GEA
Grupul de Economie Aplicata
Str. Clucerului nr. 34 Sect.1 Bucuresti 011366 Romania
Tel.: 0314022675, 0314022676 Fax: 021/2225109
E-mail: office@gea.org.ro Web: www.gea.org.ro

Multi-Annual Budgeting and the Future of Fiscal Policy in Romania[♣]

Study prepared by

Laurian Lungu

with the assistance of **Amalia Fugaru** and **Dorin Mantescu**

Project Coordinator: **Daniel Daianu**

Comments and Analysis by
James Foreman-Peck and **Florin Citu**

March 2005

[♣] We thank seminar participants at the Hilton Hotel on 24 February 2005 for helpful discussions.
[♣♣] This study was part of the programme "Strengthening Economic Governance in Romania on the way to EU Accession", financed through the Global Opportunities Fund, a support scheme launched in 2003 by the Foreign and Commonwealth Office of the UK and administered in Romania by the British Embassy in Bucharest.

Table of Contents

1. Introduction

A country's macroeconomic stability and long-run economic growth potential success depend crucially on the implementation of the right mix of monetary and fiscal policies. Thus, government policies are bound to have an important influence on ensuring that the course of the economy could follow a sustainable economic growth path or indeed, that fiscal policy would not be a source of macroeconomic imbalances. One of the issues that arises in this context is that of fiscal sustainability. A sustainable fiscal policy implies that government's stock of debt should not be allowed to grow beyond the point where the debt to GDP ratio would be too high to service debt payments. Given the fact that over the longer term there are significant uncertainties surrounding projections of future fiscal costs, getting a measure of the risks associated to various scenarios is of paramount importance. Long-term fiscal strategies will have to ensure that the pursued social objectives are met without recourse to persistent budget deficits that could, eventually, endanger macroeconomic stability.

In addition to the attention devoted to long-term fiscal costs, such as reforming the health or pension systems, Romania will have to take into consideration the significant fiscal pressures that are to be expected in the short and medium term. The need to upgrade the country's poor infrastructure and contributions to the EU budget are set to burden the country's fiscal deficits in the years to come. It is therefore vital that these costs are smoothed over the coming years and will be accounted for in such a way as to avoid the occurrence of excessive budget deficits. A multi annual fiscal policy framework would, for these reasons, be appropriate. Over the last years, under the supervision of international financial institutions, the Romanian authorities have succeeded in adopting a conservatory fiscal stance. The implementation of a multi annual budgeting approach would help the authorities to build up on the progress they have already made while also reducing the risks associated with large deficits. The need for budgetary restraint in the coming years is particularly important given the country's need to reduce inflation to EU levels.

The study is structured as follows. The following section reviews several theoretical concepts that are important when implementing fiscal policy such as transparency, public

debt management and sustainability. Section 3 does an analysis of fiscal policy in Romania. Section 4 presents simulation results of a small model, which estimates each of the components of tax revenues as a function of the gross domestic product (GDP), with the implications for fiscal policy in the medium run. The study ends with a section of conclusions.

2. Issues on Fiscal Policy

Fiscal transparency has long been at the centre of international institutions' attention. At its spring and autumn meetings in 1996 the IMF's Interim Committee emphasised the need for more fiscal transparency, especially where off-budget transactions and quasi-fiscal deficits were involved. Kopits and Craig (1998) provide a useful review of the issues related to fiscal transparency. Because governments are usually the largest single debtors in each country, the transparency of their operations is an important pre-condition for macroeconomic stability. The transparency issue has to be applied to all government's objectives. In this respect, den Noord (2001) suggests that objectives such as macroeconomic sustainability, allocative efficiency and technical efficiency are paramount for a better specification and implementation of fiscal policy. Elements that help defining such objectives include fiscal policy rules, medium-term fiscal frameworks and fiscal management and control systems.

For example, over the last years a series of countries have adopted, either explicitly or implicitly, various forms of fiscal rules. These are aimed, primarily, at preventing a highly volatile and pro-cyclical fiscal policy stance, at the same time ensuring its sustainability. By adopting such a rule the government effectively imposes a constraint on its spending policies. An important aspect worth mentioning here is that in order to be credible, the rule has to be applied on a long-term basis by successive governments. Kopits and Symansky (1998) identify several types of fiscal policy rules that are in operation in countries around the world. These rules can either fix a limit on the size of government deficit as a proportion of GDP, or impose some sort of borrowing constraints or restrict the stock of gross (net) government liabilities as a proportion of GDP.

