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## The “Flat Tax(es)”: Principles and Evidence

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**The “Flat Tax(es)”’: Principles and Evidence**

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**Abstract**

**This Working Paper should not be reported as representing the views of the IMF.** The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

One of the most striking tax developments in recent years, and one that continues to attract considerable attention, is the adoption by several countries of a form of “flat tax.” Discussion of these quite radical reforms has been marked, however, more by assertion and rhetoric than by analysis and evidence. This paper reviews experience with the flat tax, seeking to redress the balance. It stresses that the flat taxes that have been adopted differ fundamentally, and that empirical evidence on their effects is very limited. This precludes simple generalization, but several lessons emerge: there is no sign of Laffer-type behavioral responses generating revenue increases from the tax cut elements of these reforms; their impact on compliance is theoretically ambiguous, but there is evidence for Russia that compliance did improve; the distributional effects of the flat taxes are not unambiguously regressive, and in some cases they may have increased progressivity, including through the impact on compliance; adoption of the flat tax has not resolved common challenges in taxing capital income; and it may have strengthened, not weakened, the automatic stabilizers. Looking forward, the question is not so much whether more countries will adopt a flat tax as whether those that have will move away from it.

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## I. INTRODUCTION

The last few years have seen widespread interest—not quite a revolution, but certainly something of a craze—in the “flat tax.” Although there were precursors (that in Hong Kong SAR, in particular, having attracted some attention),<sup>2</sup> Estonia was the first of the current spate in 1994. But, it was the flat tax adopted by Russia in 2001 that spurred the recent and continuing interest. This reform—which combined not only a flattening of the rate structure but a sharp reduction in the highest marginal rates of tax on labor income—was followed by a marked increase in revenue from the PIT: over one-quarter, in real terms. The apparently spectacular success of this reform prompted a second wave of flat tax reforms that still continues. For although the craze seems to have somewhat calmed, the possibility of adopting a flat tax remains on the agenda in several countries, including, for example, Costa Rica, the Czech Republic, Mauritius, Mongolia, Poland, and Slovenia.

A notable and troubling feature of discussion of the flat tax is that it has been marked more by rhetoric and assertion than by analysis and evidence. The purpose of this paper is to provide a broad review of the lessons of principle and experience on the impact of the “flat tax” (having first discussed what exactly it is—and is not). For it has now been in place in several countries long enough for serious evaluation to at least begin. Much of the enthusiasm of advocates of the flat tax, of course, seems to relate at least as much to tax cuts, particularly in the upper part of the income distribution, as to flatness per se. While it is impossible to consider the effects of flatness without also addressing the impact of rate changes—moving to a flat tax necessarily changes the level of taxation applied to some groups—the focus in the paper is on flatness, since it is this that is the distinctive and novel feature of the reforms at issue.

After setting out what is generally meant by the term “flat tax”—which has been used quite loosely—Section II looks at experience with the taxes in this family that have been implemented over the past decade. Section III then considers the implications of optimal tax considerations for the shape of the tax schedule, analyses in some detail key aspects of the impact of the flat tax (bringing to bear the (scant) evidence that there now is)—on equity, work incentives, compliance and administration, and automatic stabilization—and considers too the political economy underlying its introduction. Conclusions are drawn in Section IV.

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<sup>2</sup> Hong Kong SAR enables taxpayers to choose between a progressive schedule and a flat tax (currently 16 percent) with a much narrower range of deductions. Other early (and nonoptional) flat taxes (in the sense defined below) include: Bolivia (13 percent), though in this case the tax is intended to serve largely as a means of enforcing the VAT, with amounts shown on VAT invoices deductible (and, consequently, a large market in fake invoices); Guernsey and Jersey (20 percent); and Jamaica (25 percent). Some subnational governments also levy a flat tax, including Massachusetts and Alberta. More generally, of course, flat income taxes have a long history. Perhaps surprisingly, the first income tax, adopted by the British in 1798, was not flat, but characterized by increasing marginal tax rates; the version reintroduced in 1842, however, was.

## II. EXPERIENCES WITH THE FLAT TAX: AN OVERVIEW

### A. What is a “Flat Tax”?

Particularly in the United States, the term “flat tax” is associated with Hall and Rabushka (1983 and 1985; HR). Their proposal is for a very precisely defined and coherent tax structure: a combination of a cash-flow tax on business income and a tax on workers’ income, both levied at the same, single rate (with a personal allowance available against the wage tax). The base of the business tax would be the difference between receipts from sales, including exports, and payments for purchases of inputs and capital goods, both domestically produced and imported, and to employees. The tax on workers’ income would be assessed on any kind of compensation to labor (including the value of fringe benefits) and on pension benefits. In effect, the HR flat tax is a consumption-type, origin-based value-added tax (VAT) collected by the subtraction method,<sup>3</sup> supplemented by a (nonrefundable) tax credit against labor income.

But this paper—like the practical developments it addresses—is not about the HR flat tax. For while there continues to be widespread interest in the idea,<sup>4</sup> no country has yet adopted it (though some, as will be seen, have moved in broadly that direction). Instead, the expression “flat tax” has come to be used much more loosely, and indeed outside the United States is not particularly associated with HR. As will be seen, the “flat taxes” that have been adopted vary widely. Their sole common feature is a single strictly positive marginal tax rate on labor income, so that liability on this income is of the form

$$T_F(Y) = \max[t.(Y - A_F), 0] \quad (1)$$

where  $T_F(Y)$  denotes liability on labor income of  $Y$ ,  $t$  the single positive marginal tax rate, and  $A_F$  some allowance (perhaps varying with taxpayer’s circumstances). While, as will be seen, some of the flat taxes that have been adopted also apply this single rate  $t$  to other kinds of income, others do not. To define our subject with some precision, throughout the rest of the paper we shall, therefore, mean by a “flat tax” any tax system under which the personal tax on labor income takes the form in (1).

Two other points should be noted. First, the definition of the flat tax in (1)—and common usage—refers only to personal taxation. In practice, the effective tax on labor income also

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<sup>3</sup> The base of a subtraction VAT is the difference between the values of a firm’s sales and purchases; under a consumption-type VAT, capital goods are excluded from the tax base. The origin-based VAT taxes exports but not imports, and so is a tax on goods produced within the country (in contrast to the usual destination-based form of VAT, under which exports are exempt and imports fully taxed, so that the base is ultimately domestic consumption).

<sup>4</sup> And in the ‘X-tax’ of Bradford (2003), which differs from the HR flat tax in applying more than one positive tax rate to labor income (with the highest marginal rate of tax on labor income equal to the business tax rate) and, perhaps, the business tax levied on a destination basis (so that export sales are excluded, and import purchases non-deductible).

depends on the pattern of social insurance contributions: with benefits commonly only loosely related to contributions made, these function in much the same way as do personal taxes on labor income. Thus, even in countries having a flat tax in the sense of (1) above, the effective labor tax schedule is far from flat. And the point is far from trivial: in many of the countries that have adopted flat personal taxes on labor income, substantially more revenue is raised by social contributions. So even where the flat tax is levied at a low rate, the overall effective rate of tax on labor income may be quite high—and indeed these high tax wedges remain a significant policy concern in many flat tax countries. In some of the more recent cases (notably in Russia and Georgia), adoption of the flat tax was accompanied by reform of the social contributions. To keep the discussion reasonably brief, however, the rest of the paper for the most part abstracts from social contribution issues.

Second, in several countries the introduction of the flat tax was part of a wider package of tax reforms, quite often including attempts to improve tax administration. While this packaging is important to understanding the politics of the flat tax, and we shall return to this aspect below, in the descriptions and analysis that follow, we shall consider administrative and compliance aspects only in so far as they relate to the parametric flat tax reform itself.

### **B. The “Flat Taxes” in Practice**

This subsection reviews the nature of and experiences with the eight flat taxes, defined as in (1), that have been introduced in recent years.<sup>5</sup>

Their headline features are summarized in Table 1 (with countries listed by order of adoption); a much more detailed account of the pre- and post-reform systems in each of these countries, on which the discussion below draws, is provided in Appendix I. Figure 1 shows how revenue developed in each of these countries around the time of the reform, displaying receipts from the PIT, corporate income tax (CIT), indirect taxes (VAT plus excises), and from all taxes, relative to GDP, in the year before and after introduction of the flat tax.<sup>6</sup>

Clearly these revenue developments will have been affected by much else other than the tax reform itself, so that interpretation must be guarded; nevertheless, the short-term experiences are suggestive and in any event have done much to shape the public policy debate.

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<sup>5</sup> Two omissions from the list merit comment. First, Serbia is sometimes included among flat tax countries, having a single positive rate tax on labor income. But, it also applies an additional tax on the sum of income from all sources above a threshold: thus, there are two strictly positive marginal rates applied to labor income. In practice, the tax has functioned much like a flat tax as defined here, in that the threshold for the additional tax was very high (though it was significantly lowered in July 2006). Nevertheless, this is not, on the definition applied here, a flat tax. Second, Paraguay introduced a 10 percent flat PIT in 2006. However, the Paraguayan tax, like the Bolivian, is largely intended as an instrument to improve VAT compliance: taxpayers may deduct from the tax base practically all their consumption expenditures (provided they are prepared to show the invoices if asked) and some types of savings.

<sup>6</sup> The underlying numbers are in Appendix II.

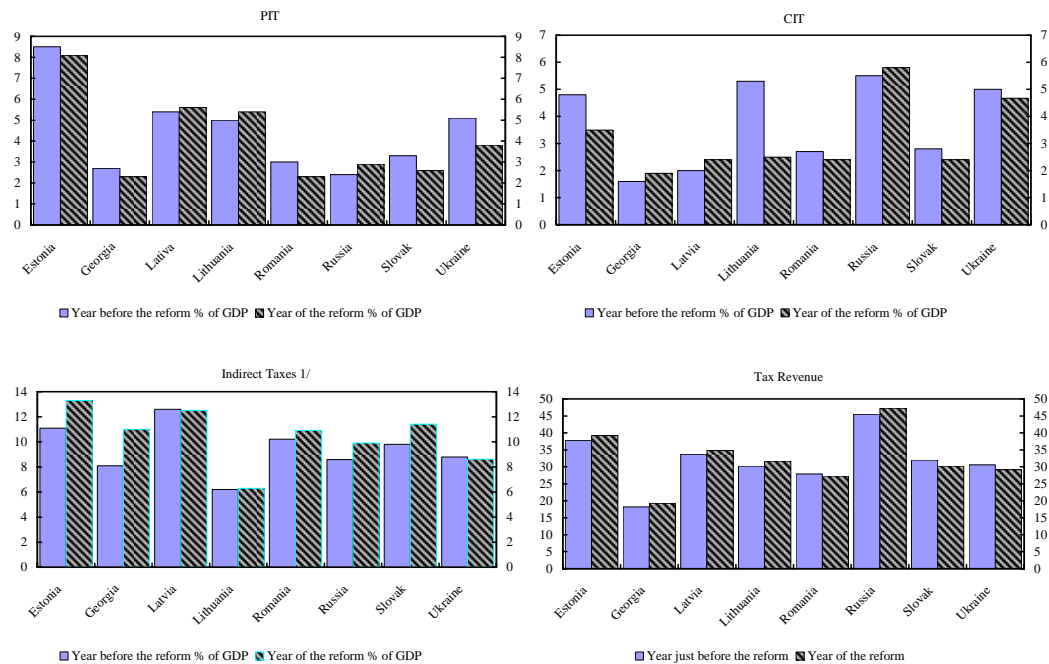
Table 1. Current "Flat Taxes" (Rates in Percent) 1/

	Flat Tax Adopted	Personal Income Tax Rates		Corporate Income Tax Rate, After Reform	Change in Basic Allowance
		After	Before		
Estonia	1994	26	16-33	26	Modest increase
Lithuania	1994	33	18-33	29	Substantial increase
Latvia	1997	25	25 and 10	25	Slight reduction
Russia	2001	13	12-30	37	Modest increase
Ukraine	2004	13	10-40	25	Increase
Slovak Republic	2004	19	10-38	19	Substantial increase
Georgia	2005	12	12-20	20	Eliminated
Romania	2005	16	18-40	16	Increase

Source: IMF staff.

1/ Rates relate to year before and after adoption of the flat tax.

Figure 1. PIT, CIT, Indirect and Total Tax Revenue, years before and after reform  
(in percent of GDP)



Sources: Country documents and Fund staff estimates.

1/ Indirect taxes of Lithuania only include VAT.



Taking each of these countries, in turn, proceeding in the order that the flat tax was adopted.

### *Estonia*

Estonia was the first of the current crop of flat taxes, initially at a rate of 26 percent (broadly midway between the lowest and highest pre-reform marginal rates). This rate has been lowered since, and is now scheduled to reach 20 percent in 2009. The personal allowance was increased substantially at the time of introduction of the flat tax: from EEK 2,400 to EEK 3,600, though inflation was then such that this represented only a modest increase in the allowance in real terms.

The rate of corporation tax, previously 35 percent, was also set at 26 percent, and has remained aligned with that on labor income. The best known feature of the Estonian approach to corporate taxation, however, was not part of the flat tax reform, being adopted only in 2000: since then, undistributed profits have been untaxed, with distributions taxed at the regular flat rate.<sup>7</sup> There appears to have been no substantial change to VAT or the excises at the time of adopting the flat tax.

As can be seen from Figure 1, revenue from both the PIT and the CIT fell, relative to GDP, with the movement to a flat tax.

### *Lithuania*

Lithuania introduced its flat tax in 1994 at 33 percent, which was the highest of the marginal rates imposed prior to the reform. The threshold was increased substantially, from LTD 35 to LTD 115 (more than doubling relative to GDP, though still reaching only a very modest 2.6 percent of per capita GDP). The corporate tax rate was maintained at 29 percent. While the PIT rate has remained unchanged since 1994, the CIT rate has been reduced to 15 percent. The previous general excise tax, which had functioned much as a VAT, was transformed into a full VAT at the time of the flat tax adoption, with the rate remaining at 18 percent; a new excise tax law was also introduced, and the rates of the excises on gasoline, diesel, and beer were increased in late 1994/early 1995.

