by one year. To some extent this effect may be mitigated as firms adapt their pricing policies: Carare and Danninger (2008) show that the rise in demand in 2006 allowed German firms to increase their prices well before the actual VAT increase took place. The impression, nonetheless, is that intertemporal shifting of consumption can be significant, albeit largely confined to particular durable sectors.

Indeed some have suggested deliberately using a phased VAT increase to stimulate consumption. Feldstein (2002), in particular argued that a phased increase in the VAT accompanied by a gradual cut in the income tax—to render the increase revenue neutral—could raise demand through this intertemporal substitution effect. However, simulations results suggest that these effects is likely small and would not substantially accelerate an exit from deflation (Auerbach and Obstfeld, 2004).

Second, evidence of lasting impact on aggregate demand is limited. In Japan, for instance, resistance to a further increase in the rate of the consumption tax largely reflects perception that a previous increase in the rate, from 3 to 5 percent in 1997, contributed to falling back in to recession late that year subsequent recession. Consumption picked up only one quarter after the tax increase. Looking at the household level data, however, Cashin and Unayama

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more fully into the VAT: Crawford et al (2010) outline the issues and preferred solutions, and IMF (2009) proposes a Financial Activities Tax (on the sum of wages and profits of financial institutions) that could some way to mitigate the problems created by exemption.

(2011), find only a very modest impact on spending levels beyond the shifting noted above Other factors, notably the onset of the Asian financial crisis, seem to have played a much bigger role.

And measures can of course be taken to limit aggregate demand effects. Indeed, accompanying VAT reform with targeted protection of the poorest consumers, of the type discussed around Figure 4, will automatically be limiting the impact on those likely to have the highest marginal propensity to consume.

III. Tax Shifts to Promote employment and competitiveness

The rise in unemployment rates during the crisis has led many countries to implement 'job strategies' to reverse these developments. These often include reductions in SCR rates as well as wage subsidy schemes. For instance, the OECD *Employment Outlook 2010* reports that 12 countries expanded their job subsidy programs in 2010, while another 8 reduced their employer social contribution rates. The underlying hope, of course, is that lower labor costs will raise labor demand, reduce unemployment and, for eurozone countries facing deep structural problems, improve international competitiveness. But, in direct terms at least, cutting social contributions is revenue-losing. This raises the question of whether, without negating the hoped-for beneficial effects of an SCR cut. revenue could be preserved, or even increased, by at the same time increasing the VAT. This section explores the potential for such a reform, now often referred to as a 'fiscal devaluation.' The issue is an urgent one: fiscal devaluation has been presented as one of the few options left for European countries faced with dire fiscal, unemployment, and competitiveness problems

A. Fiscal Devaluations—In Principle

The basic argument

The idea that tax changes can, to some degree, mimic the effect of a devaluation is not new. In 1931, Keynes noted that the combination of an import tariff and an export subsidy has much the same effect, raising the domestic price of importables and reducing the foreign price of exportables.[26] But explicit taxes on trade are not needed to have this effect: discussion of the appropriate regime for commodity taxation in the European Union prompted a recognition that moving from the taxation of final goods, at a uniform rate, on an 'origin' basis—that is, according to where they are produced—to their taxation on a 'destination' basis—according to where they are consumed—is essentially equivalent to an exchange rate devaluation: such a shift brings imports into tax, and takes exports out.[27] With

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[26] Laker (1981) provides an early review of the literature on fiscal measures to replicate a nominal devaluation.

[27] Calmfors (1998) recognized long ago the potential to undertake such a reform for countries adopting the euro.

such shifts in commodity taxation ruled out by adoption of the destination base as the international norm for commodity taxation, the next device that suggests itself is to shift away from production-based taxes effectively levied on an origin basis, offsetting the revenue loss as need be by increasing broad-based destination-based taxes, the most obvious candidate for the latter role being the VAT. This is the essence of a 'fiscal devaluation'

The classic form of fiscal devaluation as it has been discussed in Europe combines a reduction in the rate of the employers' social contribution (SCR) with an increase in the VAT sufficient to at least preserve government revenue. The focus on the employers' contribution—rather than the employee's, or even personal taxes on labor income—reflects a view that the relevant rigidity comes from contracts specified in terms of payment *after* SCRs.[28] The reduction in the SCR is assumed to be fully passed on in producer prices, so that the foreign currency price of exports falls; the increased VAT has no effect on this, since—as a destination-based tax—it simply does not apply to exports. The reduced SCR also reduces the producer price of domestically produced goods sold in the home market, while leaving the producer price of competing imports unaffected; since the increased VAT applies equally to both imports and domestically produced goods, the combined effect is an increase in the relative consumer price of imported goods. Thus exports become cheaper abroad and imports more expensive at home. The effect is not precisely equivalent to an exchange rate depreciation[29]—there is no change, for instance, in the foreign currency value of assets denominated in the domestic currency—but the direct impact on the trade balance is expected to be much the same.

The effectiveness of this strategy, it should be stressed, requires rigidity in *both* the exchange rate and the nominal wage. With a flexible exchange rate, the increased demand for exports and reduced demand for imports prompted by this tax shift will cause an appreciation of the nominal exchange rate that undoes its competitiveness impact. Even if the exchange rate is fixed, a fiscal devaluation will have no real effect if—or when—domestic wages adjust, as one would expect them to do: as workers find their real wage reduced by the increased VAT rate, they (or their unions) will aim to increase their nominal wages, moving the real producer wage back towards the pre-reform equilibrium (a process that any wage indexation, of course, would accelerate). In the meantime, a fiscal devaluation would be expected to reduce unemployment and improve the trade balance, but because of this wage adjustment, with no long run impact on product or labor markets.

That the effects of a fiscal devaluation, if any, are likely to be largely temporary does not mean they must be unimportant. Temporary effects could last some time. Moreover, the case for fiscal devaluation may be especially strong when the economy, owing to nominal

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[28] If it were the net wage received by the worker that is fixed, a cut in the employee's contribution (SCE) or personal income tax (PIT) would do just as well.

[29] Fahri et al. (2011).

downward rigidities in nominal wages, is initially in marked disequilibrium, with an highly overvalued real exchange rate and extensive involuntary unemployment. A fiscal devaluation could then accelerate needed adjustments. The end result—the point to which the real exchange rate and the unemployment rate converge in the long run—may not be much affected by the fiscal devaluation but the convergence can be much faster. Quick improvement and adjustment is critical in countries where doubts may otherwise arise on the sustainability of the adjustment process under a pegged exchange rate.

This analysis may suggest a coordination problem. A fiscal devaluation could appeal to many countries; but if all or many undertake it, the impact is diminished. There may thus seem to be a risk of competitive fiscal devaluations as a form of international tax competition. There is an important difference, however, from standard results on the harm suffered, for instance, from tax competition to attract mobile capital. There damage arises from the under-taxation of a base that is much less mobile from the collective perspective than from the national: the outcome of the game, in which all countries set lower tax rates on capital than is collectively optimal, leaves them all worse off.[30] For a fiscal devaluation, however, the end-point is an increase in the rate of consumption taxation and a reduction in the taxation of labor. And that—bearing in mind for instance the results cited above on the relative growth impact of these two forms of taxation—may be an improvement in national tax policies. In this respect, the downside is limited: even an unsuccessful fiscal devaluation may lead to an improved tax structure.

All this is not to say, of course, that tax policy is the best way to address the structural problems underlying wage rigidities: it is not. The point stressed by its advocates is rather that it can perhaps provide some temporary mitigation and smooth the impact of the more fundamental reforms required.