According to the Maastricht Treaty, the annual government deficit and the gross debt are restricted to 3% and 60% of GDP respectively for all EMU members. It has to be said however, that various EU countries have been in a breach of either one of these limits for several years. Both governments of France and Germany for example, have been exceeding the 3% limit on the government deficit ceiling over the last couple of years. Italy and Belgium on the other hand have had public sector deficits well in excess of the 60% limit[1]. It is not surprising therefore that, although initial suggestions by some EU members to change the Maastricht criterion on the fiscal deficit rule were rejected, in the end some changes are eventually set to be implemented. In March 2005 EU finance ministers agreed on sweeping plans to re-write the Stability and Growth Pact by devising a new set of EU fiscal rules. Although these changes are perceived, in general, as weakening budgetary discipline in Europe, constraints on indicators of overall fiscal performance remain still in place and are considered to be essential for the EU-wide macroeconomic stability. Indeed, if monetary policy is delegated to an independent central bank, as it is the case with the ECB, fiscal policy is significantly constrained. Apart from ensuring sound public finances over the medium term, fiscal policy has to support the ECB in its objective of price stability. This is necessary in order to achieve solvency and secure long-run consistency between public debt and money holdings.

It is well acknowledged the importance of debt management decisions, which play a crucial role in governments' fiscal strategies. At the extreme, a poor debt management could lead to a government defaulting on its repayment obligations which, in turn, would trigger a loss of credibility on international markets. This will make it considerably more difficult for a bankrupt government to tap into foreign markets for some time or, if it manages to do so, it is very likely it will have to pay a substantial risk premium.

A document published by the IMF and the World Bank in November 2002 sets out a set of guidelines for public debt management with the aim of reducing the government's exposure to financial vulnerability. The paper covers a broad range of issues ranging from the institutional aspects of government structures to techniques for issuing government securities in domestic and foreign markets. The document contains also 18

[1] However, the reference value of 60% of GDP does not include publicly guaranteed liabilities and other contingent liabilities.

country case studies that address the issues these countries have been dealing with while improving their public debt management practices.

3. Fiscal and Budgetary Policy in Romania

3.1 Introduction

In December 2004 the European Council confirmed the provisional closure of accession negotiations with Romania. The country is now expected to sign the EU treaty in April 2005 and, barring any unexpected developments, it should join the EU in January 2007. Starting from that moment on Romania is expected to be bound by the rules of the Stability and Growth pact as well as the Broad Economic Policy Guidelines. It will have to present an annual Convergence Programme to the European Commission (EC) and follow the EC's recommendations on economic policy. In the light of this, Romania will have to implement a set of sustainable and stabilising fiscal-financial policies. Several remarks are worth mentioned. Firstly, the independence of the NBR in its conduct of monetary policy severely constrains fiscal policy. The latter will have to be designed in such a way as to support the current disinflation strategy and not to pose an additional threat to the external balance. Secondly, given these constraints, there is a need for a thorough assessment of the future costs on the budgetary and fiscal policies. Apart from the EU-related costs such as contributions to the EU budget, increased spending on infrastructure and environment projects, other pressures on government expenditure, such as those brought about by social security, education and health reforms, are expected to burden the deficit in the years to come. Finally, in order to smooth out these costs and ensure a fiscal and financial stability in the years to come, the government's objectives will have to be subordinated to an intertemporal budget constraint. This suggests a move towards the implementation of a multi-year budgetary framework. At present, the budget has a one year horizon only, which is far too short for assessing any medium term risks posed by changing macroeconomic conditions. It is true that projections of several fiscal variables are available for the next four-five years (see the section below) but these are usually extrapolated from current data with only minor changes based on some ad-hoc assumptions being considered.

The remaining subsections address the issues related to public finance in Romania. It looks at the structure of government revenues and expenditure and does an analysis of the public and publicly guaranteed debt. It also makes an attempt to assess the magnitude of the costs that are likely to burden the budget in the years to come.

3.2 The Budgetary Policy

Arguably, over the last few years fiscal policy in Romania has been tight. In this respect, the authorities' determination to achieve the deficit targets agreed with international financial institutions has played, undoubtedly, a major role. As it can be seen from Table 3.1 the budget deficit balance, which is a good indicator of the fiscal policy sustainability, has been following a decreasing trend. This has been falling from 4% of GDP in 2000, to an estimated 1.2% of GDP in 2004.