Not surprisingly, revenue from the PIT rose with movement to the flat tax. There is no obvious explanation, however, for the marked fall in CIT revenue.

### *Latvia*

The flat tax in Latvia was introduced in 1997 at the rate of 25 percent. In the year prior to this, Latvia had an unusual degressive rate structure (one, that is, under which the marginal

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<sup>7</sup> Being levied on payments to residents of other EU countries, this scheme runs counter to the EU's Parent-Subsidiary Directive, and is to be reformed by 2009.

rate falls with income), with a starting marginal rate of 25 percent followed by a marginal rate of 10 percent on the highest incomes.<sup>8</sup> Unusually—indeed uniquely—adoption of the flat tax in Latvia thus resulted in increased tax liability at the very highest incomes. The value of personal allowances was slightly reduced, but remained high (at around 19 percent of per capita income).

Corporate tax was at 25 percent prior to reform, and was retained at this level, and hence, at the same rate as on labor income. Since then, however, the two have diverged, with the CIT now set at 15 percent. Dividend and interest income were, and remain, exempt. As in Estonia, there seem to have been no significant changes to the VAT or excises. Again, unsurprisingly—since allowances were reduced and the marginal rate at all incomes unchanged or increased—revenue from the PIT rose somewhat following the reform. So too did CIT revenue, consistent with reduction of the bias against incorporation at higher income levels, though of course wider effects may have been at work too.

### *Russia*

At the start of 2001, Russia unified its marginal rates of personal income taxation—previously 12, 20, and 30 percent—at 13 percent, near to the lowest marginal tax rate. The threshold for taxable income increased only modestly in real terms. This allowance is withdrawn discontinuously as income rises, so that the effective marginal rate is, in principle, infinite at these critical income levels: in this sense, the tax is not truly ‘flat.’ Moreover, once the allowance has been fully exhausted the tax functions as a proportional tax on income: in the highest income range, 13 percent is the average tax rate as well as the marginal. A variety of measures were also taken to broaden the base of the PIT, including the elimination of exemptions for military servicemen. While the personal tax on interest income was reduced from 15 percent to the flat 13 percent, a special tax of 35 percent was introduced on ‘excessive’ bank interest (this rate being chosen to broadly equate with the effective tax—PIT plus social security—on labor income).

The maximum rate of corporate tax, inclusive of municipal add ons, was increased from 30 to 35 percent, and the rate of dividend taxation increased from 15 to 30 percent. There were also significant structural changes to the VAT, including the elimination of some exemptions and application of the tax to individual entrepreneurs. Excises were imposed on diesel and lubricants, and those on tobacco and petroleum excises were substantially increased (the former, for instance, more than doubled in nominal terms).

Unlike the previous flat tax reforms (and most subsequent ones), the Russian was accompanied by a major change in the rate structure for social contributions, and indeed one away from flatness: a variety of contributions payable at a flat rate of roughly 39.5 percent were replaced by a degressive ‘unified social tax,’ with the marginal rate falling from 35.6 to 5 percent.

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<sup>8</sup> See, for instance, Appendix I of Stepanyan (2003), PriceWaterhouse (1996), and International Bureau of Fiscal Documentation News Service, April 1997 (p.156).

In the year following the reform, revenue from the PIT rose by nearly one-quarter in real terms: an experience that prompted much interest and emulation elsewhere.

### *Ukraine*

Effective January 2004, a flat tax at 13 percent (slated to increase to 15 percent in 2007) tax replaced a PIT with marginal rates ranging from 10 to 40 percent. The personal allowance was increased from around Hrv 204 to Hrv 738 (on an annual equivalent), being available only, however, to those with incomes less than 1.4 times a subsistence amount; at that point, the allowance is removed entirely. Thus, like the Russian, the Ukrainian variant is not truly flat and, above the critical income level at which the allowance is withdrawn, becomes a proportional tax.

The PIT base was broadened by bringing interest income, previously exempt, into tax at the flat rate, eliminating various occupation-specific exemptions (replacing them with direct payments) and adopting a more comprehensive definition of capital gains. The rate of CIT was reduced from 30 to 25 percent, and significant preferences and exemptions removed in 2003 and 2004. VAT remained at a single rate of 19 percent, but several sectoral exemptions were eliminated (including for housing construction, aircraft, and shipbuilding).

PIT revenue fell significantly following reform.

### *Slovak Republic*

The Slovak Republic implemented a major and innovative tax reform in 2004, establishing a single common rate (19 percent) not only for the PIT and CIT, but also for the VAT. This replaced a PIT schedule of five non-zero marginal rates ranging from 10 to 38 percent (with five other rates applying to specific types of income). The personal allowance was more than doubled, from SK 38,760 to SK 80,832 (reaching around 60 percent of the average wage, by far the highest level in any of these countries), while the spouse allowance increased almost sevenfold, from SK 12,000 to the same value as the personal allowance. Income-related tax allowances for children were replaced by fixed allowances and a refundable tax credit for those with sufficient labor market participation.

The reduction in the CIT rate, previously at 25 percent, was accompanied by more rapid depreciation and more generous carry-forward provisions. The dividend tax—15 percent final withholding, prior to reform—was abolished; so too were inheritance and gift taxes.

The income tax reform included significant scaling back of exemptions<sup>9</sup> under both the PIT (with, for example, the removal of some allowances for interest and capital income, additional private pension contributions, and exemptions for soldiers and judges) and the CIT

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<sup>9</sup> Further detail on this and other aspects of the package of tax reforms in the Slovak Republic is provided by Brook and Liebfriz (2005), Mikloš, Jakoby, and Morvay (2005), and Ministry of Finance (2005), p.15.

(including, notably, tax holidays for newly established firms, with limits also placed on the deductibility of charitable giving and tighter rules for provisioning and reserves). The aggregate social security tax was reduced from 51 to 48.6 percent, with the revenue effect, in part, offset by increasing contribution ceilings.

There were significant indirect tax reforms around the same time, with the unification of a 20 percent standard rate of VAT and a reduced rate (mainly applicable to foodstuffs) of 14 percent at the flat rate of 19 percent, and an increase in excises to bring them in line with EU requirements (ahead of the negotiated schedule).

Importantly, the tax reform was accompanied by a fundamental reform of the benefits system,<sup>10</sup> focused on sharpening work incentives by reducing out-of-work benefits and reducing the loss of benefit on taking employment, accompanied by such other measures as a reduction in the implicit tax rate on those working beyond the retirement age (which then began to be gradually increased). A labor law reform in the year prior to adoption of the flat tax sought to increase labor market flexibility by, for example, reducing severance pay and allowing unlimited renewal of fixed term contracts.

Following the reform, revenue from the PIT fell by around 0.7 points of GDP; less than the 1.2 points forecast by the authorities. Revenue from the CIT and social contributions fell by 0.4 and 1.5 percent of GDP respectively, but these losses were largely offset by higher indirect tax revenue, mainly from VAT.

### *Georgia*

A flat tax on personal income of 12 percent was introduced at the start of 2005, replacing a schedule with rates of 12, 15, 17, and 20 percent. A unique feature of the Georgian flat tax<sup>11</sup> is that there is no basic allowance: in this case, the tax on labor income is not merely flat but, at all income levels, proportional. The extent of the change should not be overstated, however; the basic allowance prior to reform was less than 5 percent of per capita GDP, and its elimination does not seem to have been a major focus of public discussion. (The rationale given for eliminating the threshold was to facilitate wage withholding on holders of multiple jobs). Some protection was afforded to the retired, however, by more than doubling the minimum pension. The CIT rate remained unchanged at 20 percent. The reform also included a substantial reduction of the social security contribution rate from 33 to 20 percent, and of the standard VAT rate from 20 to 18 percent.

To partly offset the revenue loss from the rate reductions, various exemptions were eliminated under both the PIT (for those in mountainous regions and in relation to self-production by farmers, for instance) and the VAT, and most of the excises were increased.

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<sup>10</sup> These reforms are described in detail in World Bank (2005). See also Moore (2005).

<sup>11</sup> Unique, that is, amongst the set of flat taxes considered here: Serbia also had no threshold for the flat tax on labor income until July 2006.

Given that the average effective PIT rate prior to the reform was around 18 percent, a substantial PIT revenue loss was expected. In the event, the fall was less than might have been anticipated: from around 2.7 to 2.5 percent of GDP. CIT revenue, on the other hand, rose. So too did indirect tax revenue, largely reflecting increased excise rates. Total revenues remained broadly unchanged.

### ***Romania***

Effective January 2005, a flat rate of 16 percent replaced a PIT schedule with five marginal rates, rising from 18 to 40 percent. The monthly basic personal allowance was raised modestly in real terms. The profit tax rate was also reduced, from 25 to 16 percent. Dividends paid to individuals, interest income and capital gains were subject to final withholding taxes at lower than the flat rate, but since 2006 have also been subject to the flat 16 percent. The two rates of VAT (19 and 9 percent) were left unchanged, but, later in 2005, several relatively minor exemptions (in relation to entertainment services, for instance) were eliminated, and excises increased.

Revenue from both the PIT and CIT fell following the reform, by a total of around one percentage point of GDP.

## **C. Common Features—and Differences**

While there are evident similarities between them—explored further below—one of the most striking aspects of this family of flat taxes is how different they are.

### **Differences**

A first sharp distinction is that between the first wave of reforms in the Baltics, characterized by tax rates set at moderately high levels—at or close to the highest marginal tax prior to the reform<sup>12</sup>—and the second wave, starting in Russia, marked by tax rates that are instead closer to the lowest of the pre-reform rates (and in Romania even lower): less than 20 percent in all cases, and much more so in some.

There are other significant structural differences between them. In half of the cases—Estonia, Latvia, the Slovak Republic, and Romania—the single positive rate of the labor income tax was set equal, when the flat tax was adopted, to the rate of the corporate income tax. Equating the two rates in this way has the merit of removing tax distortions to the choice as to whether to conduct an activity in corporate form or as an individual, so long as dividend and capital gains are untaxed. And the first three of these countries did indeed remove the withholding tax on dividends—Romania, on the other hand, did not. These are the cases in which the flat tax comes closest to an HR flat tax, though with the key difference that

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<sup>12</sup> Even though, recall, in Latvia the highest marginal rate was not that which applied to the highest incomes.

investment expenditure is not fully expensed, but instead attracts depreciation allowances;<sup>13</sup> and also departing significantly from the pure form in the presence of many other substantial and quite different tax instruments, including taxes on interest income and capital gains (except in Latvia, where they are exempt, as they were prior to adoption of the flat tax), and a traditional destination-based VAT. And two of these four significantly amended their CIT regimes after adoption of the flat tax: Estonia eliminated its CIT altogether (instead simply taxing dividends at the flat rate), and Latvia reduced the CIT rate far below the flat tax on labor income.

Of the four other flat tax countries, three tax corporate income more heavily than labor income, in some cases quite substantially so; in Lithuania, however, corporate income is taxed less heavily. These four all retain withholding on dividends, though Russia mitigated the effect of this by introducing a credit against liability at personal level.

There are other differences too. Most strikingly, the Slovak Republic is unique in setting the single rate of VAT equal to a common rate of labor taxation and CIT. There is little obvious rationale for equating the VAT to either or both of these rates, and indeed this may simply be an artifact of 19 percent having proved to be the single rate required to maintain revenue unchanged in adopting the flat tax and moving from the previous dual rate VAT.

These reforms have also varied in their approach to the treatment of capital income. While the second wave reformers generally tax interest and capital gains at or close to, the flat rate (which sometimes required a significant increase in the general rate of tax on interest income), Latvia exempts them entirely and Estonia taxes interest at below the flat rate. Indeed, the flat taxes of the first wave have in this respect close similarities to the dual income tax (DIT) structure—which also applies a low flat tax on capital income, though combining this with a progressive (rather than flat) tax on labor income—that was pioneered in the Nordic countries and is now attracting increasing attention in a wider range of countries. The key difference from the DIT is simply that the first wavers apply only one positive marginal rate, and, more deeply, that these reforms were not built on an explicit and consistently pursued distinction between capital and labor income (which leads the DIT countries, for example, to adopt schemes intended to divide the income of the self employed into these two distinct components). While the low levels of the single rate in the second wavers eases this tension between the taxes on labor and capital income, even these rates are by no means low in terms of current norms for the taxation of internationally mobile capital.

There are also differences in relation to the basic level of personal allowances. These have generally been increased, especially in the second wave of reforms. Even amongst these, however, the Georgian flat tax, with no threshold at all after the reform, stands out as an exception and an interesting experiment.

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<sup>13</sup> If investment is fully expensed, the labor tax and CIT combined are in effect an origin-based VAT, combined with a personal tax credit.

### Some common themes

Beyond the defining commonality of a single positive marginal rate on labor income, there are nevertheless several design features which, though by no means common to all, have tended to recur:

- Except in Latvia and, most spectacularly, Georgia, adoption of the flat tax has been associated with an increase—in some cases quite substantial—in personal allowances, the evident motive being to limit the increase in the tax burden for the less highly paid. Beyond this, however—and with the exceptions of the Slovak Republic (for those active in the labor market) and Georgia (for the retired)—measures to protect those on lower incomes appear to have been the exception rather than the rule.
- Reform has, to varying degrees, been accompanied by some elimination or reduction of exemptions under both PIT and CIT, whether in terms of bringing capital income into tax or eliminating preferences for particular taxpayers or activities.
- Except in Latvia, Lithuania—which both set the flat tax rate at the highest marginal tax rate prior to reform—and in Russia, adoption of the flat tax was followed by a reduction in PIT revenue. Base-broadening and behavioral responses (whether in terms of increased labor supply or improved compliance) seem not to have been enough to offset the effects of rate reductions in the upper income ranges and of increased basic allowances.
- In many cases, adoption was associated with a reduction in the CIT rate; and continued reductions in this rate have been more marked than reductions in the flat rate on labor income.
- Most of the second wave reforms—Russia, the Slovak Republic and Georgia—have included a reduction in social contributions.
- Finally, the second wave reforms have typically been accompanied by a substantial increase in indirect taxation, and especially the excises, with—as can be seen from Figure 1—a strong increase in revenue from this source.