A Closer Look

To explore further the analytics of a fiscal devaluation and guide the later empirics, this section considers the impact of a tax shift away from the employers' social contribution towards the VAT in the setting of a small, two-period open economy with a representative consumer, with features key to the argument above. Production in period t is characterized by a revenue function $R(P_t, L_t)$ defined on and homogeneous of degree one in the N-vector[31] of world prices P_t (exogenous and fixed throughout) and labor use L; For simplicity, the discount rate is assumed to be zero, so that the *2N*-vector of present value producer prices over the two periods is $P \equiv (P_1', P_2')'$. Labor supply in each period is inelastic in amount $\bar{L}$ (this being relaxed below). In period 2 there is (for simplicity) no taxation of labor, and the

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[30] This over-simplifies: some countries, particularly small ones, may benefit from tax competition of this kind.

[31] Vectors are row vectors, a prime indicating transposition. Derivatives are indicated by subscripts for functions of many variables, by a prime for functions of just one.

labor market clears. In period 1, however, there is a fixed nominal wage W and a tax T^r (thought of as the employers' social contribution) levied on top of this, with the two leaving the price of labor above the market-clearing rate $R_L(P, \bar{L})$. Employment $L_1(T^r))$ is then determined from

$$R_L(P_1, L_1) = W + T^r \tag{3.1}$$

so that (suppressing P here and elsewhere)

$$L_1'(T^r) = \frac{1}{R_{LL}} < 0 . \tag{3.2}$$

Though in practice levied in ad valorem form, it is convenient to characterize the VAT as a vector of specific taxes, $T^v \equiv \left(T_1^{v'}, T_2^{v'}\right)'$. Consumer prices,[32] assumed fully flexible to changes in VAT rates, are then $Q = P + T^v$. Preferences are characterized by an expenditure function $E(Q, U)$, U denoting utility; compensated demands are thus $E_Q(Q, U)$.

Revenue from the employers' contribution and VAT is assumed to be returned to the consumer as a lump sum.[33] Since these are not the only taxes levied in practice, for structuring the empirics it is useful to allow for another tax instrument, the simplest way being to suppose that a lump sum in amount $(1 + \lambda)A_t$ is levied but returned to the consumer only in amount A_t, with $\lambda \geq 0$ an ad hoc characterization of some associated inefficiency. With perfect capital markets, the consumer's budget constraint thus implies

$$E(P + T^v, U) = R(\bar{L}) + R\big(L_1(T_r)\big) + T^{v'} E_Q(P + T^v, U) - \lambda A \tag{3.3}$$

where $A \equiv A_1 + A_2$. The value at world prices of net exports in period 1[34] is given (recalling that outputs are given by the price derivatives of the revenue function) by

$$N = P_1' \left(R_p(L_1(T_r) - E_{Q_1}(Q, U) \right) . \tag{3.4}$$

The question of interest is thus how N is affected by a shift from T_r to T_v.

For this, it is shown in Appendix B that, for arbitrary small changes in the available tax instruments,

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[32] With the fixed nominal wage, there is no need for an additional normalization of consumer prices.

[33] Having revenues instead finance the provision of some good that enters preferences adds only complexities through an additional dimension of demand responses.

[34] No assumption is made on the sign of net exports in period 1. Used in (3.3), linear homogeneity of the expenditure and revenue functions implies that trade is balanced over the two periods (aside from the λ term, since this is pure waste.

$$dN = \beta_r dT_r + \beta_v' dT^v + \beta_A dA \tag{3.5}$$

where

$$\beta_r \equiv -\Omega \left(1 - \frac{P_1' E_{Q_1 U}}{P' E_{QU}} \right) L_1 \tag{3.6}$$

$$\beta_v' \equiv -P_1' E_{Q_1 Q} + (P_2' E_{Q_2 Q} + P_1' E_{Q_1 Q}) \left(\frac{P_1' E_{Q_1 U}}{P' E_{QU}} \right) \tag{3.7}$$

$$\beta_A \equiv \lambda \left(\frac{P_1' E_{Q_1 U}}{P' E_{QU}} \right) > 0 \tag{3.8}$$

and $\Omega \equiv -R_L / (L R_{LL}) > 0$ denotes the elasticity of labor demand.

To interpret the effects in (3.6)-(3.8), it is helpful to begin with the effect of an increase in the un-modeled 'other' tax A. The distortionary impact of this lowers lifetime consumer welfare by λ, leading to reduced demand and so tending to increase net exports; how much of this reduced demand occurs in period 1, however—and so increases the value of net exports then—depends on the proportion of that reduced expenditure which occurs in period 1, given by $P_1' E_{Q_1 U} / P' E_{QU}$; loosely, the improvement in period 1 net exports is greater the larger is the marginal propensity to consume in that period.

Turning to β_r, an increase in the employers' contribution tends to reduce period 1 net exports, and, as one would expect, by a larger amount the more elastic is the demand for labor. The effect is smaller, however, the greater is the marginal propensity to consume in period 1; this is because the distortionary effect of such an increase leads to a reduction in welfare that triggers demand effects of the kind just described, tending to increase net exports. Under the very weak assumption that the marginal propensity to consume in period 2 is strictly positive, however, the direct effect through the demand for labor dominates, so that $\beta_r < 0$: a higher employers' contribution unambiguously reduces net exports in period 1.

Equation (3.7) shows that an arbitrary change in the *2N*-vector of VAT rates T^v affects net exports in two ways. The first is the direct impact on period 1 demand, which, through the $(N \times 2N)$-matrix $E_{Q_1 Q}$, reflects not only within-period effects from changes in period 1 prices (though $E_{Q_1 Q_1}$) but also substitution effects from the change in period 2 prices (though $E_{Q_1 Q_2}$). The second channel is an impact on first period demand, again reflecting relative marginal propensities to consume, of the welfare loss from the distortions induced by the change in T^v. Unsurprisingly, the impact of a change dT^v in the VAT structure thus depends on the details of that change and on the structure of demand responses. Raising the tax on items with highly elastic compensated demand, for instance, will do more to reduce net exports than doing so on those in inelastic demand; and intertemporal substitution effects will

come into play when consumer prices are raised by differing proportionate amounts in the two periods.

There is, however, one special case in which the effect of a VAT reform is unambiguous. This is that in which $dT^v = \mu Q$, for some scalar μ; that is, in which the effect is to increase all consumer prices by the same proportion. Since linear homogeneity of the expenditure function implies that $E_{Q_tQ}Q = 0$, in this case $\beta'_v dT^v = 0$; there is then no effect on net exports, the reason being that such a tax change is equivalent to a lump sum tax. And the most obvious case in which a VAT reform cause an equi-proportionate increase in all consumer prices is when it is levied at a uniform (tax-exclusive) rate, τ, in both periods, so that $dT^v = Q(d\tau/(1 + \tau))$. This result—that increasing the rate of a VAT applied to all commodities has no impact on net exports—is elegant, its practical relevance is open to doubt: as seen in Table 1 of Section B above, most VATs are from being levied at a uniform rate.

What then of a fiscal devaluation, in the sense of a reduction in T^r combined with a change in T^v that maintains revenue unchanged? No general results appear to be available, in that while the cut in the employers' contribution increases net exports, simply imposing on dT^v the further requirement of maintaining overall revenue does not remove the dependence on the complexities of design and demand responses just discussed. In the special case of a uniform VAT (or more generally a reform that raises all consumer prices by the same proportion), however, the ambiguity vanishes, since then $dN = \beta_r dT_r > 0$: only the effect of the cut in the employer's contribution remains, and a fiscal devaluation—indeed any shift towards the VAT, even if not revenue-neutral—increases period 1 net exports. It is also, as shown in Appendix B, welfare-improving.