Table 3.1 The Budget Deficit (% of GDP). Actuals for the period 2000-2003 and projected for the period 2004-2008.

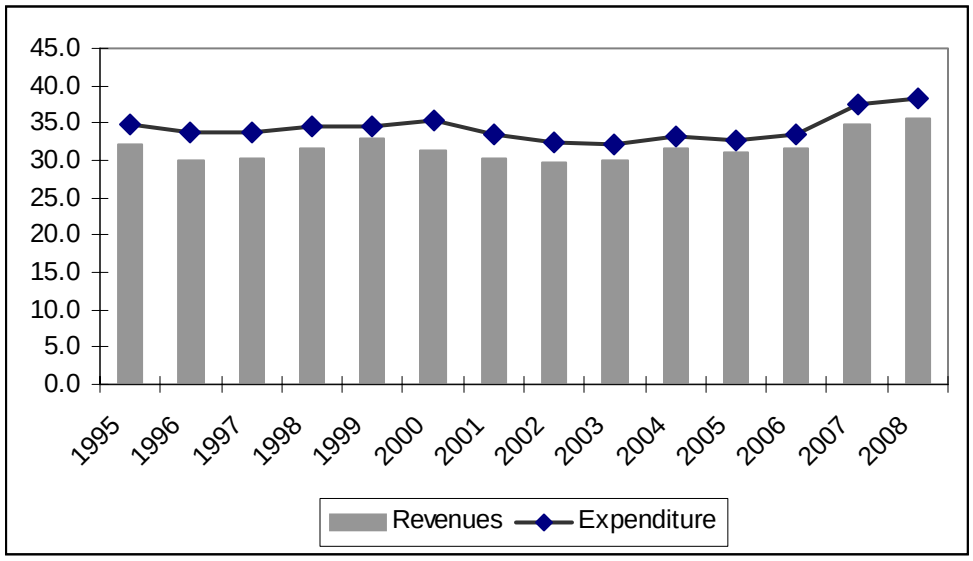
	2000	2001	2002	2003	2004	2005	2006	2007	2008
Overall Balance	-4.0	-3.2	-2.6	-2.3	-2.5	-0.7	-1.9	-2.5	-2.7
Primary Balance	0.9	0.6	0.4	-0.2	-1.2	0.0	-0.2	-0.8	-1.2

Source: IMF and the Ministry of Finance

However, the increasing need for government finance in the medium run is expected to widen the budget deficit in the years to come. For 2008 the deficit is projected to reach 2.7% of GDP, close to the maximum 3% Maastricht criteria limit. It has to be noted that the reduction in fiscal deficits does not reflect the true picture for the government's fiscal position. Government spending has been kept under control largely by artificial polices such as non-payment to suppliers of goods and services or taxes. In spite of the implementation of various measures to contain them, budget arrears have been increasing

to an estimated 4% of GDP at the end of 2003[2]. As it can be seen from Figure 3.1 over the last decade total revenues have been fluctuating around 30% of GDP while total expenditure, after reaching a peak of 35% of GDP in 2000, has since been falling gradually.

Figure 3.1 General Government Revenue and Expenditure (% of GDP). Forecast values for the 2004-2008 period.



Maybe not surprisingly, the largest budget deficits over the period under consideration have been incurred during the election years, 3.8% and 4% in 1996 and 2000 respectively. From this point of view, moving towards a multi-annual budgeting framework would restrict severely government's manipulation of funding aimed at targeted expenditure programmes in order to gain political advantages.