### III. ANALYZING THE “FLAT TAX”

The second wave of “flat tax” reforms that have attracted so much attention has generally involved not only a flattening of the PIT but a substantial reduction in rates (both average and marginal) in the upper part of the income distribution. And much of the flat tax rhetoric seems to be concerned more with the latter than with flatness in itself. There is of course a voluminous literature on the behavioral and revenue effects of tax rate changes. The consequences of flatness per se, however, have received little analytical attention. It is therefore on these more novel issues that the discussion below focuses, though as will become clear it is difficult (perhaps impossible) to disentangle these empirically from those of the accompanying tax increases or reductions that movement to a flat tax implies.

### A. Might a “Flat Tax” be Fully Optimal?

It is natural to start with the question: Are there any reasons to suppose that a flat tax is fully optimal?

A natural first way of framing this is to ask whether the solution to the general problem of designing an optimal non-linear income tax schedule, in the tradition of Mirrlees (1971), turns out to be close to linear. That problem—balancing the efficiency costs of distortions to work effort against the distributional advantages of collecting revenue mainly from the better-off—is, of course, technically complex. Broadly, the only general property of optimal non-linear income tax schedules is that the marginal tax rate lies everywhere between zero and one. This, however, tells us nothing about how marginal tax rate should vary with income.<sup>14</sup>

Part of the seminal contribution of Mirrlees (1971), however, was to suggest that a case might indeed be made for linearity: simulating the optimal schedule for a utilitarian objective function, preferences Cobb-Douglas in consumption and leisure, and a log-normal distribution of underlying abilities, he concluded that “[p]erhaps the most striking feature of the results is the closeness to linearity of the [optimal] tax schedules” (p.206). Weighed against the practical difficulties that non-linear tax schedules imply—in administration, compliance, and the potential for tax arbitrage—the implication appeared to be that a flat tax in the sense defined above would be a close proxy for the best possible income tax. Subsequent simulation work, however, (notably by Tuomala (1990)) showed that this conclusion is not robust: with more inequality-averse social welfare functions than the utilitarian, alternative patterns of labor supply response, and other assumptions on the distribution of underlying abilities, the optimal schedule can be highly nonlinear.

While a flat tax may not be fully optimal, however, it should be noted that there is also no overwhelmingly theoretical reason to suppose that the optimal tax schedule is progressive, either in the sense that the average rate of tax increases at all levels of income (which is the sense in which we shall use the unqualified term ‘progressive’) or in the sense that the marginal tax rate is everywhere increasing. When the distribution of abilities is bounded above, Pareto efficiency requires that the marginal tax rate on the highest earner be zero (since otherwise it would be possible, by moving the marginal tax rate on that earner closer to zero, to raise more revenue without making any individual worse off). This implies not only a decreasing marginal tax rate in the upper income range but also (since a marginal tax rate of zero must lie below the average rate<sup>15</sup>) a decreasing average rate. With an unbounded distribution, the optimal tax schedule may take any of a variety of shapes even in the higher

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<sup>14</sup> Nevertheless, this result is far from trivial, in that it rules out, for example, marginal income subsidies. Even these properties are not assured, however, when participation decisions are realistically modeled (Saez, 2002) or the objective function is non-welfarist (Besley and Coate (1995), Kanbur, Keen, and Tuomala (1994)).

<sup>15</sup> The average rate must be positive at all income levels as a consequence of the general results cited above (so long as the revenue required by the government is strictly positive).



ranges: Boadway, Cuff and Marchand (2000), for instance, identify special cases in which the marginal tax rate either optimally increases or optimally decreases with incomes, and conclude that in plausible cases the pattern of marginal tax rates has an inverted U shape, being highest in the middle part of the income distribution. Given too the inherent limitations of the framework of these models—essentially atemporal models, with no role for imperfect compliance—there emerges no clear presumption for flat taxes. But nor is there any clear presumption against. If one were to seek an argument for linearity from the optimal tax literature, it would be that since views and circumstances point in principle to quite different forms of non-linearity, and we have relatively little idea about which best represent reality, linearity may be a reasonable choice.

A quite different case for linearity per se does emerge, however, in a context that focuses not on labor supply distortions but on problems of tax evasion and corruption in tax collection—problems that have been particular concerns in many of the countries that have adopted a flat tax. Consider for example the problem of optimal tax design when income is exogenous (abstracting from labor supply effects) but is collected by tax inspectors who, costlessly observing that income, are willing to collude with the taxpayer in understating their taxable income (in return for a bribe), and who may also threaten (if not paid a bribe) to over report it (the appeal system available to the taxpayer being imperfect). Suppose too that the government wishes to maximize the revenue that it collects (perhaps in order to redistribute to the least well-off), and has as instruments at its disposal not only the shape of the tax schedule  $T(Y)$  but also the penalty structure and the reward system for tax inspectors. In such a setting, Hindriks, Keen and Muthoo (1999; HKM; Corollary 1) show that a linear tax, set at the appropriate rate and combined with an appropriate penalty structure and a simple wage payment to inspectors, has the attractive properties of maximizing revenue without inducing either tax evasion or the payment of bribes.

To see why, suppose that in the event of taxpayer and inspector being detected colluding in misreporting, which occurs with probability  $\pi$ , the collective penalty is the full amount of the taxpayer's income  $Y$  (this is stronger than is needed for the result,<sup>16</sup> but keeps the argument simple). If they choose to misreport, they will then choose to report a tax liability of zero, since there is no gain from reporting any more than that. Thus their expected collective payment if they choose to misreport is  $\pi Y$ . Their collective payment if they report truthfully, on the other hand, is simply  $T(Y)$ . With the tax schedule  $T$  chosen to maximize revenue and preserve truth-telling, it must therefore be the case that  $\pi Y = T(Y)$ : and thus the tax must be a simple proportional tax—and, more specifically, at a rate equal to the probability of detection.

This result is clearly very special, emerging from a highly stylized model. Even in that framework, moreover, there are non-linear tax schedules that are also revenue-maximizing, corruption-proof and evasion-proof. Such schemes require, however, that some form of

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<sup>16</sup> Formally, the requirement is that the fine equal the difference between net incomes at true and reported incomes.

commission be paid to tax inspectors on the tax revenue they collect<sup>17</sup>—a practice that is now in ill-favor, at least when applied at the level of the individual inspector rather than as something more akin to a team bonus. The result also requires the imposition of penalties higher than society commonly appears willing to apply for tax offences (perhaps because of the risk of punishing the innocent). While the HKM result thus cannot be taken too literally, it does lend substance to the claim that flatness provides some protection against evasion and corruption, while also stressing too that in this context it is not only flatness but also the level of taxation that matters, with the level of taxation that can be imposed without inducing evasion and corruption ultimately restricted by the likelihood that abuse will be detected and punished.

There is, finally, a political economy argument for linearity (or similar parametric restriction on the income tax schedule), dating back to Brennan and Buchanan (1977), that appears to underlie some of the flat tax rhetoric. For those who see government not as benevolent but rather as inclined to waste and the pursuit of the narrow self-interest of policy-makers themselves, adoption of a flat tax can be desirable as a means of restricting the size of government. This stems from a view of policy-makers as seeking to maximize revenue, subject to providing some level of well-being to consumers, which is dual to the standard optimal tax problem discussed above, so that it too requires a potentially complex pattern of marginal tax rates. If government can somehow be restricted to using only a single marginal tax rate, then this will limit the amount of revenue it can raise; and hence the amount of damage that government can do. While this argument is rarely made explicit, opponents perceive this point keenly: Murphy (2006, p.100), for instance, argues on these grounds that the flat tax “...is in effect an attack on the whole structure of the society we live in.”

Even in its own terms, however, the argument is open to challenge. There may be institutional devices—fiscal rules of various kinds, such as simple revenue limits—by which the size of government can be limited without restricting it to the use of inefficient tax instruments. Moreover, even an only slightly less extreme view of policy making leads to a quite different conclusions. For suppose that instead of simply aiming to leave citizens with some fixed level of well-being, policy makers derive at least some selfish benefit from increased consumer welfare—even if only in the form of an increased chance of retaining office—with this in part depending on the amount of revenue allocated to finance some good that they value (with the rest used to benefit only policy makers). Then restricting policy makers to a less efficient tax instrument in effect faces them with a reduction in the real income available to allocate to the two spending items; and so long as the consumer’s welfare is a normal good in their preferences, one consequence of this will be a reduction in the level of that welfare, as a consequence of both the increased inefficiency itself and reduced expenditure on the item they value.<sup>18</sup>

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<sup>17</sup> To see this, note that with a commission of  $\lambda(Y)$  payable on an income report of  $Y$ , the condition in the text becomes  $pY = (1 - \lambda(Y))T(Y)$ , opening the way to progressive taxation so long as the commission increases appropriately with the income report. The claim that revenue-maximization, corruption-proofness and evasion-proofness requires a proportional tax if no commission is paid to inspectors follows from Theorem 2 of HKM.

<sup>18</sup> For a formal argument along these lines, see Edwards and Keen (1996).

## B. Equity

So long as it has some basic exemption, a flat tax is progressive, since the average rate of tax increases with the level of income. But the more relevant question whenever a flat tax is adopted, of course, is whether it is more or less progressive than the tax scheme it replaces.

### *Preliminaries*

To abstract from the incentive issues discussed later, pre-tax income  $Y$  is assumed throughout this section to be exogenous, and so to be unaffected by the income tax schedule in place; we shall though allow for the possibility that the decision to avoid or evade tax may change as the tax schedule changes.

It is helpful too to start with a clear statement of what it means to describe one tax as more progressive than another. We shall say that a tax scheme  $M$ , characterized by tax schedule  $T_M(Y)$ , is ‘more progressive’ than another tax  $L$ , characterized by  $T_L(Y)$ , if and only if the distribution of tax payments under  $M$  is more unequal than that under  $L$  in the sense that the concentration curve of tax liabilities under  $M$  lies everywhere below that of  $L$ :<sup>19</sup> which simply means that the poorest  $p$  percent of the population<sup>20</sup> pay a smaller share of all tax revenue under  $M$  than under  $L$ , for all  $p$ .

It will also prove helpful to make use of some ‘single-crossing’ results to be found in the literature. For this, suppose that  $M$  and  $L$  raise the same revenue. Then if the schedule  $T_M(Y)$  crosses  $T_L(Y)$  once, from below,  $M$  can be shown to be more progressive than  $L$  in the sense above (Hemming and Keen, 1983). And if  $T_M(Y)$  and  $T_L(Y)$  cross twice in the relevant range of incomes,<sup>21</sup> then the concentration curves cross once (Daroni and Lambert (1988)): which means that no unambiguous progressivity comparison can be made.

Consider then the comparison between a flat tax of the form in (1) above and a pre-existing tax  $T_p(Y)$  with the properties (primes denoting derivatives)

$$T_p(Y) = 0, \text{ for } Y \leq A_p; \text{ and } T'(Y), T''(Y) > 0 \text{ for all } Y > A_p, \quad (2)$$

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<sup>19</sup> It is easily shown that this is consistent with the earlier and standard definition of a progressive tax as one characterized by an average tax rate that increases at all income levels: a tax is ‘progressive’ if it is ‘more progressive’ than no tax at all.

<sup>20</sup> For simplicity, it is assumed that the ranking of households by before and after-tax income is the same (so that the tax system does not cause any reranking).

<sup>21</sup> More precisely, they must cross twice on the support of the distribution of pre-tax income.

meaning that there is some tax-free amount,  $A_p$ , above which the marginal tax rate is strictly positive and everywhere increasing.<sup>22 23</sup>

### *Progressivity comparison with full compliance*

To keep track of the various considerations and possibilities, it is useful to start with the case in which the flat tax and pre-existing schedule raise the same revenue, before turning in some detail to that in which their yields differ.

#### *Revenue neutral comparisons*

If  $F$  and  $P$  raise the same revenue—a case treated at length by Davies and Hoy (2000)—then the corresponding tax schedules must cross at least once. There are then three possibilities. Suppose first that the tax-free amount is lower under the flat tax:  $A_F < A_p$ . In this case, it is easy to see,  $T_F$  must cross  $T_p$  only once, and from above.<sup>24</sup> From the result above, the flat tax is indeed then unambiguously *less* progressive than the tax it replaces, as indeed appears to be a commonplace view of the flat tax. Only the Georgian case, however, broadly fits this picture; some care is needed here, however, since the reform was not revenue neutral (so that the results set out above are not strictly applicable), a point, as just noted, returned to later.

In the two other cases,  $A_F > A_p$ , so that  $T_F$  initially crosses  $T_p$  from below. An obvious but key implication is that the least well off taxpayers find themselves paying less tax (or continuing to pay none) under the flat tax than under the pre-existing tax. In this sense, movement to the flat tax is clearly pro-poor—and it cannot be the case that the flat tax is unambiguously less progressive than the tax it replaces.

The two possibilities that arise when  $A_F > A_p$  are shown in Figure 2. One, in Panel A, is that the marginal rate under the flat tax is at least equal to the highest of the marginal rates under the pre-reform system. In this case, the schedules cannot cross more than once, so that the flat tax is unambiguously *more* progressive than its predecessor. These circumstances—an increase in the threshold and a flat rate set at the highest of the pre-reform marginal rates—best match those of the Lithuanian flat tax, suggesting that in this case the effect of the reform was an unambiguous increase in progressivity; again, however, this particular reform was not revenue neutral.