This analysis is greatly simplified, it should be noted, by the assumption of inelastic labor supply: this means that the labor supply effects have no impact on employment not only in period 1, when this is demand-determined, but in period 2 as well. Appendix D explores the consequences of allowing for such labor supply responses. The implication, broadly speaking, is that additional negative effects emerge from increases in both the SCR and the VAT: each tends to lead to an increase in real wages and hence in employment. While these too will vanish to the extent that the combined effect of a cut in the former and increase in the latter is to leave the real wage unchanged, the implication is that, as labor market conditions adjust, when considered in isolation not only the SCR but now also the VAT might be expected to have some negative impact on net exports.

Other considerations

There are other important features of reality ignored in the model. Some affect the purposive design of tax shifts, and these are taken up in subsection C below; others impact the positive analysis of tax changes that may be reflected in the empirics.

Prominent amongst the latter is the neglect of non-tradables. Feldstein and Krugman (1990) argue, for instance, that tradables are generally taxed more heavily under the VAT than are non-tradables; and indeed nine EU Member States currently make use of special provisions enabling the application of reduced rates to specified non-tradable labor–intensive services. In these circumstances, a higher standard VAT rate will reduce the relative consumer price of non-tradables, encouraging substitution out of tradables.[35] This is not the only possibility, however. In some cases, reduced VAT rates apply to tradables, such as zero-rated food in the U.K. The net direction of the impact of an increase in the VAT rate on net exports is then unclear.

The presence of non-tradables also complicates the impact of the SCR cut. If, as could plausibly be the case, these are relatively labor-intensive in production, then the reduction in the SCR tends to differentially promote their production. This then limits the tendency for an improved trade balance. In this connection, a concern in for instance Greece is that the large non-tradable sector—which is highly regulated and dominated by state-owned enterprises and (semi-)government organizations—seems to have dictated excessive wage growth in the tradable sector. Export firms competing for the same workers on the domestic labor market had to raise wages more than was justified by productivity increases, which has caused deterioration in competitiveness. It runs counter to the Balassa-Samuelson effect, which suggests that productivity in the tradable sector will dictate wages in the non-tradable sector. It points to a key imbalance that needs to be restored, preferably by cutting wage costs in the exposed sectors of the economy.

More generally, just as the VAT has been seen in section II to be far more complex than a single rate applied to all consumption, so the structure of employer's social contribution is often more complex than can be described, as the theory above presumes, by a single parameter. There may be an upper limit on contributions, for instance, and, still more fundamentally, to the extent that payment is requited by the expectation of future benefits, the incentive effects of social contributions may be quite different from those of a tax on labor (Disney, 2004).

B.   Tax Effects on Net Exports--Empirics

There is, as noted above, substantial evidence that reductions in labor taxation can increase employment. But there is almost no empirical evidence bearing on the likely trade impact of a fiscal devaluation, or on trade impacts of tax reforms more generally. Poterba et al. (1986) explore how the mix between taxes on producers and consumers affects prices and wages, thus testing for the presence of nominal rigidities. They find these rigidities to be important, suggesting that those underlying the case for a fiscal devaluation may indeed be—or at least were—present. They do not, however, look at the trade effects of the tax mix. Keen and Syed

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[35] To the extent that non-tradables tend to be labor-intensive services, this will amplify the effect through the lower SCR.

(2006) explore the impact of corporate taxes and the VAT on net exports, finding that the structure between the two matters significantly for the trade balance in the short run. But they do not include social contributions in their analysis. Franco (2011) estimates a number of VAR equations with Portuguese data and then simulates the impact of an SCR reduction and an offsetting increase in the VAT on both exports and imports. The analysis here is similar, but focuses on the full set of OECD countries and a wider range of tax instruments.

Methodology

The aim in what follows is to look to the data for signs of whether tax changes appears to affect net exports in ways consistent with the rationale offered for fiscal devaluations, as set out above.

Allowing for the potentially complex dynamics the analysis above suggests regressions of the single equation error correction form:

$$\Delta N_{it} = \lambda N_{i,t-1} + \beta_{Dr}\Delta SCR_{it} + \beta_{Dv}\Delta VAT_{it} + \beta_{Lr}SCR_{it-1} + \beta_{Dv}VAT_{it-1}$$
$$+\beta'_{DX}\Delta X_{i,t} + \beta'_{LX}X_{i,t-1} + \alpha_i + u_{it} \qquad (3.9)$$

where i and t index respectively countries and time, N denotes net exports. SCR indicates the employer's social contributions and VAT the value added tax (both variously measured, as described below); A is the revenue from other taxes and B the government balance. The two tax variables enter in differenced and lagged form, and the same holds for the controls in X (which includes A and B). This structure allows for a rich dynamic pattern of responses to tax changes, with a structural long-term relationship captured by the lagged values and short-term adjustments measured by the differenced variables. The contemporaneous impact of an increase in some tax variable k is given by the coefficient on the difference, β_{Dk}. If $\lambda = 0$, this short run impact is permanent, and exactly equal to the long run effect; otherwise the long run impact is given by $\beta_{Lk}/-\lambda$. [36] Results are reported with and without time effects; the latter perform somewhat more satisfactorily, with the growth variable perhaps containing more information.

The arguments above give reason to expect both β_{Dr} and β_{Lr} to be negative; the immediate impact of a VAT increase β_{Dv}, could be small or zero, while the longer term impact β_{Lv} reflecting the unwinding of effects in the labor market, is expected to be negative. They also imply that β_A be positive but perhaps small. While the model above allows no role for B, it is included in the empirics to allow for non-Ricardian effects. Empirical studies generally report a positive effect of the government balance on the current account (see for example

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[36] The real exchange rate is not included in the regressions, since this is the route through which tax changes are expected, at least in part, to take effect. Moreover, tax changes may also have indirect effects on net exports by affecting future values (endogenous but predetermined) variables in X: they might induce a reduction in growth, for instance, that leads, indirectly, to a future effect on net exports. These are not captured here.

IMF, 2011, chapter 4). Including the government balance means that the coefficients on the tax terms are to be interpreted as identifying effects conditional on other measures to maintain the government balance unchanged. Included among the possible controls *X* are those that have become fairly standard in the international trade literature,[37] such as the dependency ratio (*DEP*, the population over 65 relative to that between 15 and 65), and the growth rate of GDP (*GROWTH*).

Recognizing that responses may well differ according to the exchange rate regime, (3.9) is estimated separately for subsamples classified by fixity of the exchange rate. For the most part, given the particular interest in fiscal devaluation in troubled eurozone countries, we split between country-years of eurozone membership and its complement; but we also report some results recognizing diversity of exchange rate regimes in non-eurozone observations.

The dataset, described in Appendix D, is an unbalanced panel of 30 OECD countries between 1965 and 2009. For the net export series, the Im-Pesaran-Shin statistic suggests that not all countries have a unit root. Looking at the individual time series, a unit root cannot be rejected for 18 countries, especially those currently in the euro zone; for non-euro countries, however, the unit root is typically rejected. This is as one might expect: net exports adjust more slowly when the exchange rate cannot move. It suggests too that wages are not flexible enough to offset this effect, providing tentative indication of scope for a fiscal devaluation to have some effect.

We explore three alternative measures of the tax variables, *SCR* and *VAT*. The first is the raw data on the shares of their respective revenues in GDP. This has two significant advantages. The first is that the revenue raised by some tax instrument is a summary indicator of the whole range of complex features of its rate and base. The second is that the impact on net exports of a shift between revenue sources that leaves total revenue unchanged can be seen easily by combining coefficients. The short run impact of reducing the employers' social contribution by one percent of GDP and recovering the revenue from increasing the VAT, for instance, is simply the difference in the coefficients on the changes in tax revenues from these sources:

$$\theta_S = \beta_{D,VAT} - \beta_{D,SCR}, \tag{3.10}$$

while the long run effect comes from the lagged terms:

$$\theta_L = -\left(\frac{\beta_{L,SCR} - \beta_{L,VAT}}{\lambda}\right) \tag{3.11}$$

The difficulty with this approach, however, is that tax-to-GDP ratios may be correlated with the error term *u*, leading to biased and inconsistent estimators: shocks that cause export

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[37] See for example Chin and Prasad (2003), Gruber and Kamin (2007) and Lee et al. (2008).

demand to fall, for instance, might also result in lower social contributions as employment falls. The inclusion of GDP growth as a control should to some degree mitigate biases from this source. So too should estimation by the system GMM method of Arellano and Bover (1995) and Blundell and Bond (1998), which uses a system of both the first-differenced equation and the model in levels to estimate (3.9). The standard rate of VAT and the marginal SCR rate are used as external instruments in these regressions.