Government Revenues

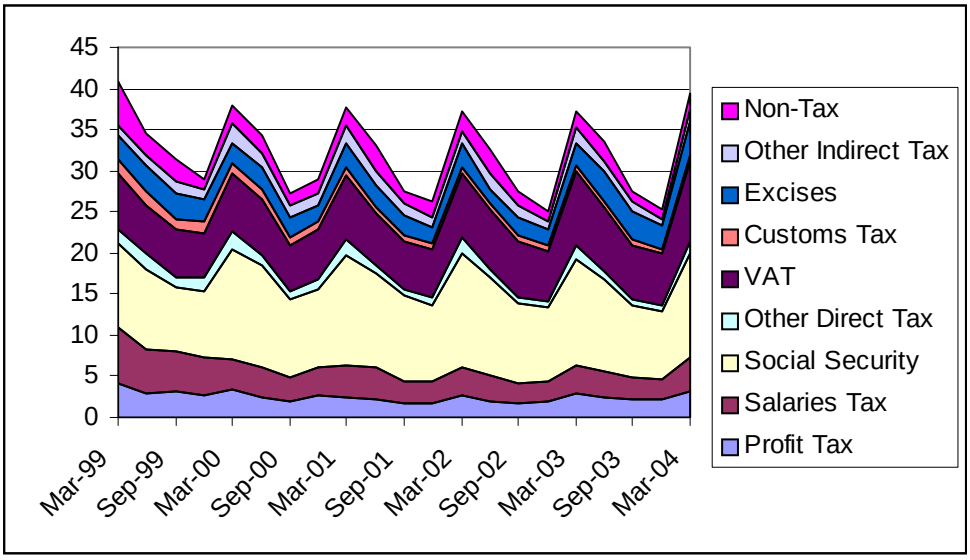
An analysis of the structure of government revenues is presented in Figure 3.2 below. The data is quarterly and covers the period 1999q1-2004q1[3]. As it can be noticed, it

[2] Given data paucity, an exact estimate for the government arrears is difficult to obtain. The World Bank report (2004b) puts the figure to 1% of GDP at the end of 2002, acknowledging that it may be underestimated. The NBR estimates budgetary arrears at 4% of GDP.

[3] The choice over the data sample is motivated by the fact that the total revenues component of the general consolidated budget is available from 1999. In contrast, the total expenditure component is available only from 2002.

exhibits a substantial cyclical component. Output tends to be lower in the first and the fourth quarter mostly because the economic activity in sectors like agriculture and construction is sensibly lower during the winter period.

Figure 3.2 General Government Revenue by Category (per cent of GDP)



The share of annual direct tax revenues in GDP have been falling from 18.5% in 1999 to 15.9 in 2004 while the share of indirect tax revenues in GDP has been raising from 11.2% to 12.2% over the same period. Among the indirect tax revenues, the VAT is by far the largest source of revenue for the government.

The budget report for 2005 includes a chapter that presents forecast values of revenues and expenditure of various budgetary headings for the period 2004-2008. A summary of these is presented in Tables 3.2 and 3.3 below:

Table 3.2 Estimated General Consolidated Budget Revenues for the Period 2004-2008

-% of GDP-

	2004	2005	2006	2007	2008
Revenues –total*[)]	31.5	31.2	31.6	34.9	35.6
Of which:					
Fiscal Revenues	28.3	27.9	28.8	29.9	29.9

Direct Tax	16.1	15.5	16.0	16.5	16.1
Of which:					
- profit tax	2.7	2.3	2.4	2.3	2.0
- income tax	3.1	2.9	3.1	3.3	2.6
- social security contributions	9.5	9.2	9.6	10.0	10.6
Indirect tax	12.2	12.5	12.8	13.3	13.7
Of which:					
- VAT	7.2	7.1	7.2	7.3	7.3
- excises	3.4	3.7	4.1	4.6	5.0
- customs tax	0.7	0.6	0.7	0.7	0.7
Non-financial Revenues	1.3	1.3	1.2	1.2	1.2
Capital Revenues	0.2	0.2	0.2	0.2	0.2
Donations and Sponsorships	1.7	1.8	1.4	3.7	4.4

*) Includes non-rambursable funds estimated to be received from the EU.