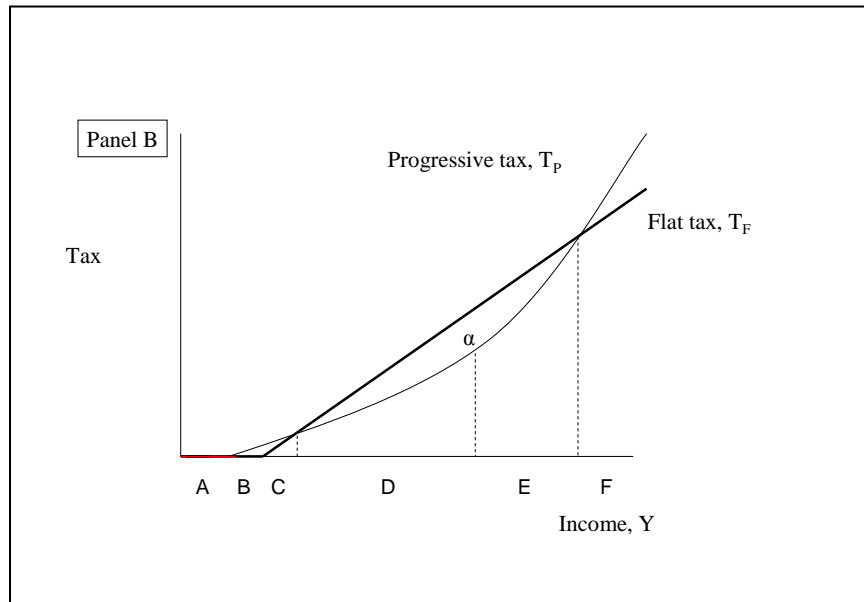
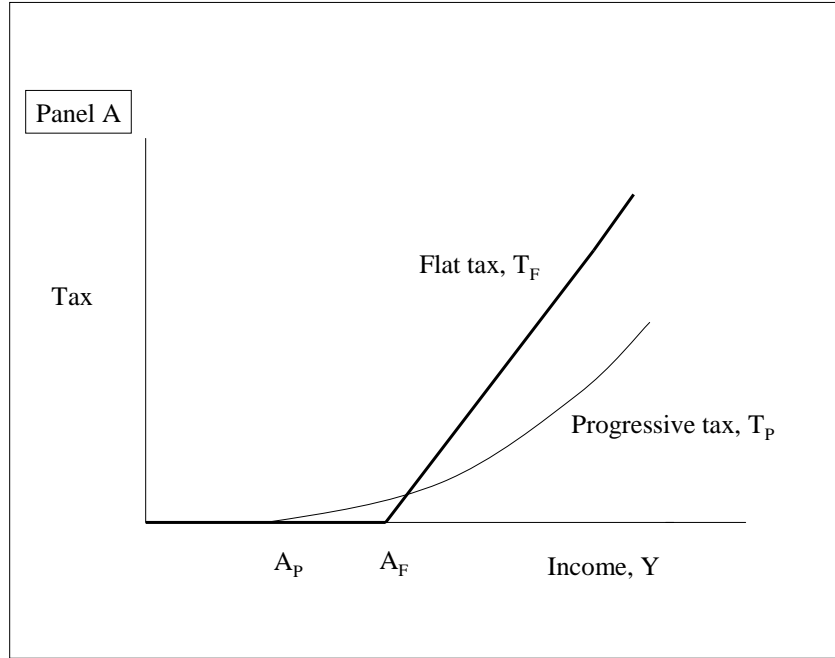
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<sup>22</sup> This latter condition was not satisfied by the pre-reform schedule in Latvia, recall, so that this case is not encompassed in the analysis that follows.

<sup>23</sup> It is also assumed that  $T_p(Y)$  is continuous at  $Y = 0$ , and, to avoid some dull qualifications, that the support of the income distribution is  $[0, \infty)$ .

<sup>24</sup> It must cross from above, since tax liability is higher under  $F$  at the lowest income levels; and it can do so only once, because otherwise the marginal tax rate under  $P$  would have to fall over some income range (which would violate the assumption in (2) of an increasing marginal rate) to bring about a second intersection.

Figure 2. Flat Tax Reforms



The third and final possibility, illustrated in Panel B, is that the threshold is higher under the flat tax and the single rate lies between the lowest and highest marginal rates pre-reform. This would be the best summary characterization of the rate reforms in Estonia, Russia, the Slovak republic and Ukraine, and is in that sense represent the ‘typical’ second wave reform. And indeed this situation also typifies options for flat tax discussed for other countries: see for instance Teather (2005) for the U.K., Peichl (2006) for Germany, and Larsen (2006) for Denmark. In these circumstances, there must be a second crossing of the tax schedules, at which  $T_F$  cuts  $T_P$  from above. Thus the concentration curves cross twice.<sup>25</sup> In this case, neither tax is unambiguously more progressive than the other. Thus the progressivity impact of the typical second wave reform is likely to have been inherently ambiguous; again, however, the theory is not exactly applicable, since these reforms were not revenue neutral.

It is of course always possible to cut through these ambiguities by ranking the flat and pre-reform taxes in terms of some summary global measure of progressivity (another point we return to shortly). And indeed it is readily seen from the argument above that in equal yield comparisons there will exist, for any given inequality measure, some critical level of the constant marginal rate such that any flat tax with a higher (lower) marginal rate will generate less (more) inequality in the distribution of after-tax incomes.<sup>26</sup> That is, all else (including revenue) equal, adopting a flat tax is more likely to be progressive the higher is the single marginal rate of tax it applies. This critical marginal rate, however, will depend on the particular measure of inequality chosen.

### *Non-equal yield comparisons*

In this case, it becomes necessary to distinguish between two aspects of the distributional impact of any tax reform: the effect on the distribution of tax payments (relating to ‘progressivity’ as defined above), and the effect on the distribution of after-tax income (relating to inequality in disposable incomes) When revenue remains unchanged, as in the analysis above, these are simply mirror images of one another, since changes in the tax schedule simply redistribute an unchanging total of after-tax income. When revenue differs, however, the change in the distribution of net income reflects not only the change in the distribution of tax payments but also that in their overall level. For example, the distribution of payments of capital gains tax is likely to be highly concentrated amongst the better-off

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<sup>25</sup> There cannot be more than two crossings, since, otherwise, the marginal tax rate under  $P$  would have to fall over some range.

<sup>26</sup> Intuitively, when the marginal tax rate is sufficiently low, revenue neutrality implies that the threshold of the flat tax is lower than that under the pre-existing tax, so that the situation is as described (but not illustrated above), with  $T_F$  crossing  $T_P$  only once, and from above. Thus inequality is unambiguously greater under  $T_F$ . For a sufficiently high marginal rate, on the other hand, the situation is as in Panel A of Figure 2, with inequality unambiguously greater under  $T_P$ . The conclusion then follows on noting that in comparing equal-yield flat taxes the single-crossing condition is always satisfied, that with the higher rate unambiguously generating less inequality. See Davies and Hoy (2002) for a formal statement and proof.

taxpayers (so that the tax may in that sense be highly progressive); but since the yield is also likely to be relatively modest, so too will be the impact on the pattern of after tax incomes.

While tax schedules may not cross in non-equal yield comparisons, Hemming and Keen (1983) show that the results used above continue to apply if re-expressed in terms of normalized tax or net income schedules derived from the actuals by dividing by the aggregate amount that each yields. Diagrammatically, this implies that the relevant comparison is between the pre-reform schedule and a notional flat tax with the same threshold as the actual but marginal rate equal to the actual multiplied by the ratio of revenue raised by the pre-reform tax to that raised by the flat tax.

To see the implications, consider first the flat tax reforms that involved a revenue loss. In this case, the relevant comparison for assessing the impact on the distribution of tax payments is thus with a flat tax steeper than the actual. For the Georgian reform (with a lower threshold under the flat tax), it is easily seen that this notional schedule intersects the pre-reform tax schedule only once, from above: thus the distribution of tax payments is indeed unambiguously less equal after adoption of the flat tax. For the other, more ‘typical’ second wave reforms (with a higher threshold under the flat tax, and a net loss of revenue at unchanged behavior), the steepening of the flat tax schedule is unlikely to have been enough to resolve the ambiguity noted earlier by removing the higher of the two crossing points: the effect on the distribution of tax payment remains unclear. For the revenue-increasing reform of Lithuania (marked, recall, by increased thresholds), the comparison is with a notional flat tax schedule flatter than the actual. This must double-cross the pre-reform schedule—since the actual flat rate equals the highest pre-reform rate, the notional rate must be lower—so that the impact on the distribution of tax payments is ultimately ambiguous.

These observations on the country-specific flat tax reforms, it should be stressed, are no more than illustrative: as is evident from the descriptions above, and pursued further below, many other considerations beyond the change in the shape of the rate schedule on labor income are relevant to assessing their distributional impact. What does emerge clearly, however, is the complexity and variety of the potential impact. In one case (Lithuania), the movement towards a flat tax had strongly progressive elements. In another (Georgia) it had equally strong regressive elements. And in many, perhaps most, the effect was intrinsically ambiguous.

### *The progressivity implications of noncompliance*

One limitation of the analysis above is that it assumes taxes to be fully complied with. In practice, a key concern—indeed, objective—in moving to a flat tax has been a potential improvement in compliance. And these compliance effects may in turn may have systematic implications for the distributional impact of the reform.

To develop a sense of these, consider a simple model of compliance behavior—along the lines of Slemrod (2001)—in which each individual chooses an amount of income  $E$  to conceal from the tax authorities, trading off the tax so saved against a cost of concealment  $C(E)$  that is increasing and convex in the amount concealed (each dollar hidden being

harder to conceal than the last). Thus  $E$  is chosen to maximize  $Y - T(Y - E) - C(E)$ . One might think of this as either a model of legal tax avoidance (with the costs arising from the transactions costs of rearranging activities or taking advice so as to reduce liability) or as a model of illegal evasion with the probability of detection being zero (but again some costs incurred in hiding income). This is not, it should be stressed, the only way in which noncompliance might be modeled, a point to which we return later. The necessary condition on the choice of  $E$  is then that

$$T'(Y - E) = C'(E). \quad (3)$$

so that the marginal cost incurred in concealing income is equated to the tax saved in doing so, which is simply the marginal tax rate. The solution to (3) gives the amount concealed as a function of true income,  $E(Y)$ . This in turn defines an *effective* tax schedule

$T^*(Y) \equiv T(Y - E(Y))$ , giving the tax actually paid by an individual with true income  $Y$ . The relevant comparison for progressivity purposes is then that between the effective schedules  $T_F^*(Y)$  and  $T_p^*(Y)$  corresponding to the flat and pre-existing schedules characterized above. Starting with the flat tax, note that since the marginal tax rate is in this case the same for all taxpayers declaring above the exempt amount, (3) implies that all those so declaring will conceal the same amount of income, and so will escape the same amount of tax. And a range of taxpayers with somewhat lower true incomes will choose to pay no tax at all. (Diagrammatically, the effective schedule under the flat tax is equivalent to the statutory schedule augmented by some increase in the tax-free amount). This means that the proportionate reduction in tax liability as a consequence of noncompliance is higher at lower levels of income: which tends to improve vertical equity, with the less well off deriving a greater proportional benefit from noncompliance than do the better off. As a consequence, the effective flat tax schedule  $T_F^*(Y)$  is *more* progressive than the statutory schedule  $T_F(Y)$ .<sup>27</sup>

For the pre-existing tax, it is straightforward to show that (in obvious notation)<sup>28</sup>  $E'(Y) \in (0,1)$ : thus the better off conceal more. Moreover, since they face a higher marginal tax rate, for each dollar they conceal the rich escape a larger absolute amount of tax than do the less well off. Under a condition somewhat stronger than that maintained so far of an increasing marginal tax rate—that the natural log of the schedule  $T_p(Y)$ , not just the schedule itself, be convex—the better off also escape a larger *proportion* of their tax liability. In this case, the effect of noncompliance is to worsen vertical equity:  $T_p^*(Y)$  can be shown to be *less* progressive than the statutory schedule  $T_p(Y)$ .

Thus, noncompliance means, loosely speaking, that the flat tax is more progressive than it seems and the pre-existing taxes less progressive than they seem. In this sense—and of

<sup>27</sup> The proof of this, and the result at the end of the next paragraph, is in Appendix III.

<sup>28</sup> Using the implicit function in (3) gives  $E' = T'' / (T'' + C'')$ , and the conclusion follows from the convexity assumptions.



course the underlying model of concealment, while appealingly simple, is quite special—recognition of noncompliance makes it even less obvious that movement to a flat tax will reduce progressivity, and mitigates the likely extent of any adverse distributional impact.

### *Other considerations*

Several further considerations arise in moving from these general analytical results to an understanding of the likely distributional impact of flat tax reforms.

First, several of the flat tax reforms have been associated with significant changes in the base of the income tax (corporate as well as personal), and with other tax and spending measures. To the extent that movement towards a flat tax is accompanied by a scaling back of personal exemptions and deductions (other than basic personal allowances), the effect will tend to be to increase both the progressivity of the tax system—Peichl (2006) shows this clearly for a hypothetical flat tax in Germany, with the proportionate income loss from such elimination monotonically increasing across income deciles. It is also likely to improve horizontal equity, including through the removal of CIT preferences, as in Ukraine. Even when allowances are not removed, moreover, movement to a flat tax has the effect of rendering their distributional effect less regressive by equating their value for all taxpayers: the increase in after-tax income associated with any child allowance, for example, is greater the higher is the marginal tax rate; and so is greater for those on higher incomes under the pre-reform tax, but the same for all under a flat tax.