The second approach is to use cyclically adjusted revenue data, reported in the OECD *Economic Outlook*, instead of actual revenue data. By filtering revenues for cyclical effects, this corrects for one important source of endogeneity in the independent variable. It does not entirely remove the possibility of endogeneity, however, since policy responses that affect the cyclical balance may be made in light of expected developments in net exports. For this reason, as well as for comparability and to avoid inconsistency arising from correlation of the lagged dependent variable with the fixed effects, [38] we continue to use the system GMM estimator.

The third approach is to use tax rates, rather than revenues. While this may be the best way to avoid endogeneity, it is open to the same difficulty as in the preceding paragraph. Moreover, rates do not capture changes in the base of either the VAT or the SCR, or in other than the standard rates at which they are charged, that might be expected to have effects similar to those set out in the model above. In this case the impact of a shift between revenue sources on net exports cannot be read directly from the regressions; instead, assumptions must be made on the expected revenue from changes in tax rates and impacts inferred from combinations of rate changes that would be expected to be revenue-neutral.

Results

Table 3 report estimates of (3.9), using the raw revenue data, for non-euro and euro observations in turn. Columns (1) and (3) exclude year dummies; columns (2) and (4) add them to control for common shocks. The Sargan test for over-identification and Arellano-Bond statistic for second order serial correlation are more encouraging for the euro observations than for the non-euro. In all cases—a feature that recurs in later results too—and despite efforts to minimize the number of instruments the very high Hansen statistic points to weak instruments, and potential finite sample bias (toward the least squares results). This is likely a lesser concern with the alternative revenue measures, in so far as these seem less prone to endogeneity issues.

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[38] This though may not be too great a concern given the fairly long time dimension.

Table 3. Taxation and net exports using revenue-to-GDP data[1]

	Non-Euro		Euro	
	(1)	**(2)**	**(3)**	**(4)**
L.Netexports	0.32*	-0.36**	-0.12**	-0.07
	(0.17)	(0.16)	(0.06)	(0.05)
ΔSCR	-1.81	-0.76	-3.01**	-4.35**
	(1.23)	(1.09)	(1.48)	(1.87)
L.SCR	0.10	0.22	0.26***	-0.24***
	(0.15)	(0.18)	(0.07)	(0.05)
ΔVAT	0.10	0.37	-1.00	-0.99
	(0.99)	(0.82)	(0.91)	(0.72)
L.VAT	-0.19	-0.30	-0.41***	-0.24**
	(0.27)	(0.29)	(0.11)	(0.10)
ΔDEP	-0.35	-0.59	0.52	0.48*
	(0.55)	(0.57)	(0.41)	(0.28)
L. DEP	-0.05	-0.00	-0.10	-0.06
	(0.07)	(0.09)	(0.07)	(0.05)
ΔGROWTH	-0.10	0.01	-0.28**	-0.13
	(0.10)	(0.29)	(0.13)	(0.15)
L.GROWTH	-0.03	0.10	-0.26***	-0.11
	(0.12)	(0.23)	(0.08)	(0.08)
Δ.A	0.49	0.508	-0.32	-0.20
	(0.44)	0.44)	(0.41)	(0.31)
L.A	0.19*	0.17	0.09**	0.05
	(0.11)	(0.11)	(0.04)	(0.04)
ΔBAL	0.24	0.20	0.27	0.26
	(0.19)	(0.17)	(0.21)	(0.18)
L.BAL	0.19	0.24*	0.11	0.049
	(0.12)	(0.12)	(0.10)	(0.09)
No. of obs	232	232	94	94
Year effects	No	Yes	No	y
AB AR(1)	0.01	0.01	0.02	0.01
AB AR(2)	0.09	0.05	0.76	0.23
Sargan	0.05	0.00	0.14	0.06
Hansen	0.99	1.00	1.00	1.00
Short-run	1.91	1.13	2.01	3.25
	(1.52)	(1.15)	(2.07)	(2.40)
Long-run	-0.92	1.13	-1.21	-0.07
	(1.17)	(1.15)	(1.38)	(1.49)
F-test	0.33	0.61	0.01	0.00

[1] Single equation error correction model, controlled for country fixed effects. Estimation is by one step robust system GMM, including fixed effects. Treating lagged and tax-rate variables as predetermined and with tax rates as external instruments. Laglimits (2,3) and instruments collapsed. *, **, *** reflecting statistical significance at 10, 5, and 1 percent. F test reports the p-value for F statistic on the null hypothesis that the coefficients on both *ΔSCR* and *ΔVAT* are zero.

The results for the two subsamples are strikingly different. For the non-eurozone observations, no significant effects emerge for tax variables, either in change or lagged; and the F-test does not reject the null that both coefficients on the tax changes are zero. Given the poor diagnostics for this subsample, the impression is simply that the model does not work well for these observations. For the euro countries,[39] in contrast, both the change in and the lags of the SCR variable show a significant negative effect on net exports, consistent with the theory. And the effects are quite large: a reduction in the share of GDP taken in the employers' social contribution—offset by other (non-VAT) measures to keep the government balance unchanged—increases net exports, in the short-term, by 3 to 4 percent of GDP. The differenced VAT variable has a negative impact in the euro subsample, but this effect is far from significant; reminiscent of the theoretical implication of no short run impact of an increase in the VAT if applied uniformly to all commodities. An increase in VAT revenues does, however, reduce net exports significantly in the following period—which is again as the theory would suggest if such an increase generates a subsequent increase in the money wage as labor supply and negotiating conditions adapt to the consequent increase in consumer prices. For the euro countries, the F-test rejects the null that both coefficients are zero.

The difference in coefficients for ΔSCR and ΔVAT suggests that a fiscal devaluation in euro countries would indeed increase net exports. As reported in the θ_S, at the bottom of the table, the point estimate is that a shift of one percent of GDP from SCR to VAT would increase net exports by 2 to 3 percent of GDP. The effects is not statistically significant, however, reflecting in part the large standard error on $\beta_{D,v}$. For non-euro observations, the point estimates suggest a smaller effect, somewhere between 1 and 2 percent. Again, this effect is not significant. The long run impact of a fiscal devaluation, θ_L, is small and insignificant for both euro and non-euro observations—consistent with the prediction that any effect is likely to be temporary.

More generally, the eurozone results point to a fairly complex time profile of effects. Using point estimates from column (4) of Table 3, for instance, Figure 5 shows how the change in net exports evolves over time, for a reduction in SCR alone of one percent of GDP, a higher VAT alone also of one percent of GDP and a combination of the two. The boost in net exports due to a lower SCR rate drops from an initial 4.4 percent to around 3.5 percent of GDP in the long run. The contraction of net exports due to the higher VAT rate increases much faster, from 1 percent of GDP to 3.5 percent in the long run. As a result, and reflecting the small coefficient on the lagged dependent variable, while the net long-run effect of a fiscal devaluation is close to zero, positive trade effects persist for a long time.

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[39] For brevity we speak here and below as if the sample were partitioned by country; current Eurozone members, however, are of course in the 'non-euro' subsample prior to their entry.