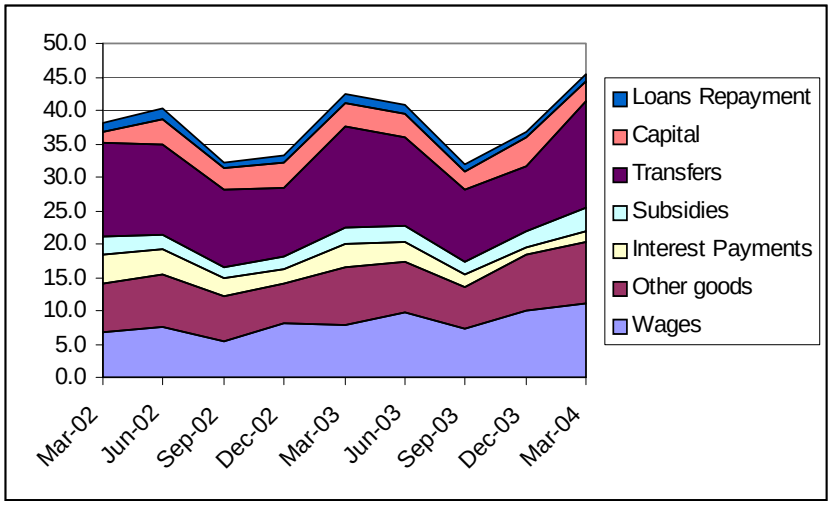
Source: Romanian Ministry of Finance

It has to be said, however, that there is a large degree of uncertainty surrounding the tax revenues for certain categories. Under the current government's tax reform programme, which has become effective from January 2005, the share of tax revenues in GDP are expected to fall in 2005 by around 0.5%. Profit tax has been cut from 25% to 16% and is estimated to generate a reduction of 0.08% of GDP in profit tax revenues. Increased excises tax revenues (forecast at 0.3% of GDP) are expected to compensate the cumulative fall in wage and social security.

Government expenditure

Figure 3.3 shows the general government expenditure by category. One fact that stands out is the continuous rise in spending on wages and salaries which grew from 6.8% of GDP in the first quarter of 2002 to 11% of GDP in March 2004.

Figure 3.3 General Government Expenditure by Category (per cent of GDP)



Source: Ministry of Finance Data.

Interest payments on public debt have been falling by more than 1% of GDP between 2002 and 2003. In fact, as it can be noticed from Table 3.1 by subtracting the primary deficit from the overall deficit, the downward trend of falling interest rate payments started earlier, in year 2000. This has been mainly a consequence of the shift from a more expensive government domestic borrowing to a cheaper external financing, which was possible due to falling risk premia for government bonds on international markets over the last years. Transfers and subsidies account by far of the largest bulk of government expenditure reflecting, among other things, the scale of social security costs.

The Ministry of Finance projected expenditure by category over the medium term is shown in Table 3.3 below.

Table 3.3 Estimated General Consolidated Budget Expenditure for the Period 2004-2008

-% of GDP-

	2004	2005	2006	2007	2008
Expenditure - total	33.1	32.7	33.5	37.4	38.3
Of which: Wages and salaries	4.9	4.8	4.9	4.9	4.9
Other goods and services	6.9	6.7	7.1	7.3	7.2
Interest rate payments on public debt	1.5	1.5	1.7	1.7	1.5
Subsidies, bonuses and transfers	16.4	16.6	16.4	19.2	19.9
Out of which: transfers	14.1	14.6	14.9	17.7	17.9

Capital expenditure	3.1	3.1	3.3	4.2	4.7

Source: Romanian Ministry of Finance

While the share of wages and salaries spending in GDP is assumed to be maintained constant, subsidies and transfers are forecast to rise, partly due to co-financing requirement on the EU projects. Similarly, capital expenditure is projected to rise over the period as more government funds are required to be channelled to infrastructure projects, environment or rural development.

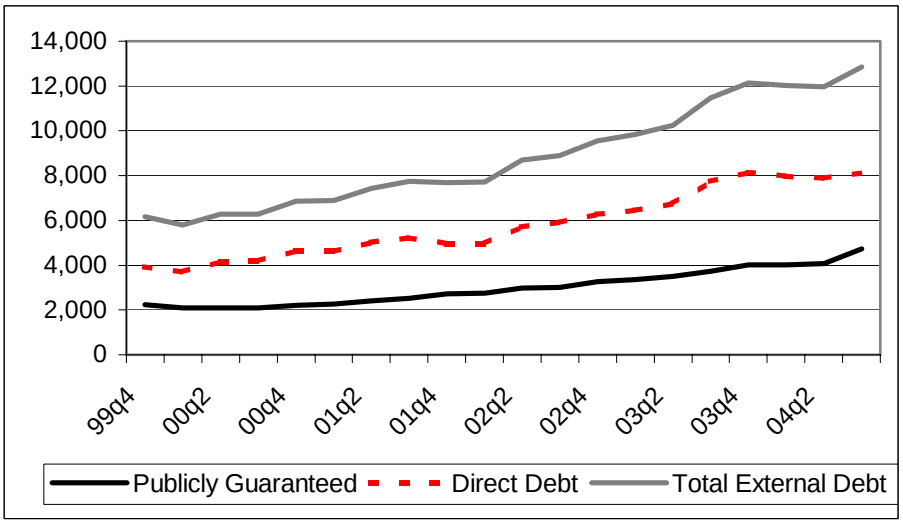
One important aspect that should be noticed is that the values above (and indeed in Table 3.2) are simple projections based on a fixed set of macroeconomic assumptions. Thus, for example, GDP is assumed to grow from 5.3% in 2006 to 5.6% in 2008 while annual inflation is expected to fall from 4% to 3% over the same period. One drawback with those projections is that they do not take into consideration various scenarios for the macroeconomic variables on which the assumptions are based upon. The probability of getting the forecast values right gets smaller the larger the forecast horizon is. This is because uncertainty becomes greater over longer time horizons. There is a risk that, under unfavourable economic conditions, revenue might well fall short of its forecast value and, if expenditure were to be kept at the targeted levels, this would create a pressure on budget deficits. For this reason, performing a sensitivity analysis (i.e. changing assumptions on the macroeconomic variables of interest) would yield a better picture of the risks associated with the forecast exercise.