Moreover, it is important to remember that the distributional impact of any tax considered in isolation is of little interest: what ultimately matters is the distributional impact of the tax (and benefit) system considered as a whole. And in this context several of these income tax reforms have been accompanied by changes in other taxes, in many cases in order to achieve broad revenue neutrality. Several countries have increased excise tax rates and/or reduced exemptions under the VAT (though only the Slovak Republic fundamentally changed the VAT structure at the time of the flat tax reform, in the direction of increasing revenue from this source). The impact of this will of course vary across countries, depending not only the nature of the indirect tax changes but also on preference patterns and the income distribution, so that each case calls for its own empirical analysis. Conceptually too, views can differ as to the distributional impact of these taxes: evaluated relative to lifetime consumption rather than current income, for example, both VAT and excises have on occasion been found to be broadly neutral in their distributional impact.<sup>29</sup> And it should be borne in mind that the distributional impact of gasoline taxes—which have been increased in several of these countries to ensure revenue neutrality of the overall reform package—may well have been progressive in many of these countries (in the Slovak Republic, for instance),<sup>30</sup> since car use in lower income countries tends to be concentrated amongst the better-off. It is a reasonable supposition, nevertheless, that accompanying indirect tax changes are unlikely to have

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<sup>29</sup> See, for example, the analysis of gasoline taxes in Poterba (1991).

<sup>30</sup> Ministry of Finance (2005), p. 62.

increased progressivity of the overall tax system. For the Slovak Republic, for instance, tabulations reported in Brook and Liebfriz (2005) indicate that the unification of the VAT rate increased the burden of the tax all income levels, with the impact of the tax (relative to current income) being regressive both before and after reform (though only modestly so). The impact on pensioners was mitigated by a lump sum payment and changes in the rules for the indexing of pensions.<sup>31</sup>

Clearly too in some cases—the Slovak Republic and Ukraine, most notably—a full distributional assessment of the reform package would require considering the impact of changes in the tax treatment of capital income. These are potentially ambiguous, since lower income groups may—at least prospectively—include retirees heavily reliant on capital income from their past savings (who would not be protected in this respect by any increase in the PIT threshold, since interest income in particular is generally taxed by final withholding). The effects are also potentially quite complex: in the Slovak Republic, for instance, the elimination of the dividend tax was combined with increased taxation of interest income, so that the distributional impact would depend on the pattern of portfolio holdings. Given too the opportunities that the wealthy typically have to escape such taxes, notably by locating their savings abroad, any progressivity from increased taxation of interest income is likely to be modest. Once again, however, there is a need for closer empirical analysis of reform in particular countries.

Note too that the analytical results above presume that the effective incidence of labor income taxes falls entirely on workers. To the extent, however, that higher paid employees, are more mobile across countries, or have easier access to avoidance opportunities, so they will bear less of the burden of any tax on their income; and so, conversely, one would expect the gain they enjoy in moving to a flat tax to be less than is supposed in the framework above.

### *Evidence*

While there are several distributional analyses of hypothetical flat tax reforms, there appear to be only two detailed studies of the distributional impact of the flat taxes that have actually been enacted: one for Russia (Sinelnikov-Mourylev et al (undated)), the other for the Slovak Republic (World Bank (2005)). In each of these cases, the analysis above suggests that the effect of the flat tax cannot have been an unambiguous increase in progressivity, since in each case the average tax rate on the highest incomes fell. Effectively putting this point aside, each study focuses on global measures of progressivity that take the form of a single summary statistic, capturing one or other of the two aspects of the distributional effect of non-equal yield tax changes noted above: either the change in the distribution of tax payments (as measured by the Kakwani index) or the change in the distribution of after-tax

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<sup>31</sup> Mikloš, Jakoby and Morvay (2006).

income (measured by the Reynolds-Smolensky index).<sup>32</sup> The advantage of such an approach is that it always leads to clear-cut rankings of tax schedules; the disadvantage (akin to that of the Gini coefficient in the measurement of income inequality) is that it implicitly embodies a particular view as to how to summarize in a single number an entire distribution of tax payments or net incomes, an issue on which views may reasonably differ. Beyond this, the two studies adopt somewhat different methodologies. Both, however, conclude that the effect of reform on global progressivity has been modest and perhaps even beneficial.

For Russia, Sinelnikov-Mourylev et al (undated) report that the 2001 reform was associated with increased progressivity in the Kakwani sense, at least with respect to the distribution of wages. They also report, as we understand it, cross-region regressions of revenues against measures of the regional tax base, concluding that these too show an increase in progressivity.

For the Slovak Republic, World Bank (2005) proceeds by simulating tax payments under the pre-and post-reform tax systems using household survey data. The conclusion is that the Kakwani index ( $K$ ) increased (signaling greater progressivity) quite substantially, from 0.114 to 0.192. The Reynold-Smolensky ( $RS$ ) index, on the other hand, was broadly unchanged. This contrast in directions of movement is consistent with the discussion above of the distinct qualitative effects (on the distributions of tax payments and of net income) of a revenue-reducing move to a flat tax. More precisely, these two indices are related as<sup>33</sup>  $RS = (t/(1-t))K$ , where  $t$  is the overall average tax rate; so if (as was the case in the Slovak Republic)  $t$  falls, then  $K$  may rise even though  $RS$  does not. The implication is that while the Slovak tax reform appears to have made the distribution of tax payments more unequal, in that sense enhancing progressivity, the reduction in the overall level of revenue raised by the PIT meant that the impact of the tax system in equalizing the distribution of after-tax income was essentially unchanged (and, at least, did not fall).

It is likely to be difficult to explain to the non-economist how a tax reform that involves a substantial tax reduction for the highest earners can be an increase in tax progressivity. And it is hard to argue that the non-economist is entirely wrong. Changes in summary indices of progressivity in these cases clearly do not tell the whole story. What these results do stress, however, is that—for the reasons discussed above—the distributional impact of the flat tax reforms is commonly quite complex, and by no means unambiguously adverse for some of the least well-off.

### C. Work Incentives

The impact of the flat tax on work incentives is naturally a key concern.

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<sup>32</sup> The Kakwani index ( $K$ ) is the area between the Lorenz curve describing the distribution of pre-tax income and the concentration curve of tax payments; the Reynolds-Smolensky index ( $RS$ ) is the area between the Lorenz curve of pre-tax incomes and the concentration curve of after-tax incomes.

<sup>33</sup> See, for example, Lambert (1993), p.184.

### *Principle*

As we have stressed, there are major differences in the structural tax reforms adopted by the flat tax countries. Even apart from possible differences in patterns of behavioral response across the flat tax countries, one should therefore expect significant differences even in qualitative terms. Rather than attempt to cover all cases, we therefore here simply give a flavor of the issues by focusing here on the stylized reform in panel B of Figure 2 above; representative, recall, of most of the second wave reforms.

The effect on an individual's work effort decisions of moving to a flat tax depend in the first instance on how it affects average and marginal tax rates (ATR, MTR) at their pre-reform level of income: the substitution effect is towards increased effort iff the MTR falls; and the income effect is towards increased effort (under the standard assumption that leisure is normal) if the ATR rises. And it is evident from Figure 2 that the incentive effects of the reform shown there are quite different at different levels of income. All those with incomes to the right of point  $\alpha$ , at which the marginal tax rate is the same before and after reform (the two schedules being parallel), or in the region B between pre-and post-reform thresholds, face a reduction in the MTR; all those with incomes above the higher crossing point, or below the lower, face a lower ATR. Leaving aside the region below the threshold under the pre-reform schedule (where nothing changes), the pattern of effects in the various income ranges is thus:

Average Tax Rate	Marginal Tax Rate	
	Up	Down
Up	D	E
Down	C	B, F

The situation is, thus, replete with ambiguities. Only in the ranges C and E are the effects clear cut: toward less and more effort respectively. Beyond this, the effect on work effort of moving to the flat tax is in principle uncertain. Even for those in the highest income range F, of course—where the rate changes are commonly largest, and whose efforts many see as especially important to wider economic performance—the impact is ambiguous: while the substitution effect points to greater effort, the income effect points to lower. Nor does the empirical literature on labor supply responses suggest that one should expect especially strong responses from this group.<sup>34</sup> If an argument is to be made for an aggregate output gain from labor supply responses, it is likely to be that effects through changes in the MTR dominate, so that, even if quantitative changes are modest, the greater productivity of the

<sup>34</sup> Examining a series of reform episodes in the United States, Goulsbee (1999) finds that, apart from the 1986 reform, the responsiveness of high income earners to tax changes has been relatively modest.

higher paid implies an output gain from their increased effort that exceeds the loss through reduced effort from the less productive. But these of course are, or should be, empirical issues: we report below on such evidence on this issue as currently exists for these countries.

For the general case in panel B, the impact of the reform on participation decisions is also in principle ambiguous. Suppose that some workers will join the labor force only if they earn enough, after-tax, to cover some fixed cost of participation (and/or replace any benefits received when out of the labor market). The increase in the tax threshold in itself tends to encourage participation, since more can be earned without paying any tax: some may now choose to enter the labor market in the income ranges B and C who previously did not find this worthwhile.<sup>35</sup> The increased marginal tax rate, however, may make participation at a somewhat higher income level (in D or E) unattractive, and so could conceivably lead to withdrawal from the labor market. Participation can only fall, however, amongst those initially paying tax at higher than the lowest of the pre-reform marginal tax rates. These are not the earners with the lowest earnings prospects. In this sense, the expectation is that participation is likely to increase amongst the lowest paid workers. This effect will be reinforced, of course, if—as in the Slovak Republic—adoption of the flat tax is accompanied by other measures that tilt the balance of social support towards the provision of in-work benefits.

### *Evidence*

There is of course a vast empirical literature on the effects of tax reform on labor supply decisions, which need not be reviewed here. The broad consensus is that the effects of tax changes on the effort of primary workers are modest (reflecting offsetting but perhaps large income and substitution effects). This literature could be drawn on to simulate the likely labor supply effect of adopting a flat tax. More directly informative than the ex ante application of existing estimates of labor supply responsiveness, however, would be evidence on the actual experiences following the flat tax reforms described above.

The only study of the labor supply response to adoption of a flat tax of which we are aware is that of the Russian flat tax reform in Ivanova, Keen and Klemm (2005; IKM). This analysis—to which further reference will be made below—uses household-level panel data (from the Russian Longitudinal Monitoring Survey) to exploit the analytically convenient feature of this reform that one group of taxpayers—those (by far the larger group) on lower incomes—were little affected by the reform (with the threshold broadly unchanged in real terms, and the marginal tax rate increasing only from 12 to 13 percent) while another group was strongly affected (with the marginal rate falling from 20 or 30 percent).<sup>36</sup> The general approach in IKM is then to take the former as a control group, and the latter as a treatment

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<sup>35</sup> Conceivably, some may now jump to participation in the highest income range *F*. It seems unlikely, however, that either the marginal valuation of leisure of many potential high earners or their fixed costs of working will be so high as to make this likely.

<sup>36</sup> Taking account too of the accompanying social security reform described above, the difference between the effective rate changes for control and treatment groups was even greater.

group,<sup>37</sup> the difference in the changes in behavior of the two groups between pre- and post-reform periods then providing some insight into the likely effects of the tax reform itself.<sup>38</sup>

Analyzing the differences in differences in this way provides no evidence that the Russian tax reform had strong effects on work effort: IKK find that neither gross income nor hours worked increased more amongst the treatment than amongst the control group (and the same is true comparing median growth rates). Indeed whenever the difference is significant it is in the direction of increased effort in the control group—precisely those unaffected by the reform.

#### **D. Compliance, Administration, and Simplicity**

Prominent amongst the merits of the flat tax claimed by its proponents is the prospect of a substantial simplification of the tax system, improvement in compliance, and reduction in administration costs. These effects are of course seen as closely related: simplification in itself is expected to make it easier to comply with the tax system and, by reducing opportunities for arbitrage, also make it easier to implement.

##### *General considerations*

There is indeed clearly an element of simplification in flatness of the PIT, since this reduces the incentive to reallocate income across closely related individuals, makes withholding easier, and also eases, for example, the need for income averaging for those with highly variable incomes. These effects should not be overstated, however. The presence of the tax-free threshold, for instance—possibly at quite a high level—means that there are really two marginal tax rates (one of them zero), so that problems of arbitrage, withholding and averaging do not disappear. There will still be complications, for example, in arranging proper withholding from those with multiple jobs (to ensure that they receive the tax-free amount only once). In this context the Georgian experiment is particularly interesting, since a prime motive for the elimination of the basic allowance is precisely to remove such difficulties. While it seems to be widely believed that compliance has improved in Georgia since the reform, the evidence is essentially anecdotal; and potentially significant changes in tax administration around the same time—an increase in penalties, and a taxpayer reregistration exercise—would in any event make it difficult to identify the part of any such improvement that was due to the parametric tax changes.

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<sup>37</sup> IKM explore, for various purposes, different characterizations of the two groups. To allow for the possibility that some initially paying at the lower rate would switch discontinuously to earning in the higher rate band, for example, for some regressions the treatment group is taken to be all those earning more than 75 percent of the threshold income for the higher rates.

<sup>38</sup> There are of course many qualifications to the IKM analysis, relating to both data and methodology. There are too few self-employed survey respondents in the sample for meaningful analysis, for instance, and account needs to be taken of the possibility that respondents will conceal from the survey income they conceal from the tax authorities. The approach also presumes no unrelated source of differential changes between the two groups.

Even more importantly, it is typically not the case that the rate structure applied to wage income is the main (or even a principal) source of tax complexity. Generally far more important are the complexities associated with defining and monitoring the base of the tax, with characterization disputes—and scope for arbitrariness, errors and corruption—arising from exemptions and other forms of special treatment. Part of the political quid pro quo for adoption of the flat tax has in some cases, such as those of the Slovak Republic and Ukraine, been a substantial base-broadening that involves cleaning out a range of exceptional treatments, and it may be in this area, rather than in the rate structure itself, that the flat tax offers the most important gains in simplicity and tax governance.