Figure 5. Effect of fiscal devaluation over time
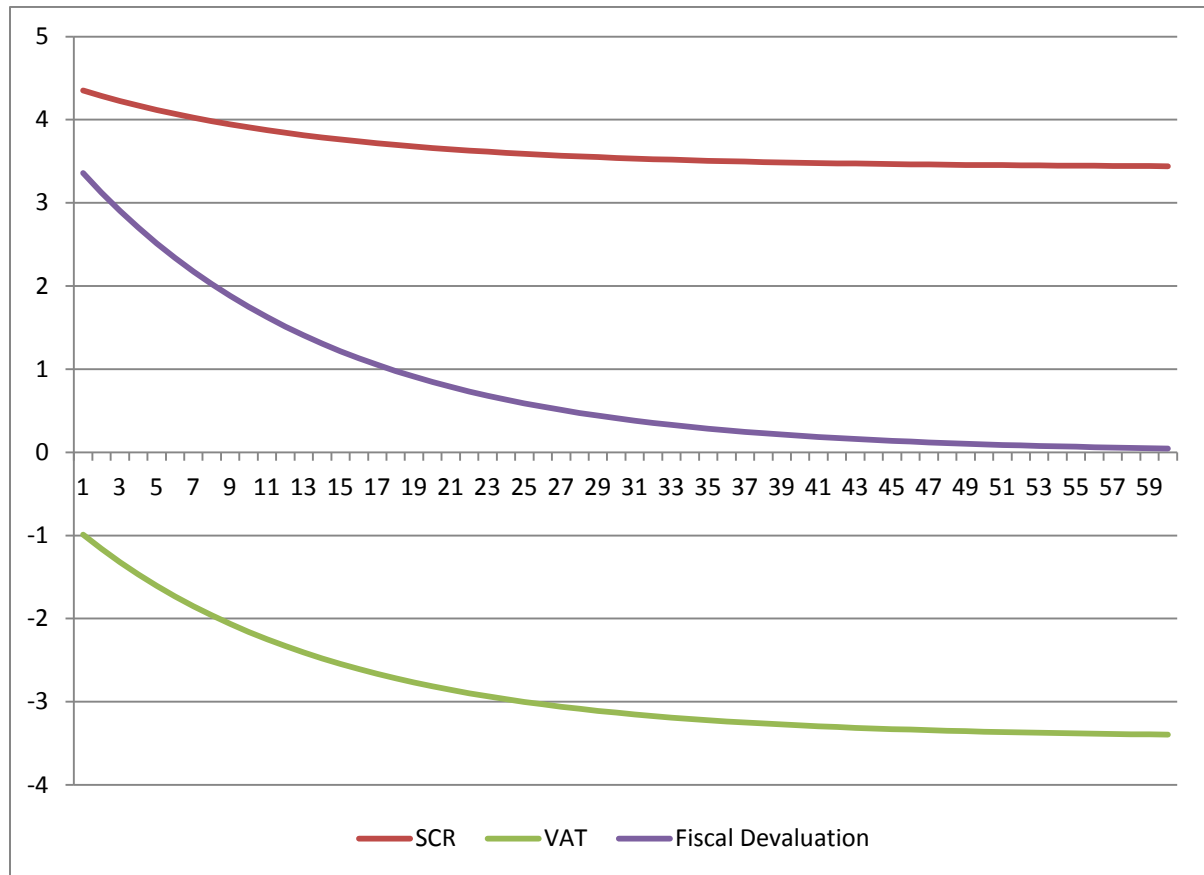
Control variables contribute little to the regressions in Table 3. One might expect a higher dependency ratio to be associated with lower net exports as a result of net dissaving by the elderly. For the most part the coefficient is indeed negative, but insignificant. Perhaps more surprising is that GDP growth is in most cases insignificant. Revenue from sources other than the SCR and VAT is insignificant in changes, but in some cases enters positively in lag—broadly consistent with the prediction above of a lasting positive effect to the extent that these other sources are distortionary. Perhaps surprisingly, but consistent with the simple model above, the government balance generally has no significant impact.

Table 4 reports results using the cyclically adjusted revenue data. For non-euro countries, the diagnostics are more reassuring—and the tax variables remain insignificant. For the euro countries, the coefficient for the change in the SCR variable is of broadly the same magnitude as when using unadjusted revenues, but becomes only marginally significant in the absence of time effect (while the Sargan test is failed in their presence); and the lagged SCR becomes insignificant. For the VAT, the only significant effect is again for the eurozone countries, and only in lag. Point estimates of the short and long-run impacts of a pure fiscal

Table 4. Taxation and net exports using cyclically adjusted revenue-to-GDP data/1

	Non-Euro		Euro	
	(1)	**(2)**	**(3)**	**(4)**
L. Net exports	-0.21**	-0.12	-0.03	-0.08*
	(0.106)	(0.09)	(0.05)	(0.04)
ΔSCR	-2.52	-2.48*	-2.81*	-3.59***
	(1.62)	(1.30)	(1.64)	(1.34)
L.SCR	-0.07	-0.06	-0.06	-0.10
	(0.11)	(0.14)	(0.07)	(0.06)
ΔVAT	0.10	0.71	-0.78	-0.79
	(0.96)	(1.34)	(0.88)	(0.88)
L.VAT	0.02	0.07	-0.45***	-0.42***
	(0.21)	(0.24)	(0.09)	(0.08)
ΔDEP	-0.38	-0.59	0.23	0.34
	(0.69)	(0.71)	(0.45)	(0.36)
L.DEP	-0.12	-0.18	--.07	-0.12
	(0.09)	(0.13)	(0.07)	(0.07)
ΔA	0.49	0.21	-0.49	-0.47*
	(0.77)	(0.88)	(0.36)	(0.28)
L.A	0.21	0.09	0.11***	0.12**
	(0.16)	(0.20)	(0.03)	(0.05)
ΔGROWTH	-0.13	-0.59	-0.06	-0.09
	(0.13)	(0.46)	(0.12)	(0.15)
L. GROWTH	-0.11	-0.54	-0.03	-0.03
	(0.14)	(0.49)	(0.06)	(0.08)
ΔBAL	0.00	-0.12	0.11	0.24
	(0.35)	(0.44)	(0.28)	(0.19)
L.BAL	-0.08	-0.08	-0.25***	-0.15
	(0.10)	(0.14)	(0.10)	(0.11)
No. of obs.	265	265	94	94
Year fe	N	y	N	Y
AB AR(1)	0.03	0.07	0.01	0.01
ArB AR(2)	0.33	0.46	0.97	0.18
Sargan	0.44	0.51	0.16	0.02
Hansen	0.91	1.00	1.00	1.00
Short-run	2.62	3.19*	2.03	2.81
	(1.83)	(1.68)	(2.34)	(1.97)
Long-run	1.39	1.05	-11.26	-4.13
	(1.21)	(3.33)	(16.67)	(3.09)
F-test	0.29	0.11	0.00	0.00

1/ Single equation error correction model, controlled for country fixed effects. Estimation is by one step robust system GMM, including fixed effects. Treating lagged and tax-rate variables as predetermined and with tax rates as external instruments. Laglimits (2,3) and instruments collapsed. *, **, *** reflecting statistical significance at 10, 5 and 1 percent. F test reports the p-value for F statistic on the null hypothesis that the coefficients on both *ΔSCR* and *ΔVAT* are zero.

devaluation—the latter now being negative for the euro countries—remain largely insignificant.

Table 5 reports results again using cyclically adjusted data but now partitioning not between eurozone and other countries but by the classification of exchange rate regimes in Ilzetzki, Reinhart and Rogoff (2008). The distinction between the two subsamples is again striking, and largely broadly consistent with the theory above: no tax effects in the 'flexible' exchange rate regime cases; in the fizxed exchange rate cases, a strongly negative effect from the change in the SCR, and no effects from the VAT. Fiscal devaluation has a significantly positive (and quite large) impact in the fixed exchange rate regimes, but none with a flexible exchange rate.