3.3 Public Debt

The stock of public debt is an important indicator of public finance sustainability. In June 2004 the government harmonised the public debt law[4] to comply with the EU legislation. Under the EU law, publicly guaranteed debt is allowed only in circumstances where the funds are used for investment projects that are of a major importance for the economy. The evolution of the stock of total public debt (which includes the publicly guaranteed debt) is shown in Figure 3.4.

[4] Law No. 313/2004.

Figure 3.4 Total Public External Debt (US$ millions)



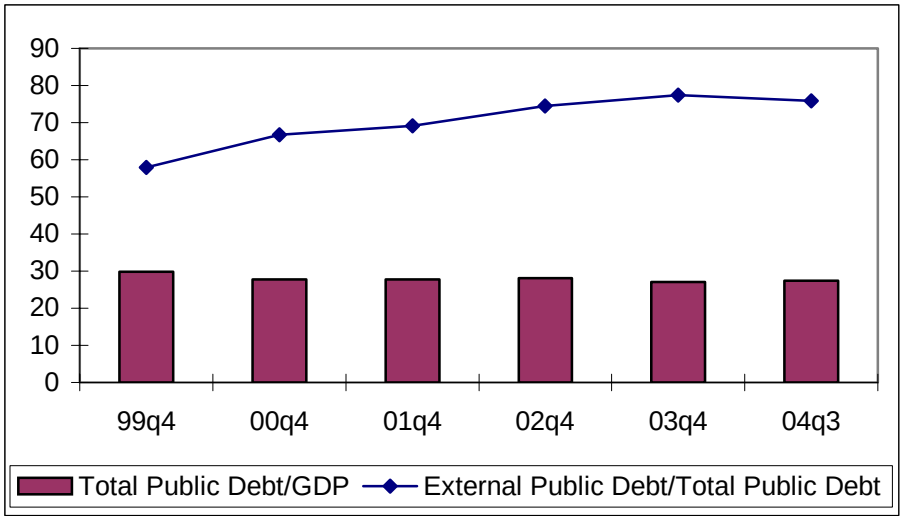
Source: Ministry of Finance

Although the stock of publicly guaranteed debt has been increasing by less than direct public debt since 1999, the former still poses a threat to public finances in the short term. In 2000 the government had to step in and cover more than 40% of its publicly guaranteed debt as companies that contracted the debt defaulted on their payment obligations. Since then the ratio fell to 30% in 2003, nevertheless this is still at an unacceptable high level.

The share of external public debt in total public debt[5] has been rising from 58% in the last quarter of 1999 to almost 76% at the end of September 2004 (see Figure 3.5). More than 40% of the total public debt is euro denominated while around 30% is denominated in US dollars. Such an over reliance on foreign finance could leave the government exposed to exchange rate risk (a depreciation of the Leu against the euro/dollar would raise the costs of servicing the debt). On the other hand, the high interest rate differentials between domestic and foreign markets explain why the government has found it cheaper to borrow from external creditors.

Figure 3.5 Total Public Debt/GDP and External Public Debt/Total Public Debt (%)

[5] Total public debt is the sum between internal and external public debt. It also includes publicly guaranteed debt.



Source: Ministry of Finance

The share of total public debt in GDP is low compared to other Eastern European countries and less than half of the Maastricht criteria limit of 60%.

3.4 Government Financing Requirements

The pressures on the government budget can be identified from a short or medium term perspective. In the present context the short term will refer to the year 2005 while the medium term covers the period up to year 2008. The short term analysis essentially focuses on the budgetary implications brought about by the tax reform – which has started to be implemented in January 2005. Most of the data on the estimated impact of tax reform is from the Ministry of Finance.