The complexity of a tax system is hard to measure, so that there is little firm evidence as to the extent to which the flat tax reforms have led to genuine simplification. It is suggestive of the limited importance in this context of the rate structure applied to labor income, however, that some (albeit indirect) survey evidence in Russia does not suggest taxpayers to have perceived the system as much simpler after the 2001 reform: the proportion of respondents regarding the perceived complexity of the tax system as important or very important to compliance decisions was virtually the same in 2002 as in 1998.<sup>39</sup>

### *Impact on compliance*

The Hindriks-Keen-Muthoo (1999) result discussed earlier suggests that linearity may in itself be conducive to compliance, but also indicates that the level and structure of tax rates matters too. It appears to be widely presumed that lower tax rates are more conducive to compliance, suggesting that rate cuts of the kind seen in Russia at the top of the income distribution will lead to reduced evasion and avoidance. But this is not necessarily the case: the impact of tax rates on compliance depends critically, in particular, on the nature of the costs incurred by taxpayers in seeking to evade or avoid tax.

To see this, suppose first that concealment takes the Slemrod (2001) form, as in subsection B above. From the necessary condition (3), it is easily seen, from the convexity of  $C$ , that an increase in the marginal tax rate increases the amount of income concealed. This then is consistent with the commonplace notion that high marginal tax rates lead to poor compliance.

But this is not the only possibility. Suppose instead—in the tradition of Allingham and Sandmo (1974), and Yitzhaki (1974) (ASY)—that evasion is viewed as a gamble, with the taxpayer facing some risk that any concealment of taxable income will be detected and punished. Then an increase in the rate of a proportional tax on income leads to an increase in the proportion of income concealed, so long—and this is critical to the result, as well as plausible in practice—as the penalty is increasing in the amount of tax that it is attempted to escape.<sup>40</sup> This may seem puzzling at first sight, but the reason is straightforward: a tax cut increases after-tax income; and as an individual's net income increases, so too (under conditions on risk aversion generally regarded as weak) does the proportion of their income that they invest in risky assets; which means, in the present context, that they evade more.

<sup>39</sup> See Ivanova, Keen, and Klemm (2005).

<sup>40</sup> This result is due to Yitzhaki (1974).

Thus the impact of tax cuts on compliance is in principle not clear-cut, depending on whether the costs of attempting to reduce tax payments varies with the extent of the income concealed (in the Slemrod framework above) or with the extent of the tax reduction itself (as in ASY). All this, and given too the complexity of the rate effects associated with the archetypal move to a flat tax (illustrated in Figure 2) precludes simple predictions as to the compliance effects of the flat tax. For those in the highest income range, for example, the reduction in the marginal tax rate would be predicted to reduce concealment in the Slemrod model, but the reduction in the average tax rate that they also experience would be predicted in the ASY framework to increase risk-taking, and hence evasion. Nor is this ambiguity a purely theoretical matter: the review by Andreoni, Erard and Feinstein (1998) concludes that empirical evidence on the impact of taxation on income concealment remains mixed.

For the flat tax reforms themselves, there is little hard evidence on the impact on compliance—reflecting the usual difficulty that the extent of non-compliance is, by its nature, hard to measure with accuracy. Some evidence suggestive of an improvement in compliance does emerge, however, from the analysis of the Russian reform in IKK. Exploiting the idea that survey respondents who are less than fully tax-compliant may be more truthful in reporting their consumption than the income that supports it, IKM estimate ‘true’ gross income as the sum of consumption and taxes paid,<sup>41</sup> and ask whether the ratio of declared income (as reported in the survey) to estimated ‘true’ income has moved differentially closer to unity for the treatment group affected by the reform than for the unaffected control group. They find that it did, and significantly so: while the ratio of consumption to income for the control group remained at around 75 percent, that for the control group increased from around 52 to 70 percent.<sup>42</sup>

This evidence of an increase in compliance in Russia is quite impressive. Indeed it may seem surprising so, given that the sample used essentially comprises workers liable to deduction at source. It is widely believed, however, that much evasion in Russia took the form of collusive misstatement by employer and employee, for which much the same considerations as discussed in the text apply (though in this case any PIT and social contribution payments evaded by failing to declare wage payments need to be balanced against the CIT deduction foregone).

In so far as it is a response to the parametric reform in itself, this apparent improvement in compliance suggests that it is the Slemrod model of noncompliance, not ASY, that represented a closer approximation to the Russian reality. And indeed, there is some plausibility to this: where tax implementation has become largely dysfunctional, escaping tax is an inconvenience rather than a gamble. If so, then the presumption is indeed that reduced tax rates will lead to increased compliance.

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<sup>41</sup> Taxes paid are not reported in the survey, but, using the tax rules in place, can be inferred from the income that is declared.

<sup>42</sup> Median growth rates tell a similar story.



It remains unclear, however, whether the apparent improvement in compliance in Russia was indeed a behavioral response to the parametric change in the tax structure itself or a strengthening of some aspects of tax administration that occurred at around the same time, including strong statements from the newly-elected President Putin intended to bolster compliance.<sup>43</sup>

### *Laffer effects from improved compliance?*

One other aspect of noncompliance is of interest. Is it possible—as the rhetoric of advocates sometimes seems to suggest—that cutting taxes in moving to a flat tax might lead to such an improvement in compliance that revenue actually increases? It might seem implausible that someone might respond to a tax cut by increasing the amount of tax they choose to pay. In fact, however, the impact on marginal incentives is such that for some taxpayers this may well be the case.

To see this, suppose that the schedule for the pre-existing tax cuts crosses that for the flat tax as in Panel B of Figure 2, and consider an individual whose declared income is exactly at the higher of the two crossing points. Thus  $T_p(Y - E(Y)) = t.(Y - E(Y))$ : if they simply declared the same income under the flat tax as they did under the pre-existing regime, they would also pay the same amount of tax. Since  $T'_p(Y - E(Y)) > t$ , the concealment condition (3) implies that  $t < C'(E)$ . This in turn means that it will be optimal under the flat tax to conceal less than  $E(Y)$ ; and so, from (4), their new level of concealment,  $E^*$ , will be such that  $t.(Y - E^*) > t.(Y - E(Y)) = T_p(Y - E)$ . By continuity, those with income slightly lower than  $Y$  will also end up paying more tax after reform even though they would actually pay less under the flat tax if they simply declared the same income.

Rate-reducing movement to a flat tax could thus induce some taxpayers to increase their compliance so much that they pay more tax than they did prior to reform. But the revenue experiences outlined above—including the Russian—provide little suggestion that these (or any other) behavioral effects have been large enough to offset the direct loss of revenue from a reduction in statutory tax rates.

## **E. Automatic Stabilization**

With discretionary fiscal policy subject to well-known difficulties, the impact of structural tax reform on the automatic stabilizers is a major concern for macroeconomic policy management (though rarely, it seems, a major concern in the design of tax reform itself). And here there appears to a widespread belief that movement to a flat tax will tend to weaken the stabilizers, upon which increasing reliance is generally placed in coping with shocks.

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<sup>43</sup> See Chua (2003) and Gale and Gaddy (2005)

This is not, however, necessarily the case. For it is important to remember that while adoption of a flat tax has typically meant a reduction in the marginal tax rate faced by the highest and lowest wage earners it also means an increase at intermediate levels: thus the impact on the aggregate marginal tax rate, meaning the increase in aggregate tax payments from a small uniform proportionate increase in pre-tax incomes—‘built-in flexibility’—is a priori unclear.

To explore this further, consider the comparison between a flat tax, as in (1), and a pre-reform progressive tax  $T_p(Y)$ , under the assumption that the two raise the same revenue at the initial distribution of income, and that the latter is progressive in the sense that the average tax rate increases at all income level. The question then is how the shift to a flat tax affects the aggregate marginal tax rate, defined for tax system  $i$  (denoting by  $f(Y)$  the density of income, and normalizing the population size at unity) as

$$B_i \equiv \int T'_i(Y)Yf(Y)dY \quad (4)$$

and, thus, in effect, a weighted average of the marginal tax rates faced by individual taxpayers.

With marginal tax rates rising and falling at different points in the distribution, (4) suggests that few general results will be available. The level of the threshold amount under the flat tax, however, turns out to be crucial.

Suppose first that there is no threshold under the flat tax, which is thus simply a proportional tax. In this case it can easily shown that the aggregate marginal tax rate falls in moving to the flat tax—the conventional view that the automatic stabilizers weaken in this case thus proves correct.

Matters are more complex, however, when there is some exempt amount under the flat tax. Since taxpayers in this range face a marginal tax rate of zero, it might at first seem that this would make it only more likely that built-in flexibility would be lower under the flat tax. Revenue neutrality means, however, that with some taxpayers excluded from tax altogether—or, more precisely, since the ambiguity arises even if all taxpayers are above the threshold, with some incomes excluded from tax—the marginal tax rate applied under the flat tax will need to be higher than would otherwise be the case in order to raise the same revenue as the pre-reform tax: which tends to increase built-in flexibility. In general, built-in flexibility may then be either increased or decreased in moving to a flat tax, depending not only on the liability progression of the pre-reform tax but also on the level at which the threshold is set under the flat tax and the shape of the income distribution. More precisely, it is shown in Appendix 4 that built-in flexibility under the flat tax is greater—and potentially higher than under the pre-reform system—the lower is the ratio of average incomes above the threshold to the level of the threshold itself: the greater, more intuitively, is the concentration of income just above the threshold (this being the range, recall, over which adoption of the flat tax leads to an increase in the marginal tax rate).

This last observation points to one other consideration pointing to stronger built in stabilization under the flat tax. There is some evidence that income shocks tend to be concentrated at lower levels of income.<sup>44</sup> To the extent that this is the region somewhat above the threshold of the flat tax—which is the one in which it is typically associated with an increase in marginal tax rates—built-in flexibility will tend to be greater under the flat tax.

## **F. Political Economy**

What explains the adoption of the flat tax in these countries? In some cases, the rate schedule change itself was broadly Pareto-improving, in the sense that liability fell at all levels of labor income. This was the case in Russia, in particular, with no change for those initially paying at 12 percent and a gain for those paying at higher rates. In this sense, the general political acceptability of the Russian reform may not seem difficult to explain. There were losers from elimination of some exemptions, some of them potentially politically powerful—notably those in the military—and the question is how their potential opposition was overcome. The leading architect of this reform, Yegor Gaidar, has attributed this to the speed of the reform—less than 50 days from announcement to presidential approval—being such as to prevent their effective mobilization. In the Slovak Republic too, broadly all income groups gained from the PIT reform (which entailed a substantial cut in revenue at unchanged behavior),<sup>45</sup> though this case also provides a reminder that adoption of the flat tax has in most cases been part of a much wider package, and it is the adoption of the package that needs to be explained.

Even when movement to a linear tax is Pareto-improving, however, it is far from clear that linearity will prove sustainable. Certainly simple voting models provide little reason to predict that linear tax schedules will emerge in political equilibrium. Bohn and Stuart (2003), for example, conclude that in a representative citizen model of voting over non-linear income tax schedules—with electoral winners unable to commit to chose, if elected, anything other than the schedule that best serves their own interests—the role of the median voter implies that the winning schedule will typically redistribute from the two extremes towards the middle: which is precisely the opposite pattern to that associated with the ‘typical’ flat tax reform in Panel B of Figure 2. In this respect, voting models do a better job of explaining why many countries have not adopted the flat tax than of why these few have.

Any convincing explanation of the adoption of the flat tax in these eight countries—and, as yet, nowhere else—is likely to be rooted more in their obvious common characteristics than in considerations that apply with equal force elsewhere.

As one aspect of this, these are all economies that, in the transition from a largely planned economy, have seen income inequality increase dramatically (and more rapidly than elsewhere): the Gini coefficient in Eastern Europe and the Former Soviet Union, for

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<sup>44</sup> See, for instance, Auerbach and Feenberg (2000), and the references there.

<sup>45</sup> See, for instance, Table 3.9 of World Bank (2005).

example, rose from around 0.25 to 0.35 during the 1990s.<sup>46</sup> The standard model of voting over linear income schedules<sup>47</sup>—not an obviously appealing characterization of decision-making under the unreformed regimes, no doubt, but nevertheless suggestive of forces that might emerge with democratization—would have predicted the response to this increased inequality to have been not a reduction but an increase in the marginal rate.<sup>48</sup> Empirically, however, there is evidence that, contrary to this standard model, more unequal societies actually redistribute less.<sup>49</sup> And there are explanations that can be given for this: Persson (1995), for example, shows that it can be rationalized by supposing that each individual's well-being depends not only on the absolute level of their own consumption but also on its level relative to the consumption of others.<sup>50</sup> Given the particular circumstances and histories of these countries, the association between increased inequality and reduced progressivity may reflect more specifically an unusually rapid emergence of strong elites, or a entrenched distrust of the capacity and willingness of government to undertake real redistribution.<sup>51</sup> Identifying any such effects would require close analysis of issues of political attitudes and dynamics; another aspect of the flat tax experience calling out for further work.

Structurally, the Russian experience provides some reason to suppose that the common circumstances and tax practices of these countries—creating market economies with little experience of tax payment by individuals and largely dysfunctional tax administrations—are relatively conducive to beneficial compliance effects from reducing tax rates; and in any event the limited initial yield of the PIT reduced the revenue at risk. But these considerations relate more to tax cuts than to flatness as such, and so in particular would not explain the first wave of flat tax reforms.

There is one other suggestive common feature of these reforms: except in the Ukraine,<sup>52</sup> the implementation of the flat tax followed a fundamental change in government, starting with the formation of a markedly pro-liberalization government in Estonia in 1992 and continuing

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<sup>46</sup> Milanovic (1999).

<sup>47</sup> As in Roberts (1977).

<sup>48</sup> Assuming—this being a median voter model—that the increased inequality was also associated with increased skewness.