Table 5: **Results for an Alternative Exchange Rate Regime Classification /1**

	All observations	Flexible ER regimes	Fixed ER regimes
	(1)	(2)	(3)
L.Netexports	-0.146	-0.192*	-0.206
	(0.096)	(0.110)	(0.170)
Δ.SCR	-3.628***	-0.043	-3.759**
	(1.228)	(0.900)	(1.915)
L.SCR	-0.064	-0.034	-0.018
	(0.097)	(0.153)	(0.118)
Δ.VAT	0.213	0.432	0.399
	(0.907)	(1.131)	(0.959)
L.VAT	-0.021	0.297	0.044
	(0.183)	(0.229)	(0.288)
Δ.DEP	-43.653	5.520	-57.143
	(59.290)	(76.795)	(70.332)
L.DEP	-16.696	-12.768	-19.917
	(11.843)	(10.911)	(14.558)
Δ.GROWTH	-0.336	-0.394	0.075
	(0.398)	(0.334)	(0.541)
L.GROWTH	-0.248	-0.814**	0.087
	(0.385)	(0.326)	(0.521)
Δ.A	0.290	0.162	0.501
	(0.673)	(0.577)	(0.711)
L.A	0.165	0.014	0.257
	(0.168)	(0.173)	(0.261
Δ.BAL	-0.069	-0.234	0.113
	(0.334)	(0.304)	(0.444)
L.BAL	-0.079	-0.143	-0.009
	(0.115)	(0.167)	(0.168)
Number of observations	369	129	320
AR(1)	0.050	0.070	0.060
AR(2)	0.450	0.150	0.320
Sargan	0.2	0	0.21
Hansen	1	1	1

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Short run	3.84**	0.47	4.16*
	(1.84)	(1.05)	(2.54)
Long run	0.29	1.73	0.30
	(1.66)	(1.42)	(1.88)
F-test	0.05	0.9	0.11

1/ Single equation error correction model, controlled for country fixed effects. Estimation is by one step robust system GMM, including fixed effects. Treating lagged and tax-rate variables as predetermined and with tax rates as external instruments. Laglimits (2,3) and instruments collapsed. *, **, *** reflecting statistical significance at 10, 5 and 1 percent. F test reports the p-value for F statistic on the null hypothesis that the coefficients on both ΔSCR and ΔVAT are zero. Exchange rate regimes are classified on the basis of Ilzetzki et al., 2008 on a scale of 1 to 5, moving from fixed to flexible. In particular: 1 = currency board or pre-announced crawling peg; 2 = crawling pegs or bands narrower than 2 percent; 3= managed floating or crawling/moving band narrower than 2 percent; 4 = freely floating; 5 if freely falling. In column (2) flexible ER refers to data with category 3, 4 and 5 and column (3) fixed ER refers to categories 1, 2 and 3.

Again reverting to the split between eurozone and other countries, Table 6 shows the results using tax rates, rather than revenue ratios.[40] All tax effects are insignificant except for a negative impact of the lagged SCR for the eurozone observations and of the VAT change for non-euro cases in the presence of time effects. The former is as theory predicts; the latter is more surprising, but its importance is diminished by the very poor Sargan statistic.

Table 6. Taxation and net exports using tax rate data /1

	Non-Euro		Euro	
	(1)	**(2)**	**(3)**	**(4)**
L.Netexports	-0.32**	-0.30*	-0.20**	-0.23
	(0.14)	(0.16)	(0.10)	(0.24)
ΔSCR	-0.12	-0.08	-0.15	-0.11
	(0.07)	(0.14)	(0.47)	(0.67)
L.SCR	0.04	0.00	-0.08**	-0.09
	(0.04)	(0.05)	(0.04)	(0.07)
ΔVAT	-0.16***	-0.09	0.31	0.28
	(0.06)	(0.09)	(0.27)	(0.17)
L.VAT	-0.06	0.03	-0.13	-0.14
	(0.07)	(0.12)	(0.11)	(0.12)
ΔDEP	-14.46	-51.63	14.87	5.78
	(42.77)	(66.56)	(38.61)	(47.55)
L.DEP	0.80	28.20	-5.50	-11.1
	(9.15)	(42.08)	(14.97)	(15.53)
ΔGROWTH	0.02		0.22	
	(0.42)		(0.36)	
L.GROWTH	0.04		0.28	
	(0.32)		(0.33)	
ΔA	0.36	1.21	-0.12	-0.25
	(0.38)	(1.08)	(0.45)	(0.81)

[40] We have also explored the average tax wedge (including SCR and employee social contributions as well as personal income tax, evaluated at 67 percent of the average wage) instead of the SCR rate. This variable consistently shows a significant positive coefficient, contrary to the theory. However, the inclusion of employee contributions and PIT makes this variable less suitable for regressions on fiscal devaluation.

L.A	0.14	-0.22	0.29**	0.31
	(0.11)	(0.40)	(0.13)	(0.29)
ΔB	0.45*	0.31	-0.20	-0.14
	(0.26)	(0.47)	(0.25)	(0.20)
L.B	0.27**	0.28	-0.10	-0.07
	(0.13)	(0.21)	(0.23)	(0.19)
No. of obs	232	232	94	94
Year fe	y	n	y	n
AB AR(1)	0.01	0.04	0.01	0.04
AB AR(2)	0.06	0.54	0.40	0.31
Sargan	0.00	0.13	0.09	0.65
Hansen	1.00	0.25	1.00	0.99
Fiscal Devaluation	-0.07	-0.01	1.22	1.04

1/ Single equation error correction model, controlled for country fixed effects. Estimation is by one step robust system GMM, including fixed effects. Treating lagged and tax-rate variables as predetermined and no external instruments. Laglimits (2,3) and instruments collapsed. *, **, *** reflecting statistical significance at 10, 5 and 1 percent. F test reports the p-value for F statistic on the null hypothesis that the coefficients on both *ΔSCR* and *ΔVAT* are zero.

The final row of Table 6 reports estimates of the impact of a revenue-neutral fiscal devaluation of one percent of GDP, computed by combining the coefficient point estimates with information on tax bases. The implied VAT base[41] in non-euro countries is around 38 percent of GDP, and the implied SCR base around 35 percent. A shift from SCR to VAT by 1 percent of GDP would therefore require a 2.6 percent higher VAT rate and a 2.9 percent lower SCR rate. On balance, this implies a negligible effect on net exports for the non-euro cases. For euro observations, the implied VAT base is 37 percent, while the SCR base is 38 percent. So a VAT increase of 2.7 percent and an SCR reduction of 2.6 percent would be revenue neutral. Given the point estimates in columns (3) and (4), a fiscal devaluation would then imply a short-run increase in net exports of about 1 percent of GDP.

Finally, Table 7 (again using cyclically adjusted data) reports results for a wider range of tax variables, including, in addition to *SCR* and *VAT*, the personal income tax (*PIT*), employee's social contribution (*SCE*) and the corporate income tax (*CIT*). Strong negative effects from *SCR*, both change and lag, again emerge, as does an absence of effects from the VAT. Increases in *PIT* also have an adverse effect on net exports, but less marked than those for *SCR*; similarly for the *SCE*; and *CIT* has no discernible impact. The implication is that cutting the SCR is indeed the surest tax measure for increasing net exports.

Table 7: Taxation and net exports with a wider range of tax instruments[1]

	All countries	Euro zone
	(1)	(2)
L.Netexports	-0.153	-0.085**
	(0.106)	(0.042)

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[41] Meaning VAT revenue in percent of GDP divided by the standard rate; and for the SCR, revenue by the SCR rate.