Short Term

Estimated changes in revenues[6]

Profit Tax. The reduction form 25% to 16% in the profit tax is expected to create a shortfall in government revenues of Lei 2,600 billion (-0.10% of GDP)[7]. On the other hand, the increase in profit tax for micro-enterprises from 1.5% to 3% is expected to

[6] For the current purposes the nominal GDP for 2005 has been estimated at Lei 2,655,148 billions (based on 5% real GDP growth and annual average inflation of 8%).

[7] This estimate comes from the Ministry of Finance but it looks incredulously small. The 7 percentage points reduction in profit tax should amount, *ceteris paribus*, to a 0.28% fall in profit tax revenues. Given that the share of profit tax revenues in GDP was around 2.8 in 2004, the estimated fall in profit tax revenues should be much higher.

generate some Lei 5,400 billion (+0.20% of GDP)[8]. Overall, the profit tax revenues are expected to increase by 0.1% of GDP. For the reason presented in footnote 7, it is unlikely that the gap in profit tax revenues could be bridged in the short run, even if the government's assumptions prove to be correct and the fall in profit tax revenues associated with the tax cut would be offset to some extent by an increase in profit tax payments due to a rise in the number of contributors.

Income Tax. The income tax reform replaces the 5-band tax rates, ranging from 18% to 40%, to a flat rate of 16%. The loss in income tax revenue is estimated to be around Lei 20,000 billion (-0.76% of GDP). Current proposals to raise taxes on dividends and capital gains to 10% are expected to generate around Lei 6,000 billion (+0.22% of GDP). This would leave a gap in income tax revenues of 0.54% of GDP compared to the initial budget draft.

Social Security Contributions. The postponement of the 2% reduction in social security contributions, as planned under the initial 2005 budget, is estimated to make available around Lei 17,870 billion (+0.67% of GDP).

Excises[9]. The appreciation of the leu against the euro is expected to create a shortfall of Lei 7,725 billion compared to the initial 2005 draft budget. To reduce this gap, the current proposals aim at bringing forward the calendar for rising excises. Under this scenario, an additional Lei 7,000 billion is expected to be raised in 2005. This still leaves a gap of an estimated Lei 775 billion (-0.03% of GDP).

VAT. The increase in consumption is forecast to yield some Lei 1,420 billion to revenues (+0.05% of GDP).

Customs Tax. The initial draft budget assumed an exchange rate of 42,500 lei/euro in 2005. However, given the tendency of the Leu appreciation against the euro, the corrected forecast exchange rate has been assessed to be around 37,500 lei/euro. Under this scenario the expected revenues shortfall is Lei 1,700 billion (-0.07% of GDP). It has to be noticed, however, that, if the current pace of money inflows continues the Leu could appreciate even further against the euro.

[8] An analysis produced by the Group of Applied Economics considers this figure optimistic.

[9] Some items, like cigarettes for example, have both a specific and an 'ad valorem' excise. The former is expressed as percentage of selling price while the latter is a fixed amount – usually in euros – per unit of volume.

Estimated changes in expenditure

Pensions. The estimated cost of pensions re-alignment is around Lei 26,000 billions out of which Lei 8,000 billions has already been budgeted for. The process is expected to be finalised in 2005 and would require an additional financing of Lei 18,000 billion (-0.68% of GDP).

Wages. The increase in public sector wages is estimated to cost around Lei 14,000 Billion (-0.53% of GDP).

Subsidies. Reductions in subventions for mining and agriculture are expected to save the budget some Lei 10,000 Billion (+0.38% of GDP).

Overall, the increase in government expenditure amounts to 0.83% of GDP.

Given the fact that the 2005 budget deficit is expected to be reduced by 1%, compared to the initial deficit of 1.5% of GDP, the estimated consolidated budget deficit seems to be in the region of 1.4% of GDP. Table 3.4 below presents the results:

Table 3.4 Estimated General Consolidated 2005 Budget (% of GDP)

	Original	Impact of Tax Reform	Draft Budget
Revenue	**31.2**	+0.28	**31.48**
Profit Tax	2.3	+0.10	2.4
Income Tax	2.9	-0.54	2.36
Social Security Contributions	9.2	+0.67	9.87
Other Direct Tax	1.1	-	1.1
VAT	7.1	+0.05	7.15
Customs Tax	0.6	-0.07	0.53
Excises	3.7	-0.03	3.67
Other Indirect Tax	1.0	-	1.0
Non-financial Revenues	1.3	-	1.3
Capital revenues	0.2	-	0.2
Donations and	1.8	-	1.8