<sup>49</sup> See for example Lindert (2000), who calls this the ‘Robin Hood paradox.’

<sup>50</sup> Taxation then serves in part to correct the external damage that each individual confers on others by working more. And the more equal are initial incomes, the more this consideration may dominate over standard efficiency and redistribution concerns.

<sup>51</sup> Mitchell (2005, p. 990), for instance, says of these countries that: “Having experienced the terrible consequences of a system based on ‘from each according to his ability,’ [they have]....instead chosen tax systems based on the principle that all citizens should be treated equally.”

<sup>52</sup> The flat tax was adopted there in the second term of President Kuchma.

through the election of Vladimir Putin in 2000, the 2003 ‘Rose Revolution’ in Georgia, and the 2004 coalition government in Romania. These were governments with a strong mandate for reform, inheriting an environment in which traditions of tax compliance and enforcement were weak, and in which the income tax, while being levied at rates commonplace in OECD economies and elsewhere, raised—and continues to raise—relatively little revenue: only 4.1 percent of GDP on average in these eight countries in 2003, for example, compared to an OECD average of 6.4. Why then might such countries be particularly ripe for a flat tax?

At least for the second wave of reforms, it is hard not to conclude that a key reason for adopting a low-rate flat tax has been as a means of attempting to signal to the rest of the world a fundamental regime change, shifting towards more market-oriented policies:<sup>53</sup> This would be consistent with the Brennan-Buchanan view discussed in Section II.A above, with the adoption of a flat tax intended as a way of tying the government’s hands in limiting the size of government. Certainly the assessment of the Slovak reform by Ministry of Finance (2005; p.79), for instance, gives prominence to the marketing advantage of the flat tax. Importantly, this shift has, in the most successful cases, involved not only a reduction in marginal tax rates, betokening an increased concern for incentive effects. It has also (as in Russia and Georgia) been marked by a commitment to improved tax enforcement and encouragement of voluntary compliance, and (as in the Slovak Republic and Ukraine) a scaling back of tax preferences and exemptions, not only potentially reducing significant distortions but, more generally, indicating an increased willingness of government to renounce an activist stance of favoring particular activities or sectors.

In other countries, where this commitment to an even-handed treatment of distinct taxpayers is less in doubt, where tax compliance is better established and tax administration more effective, where the income tax is more important in revenue terms, and where presumptions of marginal rate progressivity are more entrenched, the attractions of the flat tax are correspondingly less. The question is whether, as these conditions become more established in the flat tax countries themselves, the flat tax structures there will prove sustainable. The strengthening of the additional tax in Serbia in 2006,<sup>54</sup> and the discussion of flat taxation in the 2006 elections in the Slovak Republic, suggest the flat tax may not prove politically robust in the years ahead.

#### IV. CONCLUSIONS

The “flat taxes” adopted in recent years differ widely. The first wave of flat taxes, for example, typically set the single rate at the highest of the pre-reform marginal tax rates; the second typically set it at the lowest. Even among the second wave reforms, some applied the same rate to corporate earnings, while others did not. Several, like the Slovak Republic, significantly increased the personal allowance; Georgia eliminated it altogether. This

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<sup>53</sup> In this respect, the early flat taxes of the distinctly investor-friendly tax systems of Hong Kong SAR and the Channel Islands may have had some role as a model.

<sup>54</sup> See footnote 5.

diversity of design—plus variety too in the nature and extent of accompanying reforms to social contributions and benefits, and in levels of indirect taxation—precludes simple generalizations. The lessons that can be drawn are limited too by the relative paucity of careful empirical analysis: except for Russia and the Slovak Republic, there seems to be no reform analyses based on household-level data. There is an evident need for studies in other flat tax countries along similar lines.

With these cautions, there do, nevertheless, emerge a few key lessons:

- Except in Russia, the second wave of low-rate flat tax reforms have been associated with a reduction in revenue from the PIT: behavioral responses may have mitigated the revenue loss, but in no case does there has appear to have been a Laffer effect: these reforms have not set off effects strong enough for them to pay for themselves. And in Russia, there is little evidence that the strong revenue performance after the reform was due to the flat tax itself: rather it appears to have reflected wider macroeconomic recovery.
- There is evidence that compliance improved after the Russian reform. This is in line with a plausible view of the nature of the avoidance/evasion decision in circumstances where administration is extremely weak—and so may also fit the circumstances of other flat tax countries—but there is no firm evidence that it was due to the parametric tax reform rather than to changes in enforcement occurring around the same time.
- The impact of the flat tax on work incentives is not clear cut in principle, and there is no evidence that it has been strong in practice. For the highest income groups that often appear to be of special interest, perhaps on the view that these are innovative people with special importance for wider growth prospects, the effect of a second wave reform is to increase work incentives by reducing the marginal tax rate but blunt them by also reducing the average tax rate. Similar ambiguities, and perhaps even disincentive to effort, appear elsewhere in the wage distribution. The question thus becomes an empirical one; and the only study to date which looks at actual household responses to the introduction of a flat tax, for Russia, does not detect any significant impact on work effort.
- The distributional effects of movement towards a flat tax are potentially complex: second wave reforms that involve an increase in the basic tax-free amount are beneficial to both the lowest and the highest earners, and compliance effects may in themselves plausibly lead to an increase in effective progressivity. There is thus no general presumption that movement to a flat tax in itself is associated with a reduction in progressivity, though the commonly used summary indices of progressivity—which, in the few studies of this issue, show an increase in progressivity—may overstate the point.
- While flatness itself is certainly a simplification, eliminating some potential forms of tax arbitrage, the rate structure itself is commonly not the primary source of

complexity in taxation. This comes more from exemptions and special treatment of various kinds. Thus the (limited) survey evidence for Russia for example, does not suggest that the system was widely seen as significantly less complex after adoption of the flat tax.

- The rate-cutting aspect of the second wave reforms has enabled some countries to construct a political package that has included significant base-broadening through the elimination of various exemptions and preferences—in Ukraine, for example, the base broadening measures were estimated to have increased revenue by around one point of GDP. This in itself is likely to have been a source of improved horizontal equity (though this does not appear to have been studied in any of these countries) and of efficiency gains, as well as of greater simplicity.
- While the question has received little attention in the debate, and appears not to have been studied empirically, movement to a flat tax may plausibly strengthen the automatic stabilizers, not weaken them.
- The flat tax has commonly—almost universally—been adopted by new governments anxious to signal a fundamental regime shift, towards more market-oriented policies. In several cases, the signal appears to have been well-received. Where no such reputation needs to be acquired, the appeal of the flat tax is consequently less.

What remains unclear is the sustainability of the flat tax. Structurally, the flat taxes that have been adopted do not provide a coherent framework for dealing with the difficulties that almost all countries now perceive in taxing internationally mobile capital income. These tensions are most evident in the first wave of flat taxes, which in some respects are most usefully thought of as special cases of a dual income tax. Dealing with the continuing pressures in taxing capital income may point towards pursuing that logic still further, for example in the treatment of the self-employed; and may also nudge the second wave reformers with the higher flat rates towards decoupling the taxation of capital income from that of labor income. Political economy considerations point towards the adoption of rate schedules that tend to benefit middle income earners: exactly the group that tends to lose most from the adoption of a second wave flat tax. Moreover, the very spread of the flat tax in itself undermines its value as a signal: it may prove too easy to mimic. While there will no doubt be new members of the flat tax community, in some respects the more interesting question is whether there will be any defections.

## REFERENCES

- Allingham, Michael, and Agnar Sandmo, 1972, "Income Tax Evasion: A Theoretical Analysis," *Journal of Public Economics*, Vol. 1, pp. 323–38.
- Andreoni, James, Brian Erard, and Jonathan Feinstein, 1999, "Tax Compliance," *Journal of Economic Literature*, Vol. 36, pp. 818–60.
- Auerbach, Alan, and Daniel Feenberg, 2000, "The Significance of Federal Taxes As Automatic Stabilizers," *Journal of Economic Perspectives*, Vol. 14, pp. 37–56.
- Besley, Timothy, and Stephen Coate, 1995, "The Design of Income Maintenance Programs," *Review of Economic Studies*, Vol. 62, pp. 187–221.
- Boadway, Robin, Katherine Cuff, and Maurice Marchand, 2000, "Optimal Income Taxation with Quasi-Linear Preferences Revisited," *Journal of Public Economic Theory*, Vol. 2, pp. 435–60.
- Bohn, Henning, and Charles Stuart, 2003, "Voting and Nonlinear Taxes in a Stylized Representative Democracy," CESifo Working Paper No. 1058 (Munich: CESifo).
- Bradford, David, 2003, "The X-Tax in the World Economy," CEPS Working Paper No. 93 (Brussels: Centre for European Policy Studies).
- Brennan, Geoffrey, and James Buchanan, 1977, "Towards a Tax Constitution for Leviathan," *Journal of Public Economics*, Vol. 8, pp. 325–73.
- Brook, Anne-Marie, and Willi Leibfritz, 2005, "Slovakia's Introduction of a Flat Tax as Part of Wider Economic Reforms," OECD Economics Department Working Paper No. 448 (Paris: Organization for Economic Cooperation and Development).
- Chua, Dale, 2003, "Tax Reform in Russia," in *Russia Rebounds*, ed. by David Owen and David Robinson (Washington: International Monetary Fund).
- Dardoni, V., and Peter Lambert, 1988, "Welfare Rankings of Income Distributions—A Role for the Variance and Some Insights for Tax Reform," *Social Choice and Welfare*, Vol. 5, pp. 1–17.
- Davies, James B., and Michael Hoy, 2002, "Flat Rate Taxes and Inequality Measurement," *Journal of Public Economics*, Vol. 84, pp. 33–46.
- Edwards, Jeremy, and Michael Keen, 1996, "Tax Competition and Leviathan," *European Economic Review*, Vol. 40, pp. 113–34.
- Feldstein, Martin, 1995, "The Effect of Marginal Tax Rates on Taxable Income: A Panel Study of the 1986 Tax Reform Act," *Journal of Political Economy*, Vol. 103, pp. 551–72.



- Gaddy, C.G., and W.G. Gale, 2005, "Demythologizing the Russian Flat Tax," *Tax Notes International*, March 14, pp. 983–88.
- Goolsbee, A., 1999, "Evidence on the High-Income Laffer-Curve from Six Decades of Tax Reform," *Brookings Papers on Economic Activity*, pp. 1–64.
- Hall, Robert E., and Alvin Rabushka, 1983, *Low Tax, Simple Tax, Flat Tax* (New York: McGraw Hill).
- , and Alvin Rabushka, 1985, *The Flat Tax* (Stanford: Hoover Institution Press).
- Hemming, Richard, and Michael Keen, 1983, "Single-Crossing Conditions in Comparisons of Tax Progressivity," *Journal of Public Economics*, Vol. 20, pp. 373–80.
- Hindriks, Jean, Michael Keen, and Abhinay Muthoo, 1999, "Corruption, Extortion, and Evasion," *Journal of Public Economics*, Vol. 74, pp. 395–430.
- Ivanova, Anna, Michael Keen, and Alexander Klemm, 2005, "The Russian "Flat Tax" Reform," *Economic Policy*, Vol. 20, pp. 397–444.
- Jakobsson, U., 1976, "On the Measurement of the Degree of Progression," *Journal of Public Economics*, Vol. 5, pp. 161–68.
- Kanbur, Ravi, Michael Keen, and Matti Tuomala, 1994, "Optimal Nonlinear Income Taxation for Income Poverty Alleviation," *European Economic Review*, Vol. 38, pp. 1613–32.
- Lambert, Peter, 1993, *The Distribution and Redistribution of Income* (Manchester: Manchester University Press).
- Larsen, Thomas, 2006, "A Flat Tax in Denmark?" *IB Revija*, Vol. XXXX, pp. 111–17.
- Lindert, Peter, 2000, "Three Centuries of Inequality in Britain and America," in *Handbook of Income Distribution*, ed. By A.B. Atkinson and F. Bourguignon (North-Holland: Amsterdam).
- Milanovic, Branko, 1999, "Explaining the Increase in Inequality During the Transition," Mimeo, World Bank Policy Research Department (Washington: World Bank).
- Mikloš, Ivan, Marek Jakoby, and Karol Morvay, 2005, "Tax Reform in the Slovak Republic." *CESifo DICE Report*, Vol. 3, pp. 53-60.
- Ministry of Finance of the Slovak Republic, 2005, *First Year of the Tax Reform, or 19 Percent at Work*, Economic Analysis 8.

- Mirrlees, James A., 1971, "An Exploration in the Theory of Optimum Income Taxation," *Review of Economic Studies*, 38, pp. 175–208.
- Mitchell, Daniel J., 2005, "Eastern Europe's Flat Tax Revolution," *Tax Notes International*, March 14, pp. 989–90.
- Mitra, Pradeep, and Nicholas H. Stern, 2003, "Tax Systems in Transition," World Bank Policy Research Working Paper 2947 (Washington: World Bank).
- Moore, David, 2005, "Slovakia's Tax and Welfare Reforms," IMF Working Paper 05/133 (Washington: International Monetary Fund).
- Murphy, Richard, 2006, "Flat Tax: Not as Simple as They'd Have You Think," *IB Revija*, Vol. XXXX, pp. 94–100.
- Peichl, Andreas, 2006, "The Distributional Effects of a Flat Tax Reform in Germany—A Microsimulation Analysis," *IB Revija*, Vol. XXXX, pp. 90–93.
- Persson, Mats, 1995, "Why are Taxes So High in Egalitarian Countries?" *Scandinavian Journal of Economics*, Vol. 97, pp. 569–80.
- Poterba, James, 1991, "Is the Gasoline Tax Regressive?" in *Tax Policy and the Economy*, ed. by David Bradford, Vol. 5, pp. 145–64.
- Price Waterhouse (1996), *Individual Taxes, 1996*.
- Rabushka, Alvin, 2005, "A Competitive Flat Tax May Spread to Lithuania," *Hoover Institution Public Policy Inquiry*, March 24.
- Roberts, Kevin, 1977, "Voting Over Income Tax Schedules," *Journal of Public Economics*, Vol. 8, pp. 329–40.
- Saez, Emmanuel, 2002, "Optimal Income Transfer Programs: Intensive Versus Extensive Labor Supply Responses," *Quarterly Journal of Economics*, Vol. 117, pp. 1039–73.
- Sinel'nikov-Mourylev, S., S. Batkibekov, P. Kadotchnikov, and D. Nekipelov (undated), "Income Tax Reform in the Russian Federation: An Estimation of the Outcomes" (Moscow: Institute for Economies in Transition).
- Slemrod, Joel, 2001, "A General Model of the Behavioral Response to Taxation," *International Tax and Public Finance*, Vol. 8, pp. 119–28.
- \_\_\_\_\_, and Shlomo Yitzhaki, 2002, "Tax Avoidance, Evasion, and Administration," in *Handbook of Public Economics*, (ed) Alan Auerbach and Martin Feldstein (North-Holland: Amsterdam) pp. 1423–70.