D.PIT	-0.724	-1.085**
	(0.590)	(0.520)
L.PIT	0.042	0.042
	(0.073)	(0.116)
D.CIT	1.201	-0.563
	(0.951)	(0.472)
L.CIT	0.198	-0.045
	(0.183)	(0.211)
D.SCE	1.060	-1.521*
	(1.521)	(0.924)
L.SCE	0.159*	0.004
	(0.096)	(0.115)
D.SCR	-1.662	-2.781**
	(1.063)	(1.205)
L.SCR	-0.069	-0.253***
	(0.098)	(0.068)
D.VAT	1.014	-0.783
	(1.049)	(0.710)
L.VAT	0.157	-0.044
	(0.176)	(0.167)
D.DEP	-33.030	3.026
	(44.638)	(28.601)
L.DEP	-8.750*	5.044
	(5.103)	(4.268)
D.B	0.066	0.081
	(0.186)	(0.225)
L.B	0.021	-0.152
	(0.063)	(0.149)
D.GROWTH	-0.060	0.015
	(0.120)	(0.091)
L.GROWTH	-0.131	0.061
	(0.118)	(0.077)
Number of observations	306	75
AR(1)	0.070	0.030
AR(2)	0.200	0.350
Sargan	0.48	0.28
Hansen	1	1
Short run	2.67	1.99
	(1.75)	(1.26)
Long run	1.48	2.45
	(1.05)	(2.50)
F-test	0.27	0.06

[1] Single equation error correction model, controlled for country fixed effects. Estimation is by one step robust system GMM, including fixed effects. Treating lagged and tax-rate variables as predetermined and with tax rates as external instruments. Laglimits (2,3) and instruments collapsed. *, **, *** reflecting statistical significance at 10, 5 and 1 percent. F test reports the p-value for F statistic on the null hypothesis that the coefficients on both *ΔSCR* and *ΔVAT* are zero.

Though in some respects problematic, these empirics do tend to confirm that, at least for countries with a fixed exchange rate, domestic tax reforms can have significant effects, of

broadly the kind that the theory set out above predicts, on trade performance. There is good reason to suppose, however, that any effects of a fiscal devaluation will be temporary, though some of the results also imply a quite sizable effect, with the short run increase in net exports from a shift of one percent of GDP ranging between 1 and 4 percent of GDP.

C. Implications

Both analytics and empirics thus suggest that judicious tax shifts can have a noticeable impact on trade performance. In building on this to derive policy prescriptions, however, several issues arise that are not captured in the analytical framework above.

First, the assumption of a representative consumer masks important distributional impacts from such tax shifts and the likely need for accompanying measures. The increased VAT component of the fiscal devaluation reduces the value to consumers of their non-labor income, whether from transfers or capital income**.** To the extent that out-of-work benefits to the unemployed are not updated to reflect the increased VAT, most labor market models suggest a long-term fall in structural unemployment. This suggests still stronger effects on employment and output. But there will also be a reduction in the real value, for instance, of pensions. And increasing the VAT may also give rise to other equity concerns, perhaps especially so if—as the analysis in Section II_ suggests would be the best approach in many countries—it took the form of an increase in reduced rates, since these are often (albeit unwisely) motivated by distributional concerns. This means that there is likely to be pressure to uprate some social benefits to address equity concerns, diluting the net revenue raised by the increase in the VAT and so allowing only a smaller reduction in the SCRs and hence a smaller gain in employment and labor supply. The distributional impact of the reform will also depend on the precise way in which the SCR is cut: on whether or not, for instance, the upper limit on contributions that some countries impose is also reduced.

Second, across-the-board cuts in SCRs are expensive, and more targeted measures may give a larger 'bang-for-buck' in output and employment effects. In the job plans proposed or implemented in OECD countries, SCR relief is often targeted to specific jobs or workers. Lower labor costs for low wage earners may be particularly attractive to relax constraints induced by minimum wage legislation or by sectoral minimum wages agreed by trade unions and employers. Moreover, employment of this group tends to be relatively sensitive to tax considerations. Targeting SCR relief to low-wage earners may thus reinforce the impact of a fiscal devaluation on employment, output and the trade balance. Two other common forms of targeting SCR cuts (or equivalent financial incentives to employers)—on new employment, and on small firms—are more problematic: see Box 1.

Box 1. Should social contribution cuts be targeted on new employment and small firms?

A number of schemes—including the Obama jobs plan—limit SCR cuts (or provide analogous financial incentives to employers) to 'new' employment. This has the intuitive appeal of avoiding a revenue loss on inframarginal employees; and maintains the impact on producer prices to the extent that these are driven by marginal rather than average cost. But such schemes are not without difficulty. Deadweight loss still arises to the extent that new employment would have also emerged without the relief. Moreover, targeting to new employment may have displacement effects: that is newly hired employees may replace existing employees. Some studies report that these effects can be as large as 70 percent (Dahlberg and Forslund, 2005). These schemes can also create perverse incentives (for instance, in laying off workers in any period before announcement and reference date relative to which increased employment is measured. They can also have high transaction costs. They are also inevitably somewhat complex, provision being needed to ensure that enterprises do not relabel themselves so as to count all employment as 'new'. Experience has been that take-up rates can be low, especially among smaller firms: Chirinko and Wilson (2011) provide an extensive analysis of the impact of such schemes operated by the U.S. sates, where they have been quite common, and conclude that the net employment effects are positive, but very small.

Some countries target SCR relief to small firms. There is widespread belief among policy makers that small companies are the main source of job growth. Early writers indeed report evidence supporting this claim for the US (see e.g. Birch, 1987). This has led governments to introduce special tax relief measures for small companies. However, more recent evidence suggests that the claims are not supported by data. David et al. (1996) discuss statistical and measurement problems and point to the need to distinguish between gross and net job creation. Accounting for such pitfalls, Neumark et al. (2009) find that small firms actually contribute less to net job growth than large firms. Haltiwanger et al. (2011) find that, when one controls for firm age, there is no systematic relationship between firm size and employment growth in the US. Instead, job growth comes more than proportionally from young firms and start-ups.

Third, the payment of social contributions is generally linked—albeit in many cases very weakly—with entitlement to benefits. If the value of the latter is to be maintained while the SCR is cut, two options arise. One is to decouple the two, and move toward tax-based finance of social benefits: this risks worsening labor supply distortions, if contributions are indeed seen as a form of forced savings (but has been advocated for the UK, for instance, in the recent Mirrlees review[42]). The alternative—feasible if cumbersome—is to maintain the link and make transfers from general revenue to provide workers with explicit credits for the SCR not directly paid.

Fourth, although discussions have focused on the VAT as the source of finance to recoup revenue lost from cutting the SCR, other destination-based taxes could in principle serve much the same purpose. The traditional excise taxes on particular products—cigarettes, alcoholic products and fuels—most directly fit the bill. These being high value and low bulk products, however, their use is more constrained by concerns of cross-border shopping and

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[42] Mirrlees and others (2011).

smuggling than is the VAT. Another possibility is residential property taxation,[43] since this has little direct impact on production costs. There is indeed some evidence that this is a relatively growth-friendly source of finance (Arnold, 2008), with untapped revenue potential in many countries, often non-Anglophone.

IV. CONCLUSION

[To be written]

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[43] Property taxes are excluded from the exercise in Table 5 because cyclically adjusted data are unavailable (and the adjustment made to other items does not seem appropriate in this case).