Stephanyan, Vahram, 2003, "Reforming Tax Systems: Experience of the Baltics, Russia, and Other Countries of the Former Soviet Union," IMF Working Paper 03/173 (Washington: International Monetary Fund).

Teather, Richard (2005), "A Flat Tax for the UK—A Practical Reality," Briefing (Adam Smith Institute: London).

Tuomala, Matti, 1990, *Optimal Income Tax and Redistribution* (Oxford: Clarendon Press).

World Bank, 2005, *The Quest for Equitable Growth in the Slovak Republic*, Report No. 32433\_SK (Washington: World Bank).

Yitzhaki, Shlomo, 1974, "A Note on 'Income Tax Evasion: A Theoretical Analysis,'" *Journal of Public Economics*, Vol. 3, pp. 201–02.

## Appendix I. A Summary of the “Flat Tax” Reforms

The tables that follow describe the tax systems immediately after and before adoption of the flat tax.

### Estonia

	General Income Tax 1/		Corporate Tax and Dividends 2/		Interest and Capital Gains	Social Contributions		VAT Rates
	Rates	Personal allowances	Rates	Treatment of dividends		Employer	Employee	
1994	26	EEK 3,600 3/	26	Exempt	Interest: 10 percent final withholding, 4/; Capital gains usually taxed as ordinary income.	33	zero	18
1993	16, 24, 33	EEK 2,400	35	NIA	Capital gains usually untaxed.	33	zero	18

Notes:

1/ Retained profits untaxed from 2000, and distributions taxed at the general rate.

2/ General rate of tax on labor and corporate income 24 percent in 2006; to be reduced by one point each year to 20 percent in 2009.

3/ Inter-company dividends carried a tax credit at 26/74 percent. (From 2005, intra-company dividends are exempt.)

4/ Interest income from credit institutions untaxed in 1994; non-exempt interest taxed at 24 percent in 2006.

### Lithuania

	General Income Tax		Corporate Tax and Dividends 1/		Interest and Capital Gains	Social Contributions		VAT Rates
	Rates	Personal allowances	Rates	Treatment of dividends		Employer	Employee	
1994	33	LTD 115	29 2/	No withholding system	Capital gains taxed as ordinary income	30	1	18
1993	10, 18, 24, 28, 33	LTD 35	29	NIA	NIA	30	1	18

Notes:

1/ Corporate tax rate 15 percent in 2002; personal tax rate remains at 33 percent.

2/ 10 percent reduced rate was introduced for retained earning in 1994 and it was reduced to zero in 1997.

**Latvia**

	General Income Tax		Corporate Tax and Dividends		Interest and Capital Gains	Social Contributions		VAT Rates
	Rates	Personal allowances	Rates	Treatment of dividends		Employer	Employee	
1997	25	LVL 252, plus 126 for spouse and per child	25	1/ No change	No change	33	5	18, 9
1996	25, 10	LVL 270, plus 138 for spouse and per child	25	Dividends paid by Latvia company exempt	Deposit interest paid by Latvian bank exempt	37	1	18, 9

Notes:

1/ Corporate tax rate 15 percent in 2006; personal tax rate remains at 25 percent

**Russia**

	General Income Tax		Corporate Tax and Dividends		Interest and Capital Gains	Social Contributions		VAT Rates
	Rates	Personal allowances	Rates	Treatment of dividends		Employer	Employee	
2001	13	RU 4,800 per annum	35	1/ 30 percent withholding, with credit for underlying CIT 2/	Interest: 13 percent, except 35 percent on 'excessive' bank interest; Capital gains: taxed as ordinary income	Marginal rates decreasing from 35.6 to 5 percent	Zero	20, 10
2000	12, 20, 30	RU 3,168 per annum	30	15 percent final withholding	Interest: 15 percent final withholding; Capital gains: taxed as ordinary income	38.5	1	20, 10

Notes:

1/ Combined federal and provincial rate remained at 30 percent, but municipalities were allowed to charge an additional 5 percent.

2/ A withholding agent may apply the 13 percent rate if the recipient is a Russian resident.

### Slovak Republic

	General Income Tax		Corporate Tax and Dividends		Interest and Capital Gains	Social Contributions		VAT Rates
	Rates	Personal allowances	Rates	Treatment of dividends		Employer	Employee	
2004	19	SK 80,832; spouse, SK 80,832 1/	19	Exempt	Interest: 19 percent withholding; Capital gains: taxed as ordinary income	35.2	13.4	19
2003	10, 20, 28, 35, 38 2/	SK 38,760; spouse, SK 12,000	25	15 percent final withholding	Interest: 15 percent final withholding; Capital gains: taxed as ordinary income	38.2	12.8	20, 14

Notes:

1/ Plus annual tax credit of SK 4,800 per child.

2/ These rates applied to wage income; additional rates applied to other forms of income.

### Ukraine

	General Income Tax		Corporate Tax and Dividends		Interest and Capital Gains	Social Contributions		VAT Rates
	Rates	Personal allowances	Rates	Treatment of dividends		Employer	Employee	
2004	13	Hrv 61.5 per month for those earning less than 1.4 minimum monthly living amounts	25	13 percent final withholding	Interest: final withholding at 13 percent 2/; Capital gains: taxed as ordinary income	No change	2-3.5	20
2003	10, 15, 20, 30, 40	Hrv 17 per month	30	30 percent withholding in advance	Interest: exempt; Capital gains: taxed as ordinary income	37 plus sector dependent accident 9	1.75-3	20

Notes:

1/ There are in addition sector-specific contributions for accident insurance, at rates of 0.25-0.5 percent.

2/ Rate has since been reduced to 5 percent.

**Georgia**

	General Income Tax		Corporate Tax and Dividends		Interest and Capital Gains	Social Contributions		VAT Rates
	Rates	Personal allowances	Rates	Treatment of dividends		Employer	Employee	
2005	12	No basic exemption	20	No change	No change	20	zero	18
2004	12, 15, 17, 20	GEL 108 basic exemption	20	10 percent final withholding	Interest: 10 percent final withholding; capital gains: taxed as ordinary income	31	2	20

**Romania**

	General Income Tax		Corporate Tax and Dividends		Interest and Capital Gains	Social Contributions		VAT Rates
	Rates	Personal allowances	Rates	Treatment of dividends		Employer	Employee	
2005	16	ROL 2.5 million per month, with additional 1 million per dependent	16	10 percent final withholding 1/	Interest: 10 percent final withholding; capital gains: 10 percent	no change	no change	19, 9
2004	18, 23, 28, 34, 40	ROL 2 million per month, with additional 1 million for spouse and each dependent child	25 2/	5 percent final withholding	Interest: 1 percent final withholding; capital gains: 1 percent final withholding	22-32 3/	9.5	19, 9

## Notes:

- 1/ Tax on investment income raised to 16 percent in 2006.
- 2/ Reduced rates applied to exporters and in disadvantaged regions.
- 3/ Depending on the nature of work.
- 3/ Tax on investment income raised to 16 percent in 2006.

## General notes to table

- 1/ Rates in percent.
2. "NIA" indicates no information available.
- 3/ Social contribution rates are in several cases aggregates of distinct charges.
- 4/ Corporation tax is classical (that is, no allowance made for underlying corporate tax paid) unless otherwise indicated.
- 5/ Description of interest and capital gains taxation relates to individual taxpayers.

Appendix II. Composition of Tax Revenues Before and After Introduction of the Flat Taxes  
(In percent of GDP)

	Personal Income Tax		Corporate Income Tax		Indirect Taxes	
	Year Before the Reform	Year of the Reform	Year Before the Reform	Year of the Reform	Year Before the Reform	Year of the Reform
Estonia	8.5	8.1	4.8	3.5	11.1	13.3
Georgia	2.7	2.5	1.6	1.9	8.1	11.0
Latvia	5.4	5.6	2.0	2.4	12.6	12.5
Lithuania	5.0	5.4	5.3	2.5	6.2 1/	6.3 1/
Romania	3.0	2.3	2.7	2.4	10.2	10.9
Russia	2.4	2.9	5.5	5.8	8.6	9.9
Slovak	3.3	2.6	2.8	2.4	9.8	11.4
Ukraine	5.1	3.8	5.0	4.7	8.8	8.6
Unweighted average	4.4	4.1	3.7	3.2	9.4	10.5

Sources: IMF country documents; and Fund staff estimates.

1/ Includes only VAT.



### Appendix III. Equity Aspects of the Flat Tax

#### The effective flat tax schedule is *more* progressive than the statutory

To compare the statutory schedule

$$T_F(Y) = \max[t.(Y - A_F), 0] \quad (\text{A3.1})$$

with the effective schedule

$$T_F^*(Y) = \max[t.(Y - A_F - \bar{E}), 0] \quad (\text{A3.2})$$

where  $\bar{E}$  denotes the amount of concealment, the same for all taxpayers (as shown in the text), we apply the Hemming-Keen result for non-equal yield comparisons described in the text. For this, denote by  $R$  the revenue raised by each tax and define the normalized schedules

$$\hat{T}_F \equiv \frac{T_F}{R_F} ; \quad \hat{T}_F^* \equiv \frac{T_F^*}{R_F^*}. \quad (\text{A3.3})$$

The marginal rate under the normalized effective flat tax schedule is higher than that under the normalized statutory, since

$$\hat{T}_F^{*'} - \hat{T}_F' = \frac{t}{R_F^*} - \frac{t}{R_F} = \frac{t}{R_F} \left( \frac{R_F}{R_F^*} - 1 \right) > 0, \quad (\text{A3.4})$$

the inequality being because the effective schedule raises less than the statutory. So, where the normalized statutory and effective schedules cross (as they must, since they raise the same revenue), the effective cuts from below—and so is more progressive.

#### The effective pre-existing tax schedule is *less* progressive than the statutory

In this case we use the result of Jakobsson (1976) that tax  $M$  more progressive than  $L$ , whatever the distribution of income, iff the elasticity of tax payments under  $M$  is greater than that under  $L$ . Elasticity under the effective schedule  $T^*$  (omitting the subscript  $P$ ) is

$$\frac{YT^{*'}}{T} = \frac{Y.T'(Y - E(Y)).(1 - E')}{T(Y - E(Y))} < \frac{YT'(Y - E(Y))}{T(Y - E(Y))} < \frac{YT'(Y)}{T(Y)} \quad (\text{A3.5})$$

where the first inequality is from  $E' < 1$  (as shown in the text) and the second from log convexity of  $T$ .<sup>55</sup>

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<sup>55</sup> Since  $\partial \ln[T(Y)] / \partial Y = T' / T$ , log convexity means that  $T'(Y) / T(Y)$  increases with  $Y$ .

## Appendix IV. Automatic Stabilizers and the Flat Tax

Note first that the condition that the two tax schedules raise the same revenue  $R$  implies (normalizing the population size to unity) that

$$R = \int_0^{\infty} T_p(Y) f(Y) dY = \int_0^{\infty} \max[t(Y - A), 0] f(Y) dY \quad (\text{A4.1})$$

$$= t \int_A^{\infty} Y f(Y) dY - tA(1 - F(A)), \quad (\text{A4.2})$$

where  $F(\cdot)$  is the distribution function. The difference in built-in flexibility under pre-reform and flat tax,

$$B_p - B_F \equiv \int_0^{\infty} T'_p(Y) Y f(Y) dY - t \int_A^0 Y f(Y) dY \quad (\text{A4.3})$$

thus becomes

$$B_p - B_F \equiv \int_0^{\infty} \{T'_p(Y) Y - T_p(Y)\} f(Y) dY - tA(1 - F(A)) \quad (\text{A4.4})$$

$$= \int T_p(Y) \left( \frac{T'_p(Y) Y}{T_p(Y)} - 1 \right) f(Y) dY - tA(1 - F(A)) \quad (\text{A4.5})$$

$$= \int T_p(Y) \left( \frac{T'_p(Y) Y}{T_p(Y)} - 1 \right) f(Y) dY - \frac{RA}{E[Y|Y \geq A] - A} \quad (\text{A4.6})$$

where the first equality substitutes for  $t \int_A^0 Y f(Y) dY$  from (A4.2), the third uses the solution for  $t$

from (A4.2), and we have defined  $E[Y|Y \geq A] \equiv \left( \int_A^{\infty} Y f(Y) dY \right) / (1 - F(A))$ . Noting that progressivity

of the pre-reform system implies that the marginal rate is greater than the average, the claims in the text follow from (A4.6). With  $A = 0$ , built-in flexibility is unambiguously greater under the pre-reform tax; if, on the other hand, the progressivity of the pre-reform schedule is sufficiently weak (in the sense that liability progression—the elasticity of tax payments with respect to pre-tax income—is sufficiently close to unity) and/or  $E[Y|Y \geq A]$  sufficiently close to  $A$ , then it is higher under the flat tax.