Appendix A: Decomposing C-efficiency

Denote by C_i and C_i^* respectively the values of the true consumption of commodity i and the part that is brought into tax, the difference between the two being imperfect implementation; and by T_i and T_i^* the statutory and effective rates of tax on final consumption of i, the latter reflecting not only of tax levied directly on i but also of indirect effects through exemptions on intermediate inputs (mediated by the input-outputs structure, as described for instance in Ebrill et al (2001). Total revenue, for instance, is thus $\sum_i T_i^* C_i^*$. Equations (2) and (3) then follow on writing

$$E^C \equiv \frac{\sum_i T_i^* C_i^*}{\tau_s \sum_i C_i} = \left(\frac{\sum_i T_i^* C_i^*}{\sum_i T_i C_i^*}\right)\left(\frac{\sum_i T_i C_i^*}{\sum_i T_i C_i}\right)\left(\frac{\sum_i T_i C_i}{\tau_s \sum_i C_i}\right) \qquad (A.1)$$

which bears the interpretation in the text with:

$$Exemptions \equiv \frac{\sum_i (T_i - T_i^*) C_i^*}{\sum_i T_i C_i^*} \qquad (A.2)$$

$$Compliance\ gap \equiv \frac{\sum_i T_i (C_i - C_i^*)}{\sum_i T_i C_i} \qquad (A.3)$$

$$Rate\ Differentiation \equiv 1 - \frac{\sum_i C_i^*}{\tau_s \sum_i C_i^*} = \frac{\tau_s - \sum_i T_i \omega_i}{\tau_s} \qquad (A.4)$$

where $\omega_i \equiv \frac{C_i}{\sum C_j}$.

The impact of exemptions is thus measured by the loss of revenue from taxing at effective rather than statutory rates—which may be negative, given the cascading effect of exempting intermediate transactions (an instance of poor design that leads to higher C-efficiency). The compliance gap is measured simply as the revenue loss (at nominal tax rates) from failing to bring some final consumption into tax. And the rate differentiation effect reflects the extent to which the weighted average VAT rate is lower than the standard rate—which could also in principle be negative, though (since $\tau_s - \sum_i T_i \omega_i = (\tau_s - E[T]) + cov(T, \omega)$) is sure to be positive if reduced rates are prevalent (so that non-standard rates are average lower than standard) and positively correlated with budget shares.

Appendix B: Derivation of (3.5)-(3.8)

Perturbing (3.3), normalizing $E_U = 1$ gives

$$dU = R_L L_1' dT^r + T^{v'} E_{QQ} dT^v + T^{v'} E_{QU} dU - \lambda dA. \tag{B.1}$$

Recalling (3.3) and noting that (since $Q' E_{QU} = E_U$ by linear homogeneity of the expenditure function) $T^{v'} E_{QU} = (Q - P)' E_{QU} = 1 - P' E_{QU}$, this gives

$$\left(P' E_{QU}\right) dU = \left(\frac{R_L}{R_{LL}}\right) dT^r + T^{v'} E_{QQ} dT^v - \lambda dA. \tag{B.2}$$

Perturbing net exports in (3.4) gives

$$dN = P_1'\left(P_{PL} dL_1 - E_{Q_1 Q} dT^v - E_{Q_1 U} dU\right). \tag{B.3}$$

Substituting from dU from (B.2) into (B.3), the result follows on using (3.3), the implication of linear homogeneity of the revenue function that $P' R_P = R_L$ (because $P' R_p = R$) and noting that

$$T^{v'} E_{QQ} = (Q - P)' E_{QQ} = -P'^E QQ = -(P_1' E_{Q_1 Q} + P_2' E_{Q_2 Q}). \tag{B.4}$$

That a reform combining in a cut in T^r with an increased uniform VAT rate is welfare-improving follows from (B.2), since then $E_{QQ} dT^v = E_{QQ} d\tau/(1 + \tau) = 0$.

Appendix C: Fiscal Devaluation with Elastic Labor Supply

[To be written]

Appendix D. Data

The data on net exports come from the world development indicators of the World Bank. Data on tax revenues in percent of GDP are obtained from the OECD. The key variables of interest are the series for 'employer social security contributions' (number 2200 in the OECD classification) and 'Value-added taxes' (number 5111 in the OECD classification). We also obtain data on total tax revenue, GDP growth, population data, and the government balance from the OECD, as well as population data to compute old-age dependency ratio. Data on the standard VAT rate and the employer social contributions are collected from various sources.

The cyclically adjusted revenue data, however, are only available on a more aggregate level. For instance, there is only one cyclically adjusted series for social contributions and one for indirect taxes. The non-cyclically adjusted series we use, however, are specific for employer social contributions and the VAT. We create an adjustment factor by dividing the cyclically adjusted and the non-adjusted series for total social contributions and total indirect taxes

(respectively, OECD classification 2000 and 5000) and use that to construct an adjusted series for the SCR and VAT (respectively, OECD classification 2200 and 5111). The categories for the cyclically adjusted series, however, are still broader than the corresponding data we for non-cyclically adjusted series. The correction factor to compute the cyclically adjusted series is therefore larger than one, causing artificially larger averages. The variation in these series, however, will properly reflect variation in the underlying cyclically adjusted data.

Regarding exchange rate regimes, we distinguish observations for the euro zone and those for non-eurozone observations. Alternatively, we look at a partitioning by exchange rate regime using the classification of Ilzetzki, Reinhart and Rogoff (2008). They developed an indicator that ranges between 1 (= fixed exchange rate regime) to 5 (fully flexible exchange rate regime), with different degrees of flexibility in between.

Table A1 shows some descriptive statistics. Net exports are zero on average across country-year observations, ranging from -34 percent of GDP to 33 percent of GDP positive. The government balance is – 2 percent of GDP on average, with a standard deviation of 4.2 percent. The coverage of the government balance is a bit smaller than for total tax and net exports, though. The tax-to-GDP ratio lies between 9 and 52 percent, with an average of 32. Excluding revenue from VAT and RSC, the average declines to slightly less than 23 percent of GDP. The employer RSC rate varies between .87 percent and 51 percent, with an average of 22.38. VAT rates vary from 3 to 30 percent, while the average is 17.2 percent.

Regarding the structure of taxation, we see that the PIT raises the largest share of public revenue, more than 9 percent of GDP. The VAT is responsible for almost 5 percent of GDP, while RSC on average raises 4.6 percent of GDP. The corresponding averages for the cyclically adjusted series are a bit higher for reasons explained above.

Table A1 Summary statistics of data

Variable	Obs	Mean	Std. Dev.	Min	Max
ER regime	1317	2.24	1.145	1	5
GDP growth	1197	3.13	3.083	-11.615	14.787
Dependency ratio	1340	18.68	5.050	5.596	35.592
In percent of GDP					
Net exports	1241	-.00	6.635	-34.681	33.240
Gross Exports	1241	35.99	22.84	5.206	179.77
Gov balance	754	-1.99	4.166	-15.593	19.087
Total tax	1248	32.44	8.898	9.278	52.246
Tax ex vat/rsc	1126	23.89	5.715	7.964	40.767
Vat base	865	37.84	8.591	0	70.541
SCR base	521	35.83	32.43	10.957	50.700
SCR rate	583	22.38	12.270	.87	51
VAT rate	914	17.20	5.148	3	30
Average tax	330	32.39	11.246	7	51.37
Marginal tax	330	40.97	13.560	7	71.311
Tax-to-GDP ratios					
PIT	1177	9.370	4.848	0	26.545
CIT	1080	2.518	1.672	-.463	12.954
ESC	1192	2.629	1.977	0	11.445
RSC	1192	4.600	3.347	0	14.005
VAT	1181	4.856	3.239	0	11.282
Cyclically adjusted series in percent of GDP					
Gov balance	779	-.107	2.963	-15.298	7.4704
PIT	732	11.24	5.127	2.384	29.181
CIT	668	2.607	1.340	-.497	6.5574
ESC	715	3.380	2.125	0	11.878
RSC	715	6.195	3.526	.0003	14.219
VAT	734	6.636	3.167	0	13.445

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