Sponsorships			
Expenditure	**32.7**	+0.83	**33.53**
Required Reduction in Deficit		-0.5	**-0.5**
Budget Balance (Deficit)	**-1.5**		**-1.57**

Medium Term

The Environmental Costs

One of the large costs Romania has to fulfil by joining the EU is that related to upgrading its environmental standards. The World Bank report (2004) suggests that the estimated total investment cost of implementing the main environmental directives for the economy as a whole could be as high as euro 30 billion. These costs cover investments required for improving air and water quality standards, waste management and so on, and are spread over a number of years, going up to 2015. The environmental expenditures are shared among state budget, local budgets and non-public sources.

For the period 2005-2006 the net state investment (ie after subtracting the funds received from the EU) is estimated to be around euro 130 million per annum (World Bank, 2004, Table 8.6) while the net local government expenditure could amount to euro 450 million per annum[10]. In the period from 2007 to 2008 these costs are expected to be in the same range for the state budget but increase to an estimated euro 740 million for local budgets[11].

Given that the estimated amounts spent on meeting the environmental standards between 1997 and 2001 appear to be in the region of euro 20 million for state budget and euro 90 million for local government, the financing gap for the following years seems to be

[10] In the period 2006-2007 the implementation of Directive 97/43 (human health security against ionising radiation) is expected to cost the state budget around euro 2.6 billion. However, due to the scope of this investment, additional funds are expected to be secured both from the EU and other external sources. Consequently, this cost is not taken into account in the current analysis.

[11] The same costs are expected to be incurred in the period 2009-2011. After 2011, the net state and local government investment is expected to decline and would be easier to meet as the economy expands.

around euro 110 million and euro 360 million respectively. Together these costs will average around 0.74% of GDP for the period 2005-2008. Part of these investment requirements are supposed to be financed from the Environmental Fund[12], which was set up in 2002.

Transport Infrastructure Costs

Given its relatively poor transport infrastructure Romania is expected to spend large amounts of money in the years to come for upgrading this. Plans for capital spending are not finalised and, at the moment, any estimates for these costs are bound to have a certain margin of error. A rough estimate on the cost related to investment in the transport infrastructure for the 2005-2025 could be in the region of euro 32 billion[13]. Out of this, road infrastructure alone is forecast to be around euro 22 billion. Assuming an annual average economic growth rate of 5% during the period, if the infrastructure costs would be borne solely by the government, the annual average burden to the government budget could be somewhere in the region of 1.45% of GDP. However, these costs are usually financed through long-term loans. Also, it is very likely that some money would be available from the EU to finance these investments

Pension Costs. Spending on pensions has averaged around 7% of GDP between 2001-2004. However, the pension fund balance exhibited a deficit of 0.2% of GDP. If contribution rate falls by 2% in 2006 and 2007 the pension fund deficit is expected to expand to an average of 0.5% of GDP.

Other Costs. In addition to the cost above there are other costs, such as social protection, education, research or health care for which Romania currently pays less than other EU countries. In the medium term it is necessary that the expenditures on those areas are raised (or indeed, setting up public-private partnerships where possible) in order to get closer to the EU average. For example, social protection is by far the most important item

[12] The Environmental Fund collects environmental-related fees and taxes.
[13] Estimates are from the presentation of the governor of National Bank of Romania '2025 Strategy. Sustainable Development of the Financial Sector in Romania in the period 2005-2025', Bucharest, November 4, 2004.

of EU governments, averaging, for EU-15, around 40% of total government expenditure over the last years. Social protection includes expenditure on unemployment and sickness benefits, old age or families and children. The second and third largest expenditure items in the EU-15 area are health and education with shares in total government expenditure in 2002 of 13.9% and 10.8% respectively. In contrast, Romania spent in 2004 an estimated 9.6% of total expenditure on health and only 22% of total expenditure on state social security.

A point of interest is to see how the level of tax revenue in Romania compares to that of other Member States. Table 3.5 below shows the level of tax revenues from 2000 to 2003 for a selection of EU countries.

Table 3.5 Total Revenue Indicator – selected countries (% of GDP)

	EU-25	Czech Republic	Germany	Ireland	Hungary	Poland	Slovenia	Slovakia	Sweden	UK
2003	41.5	36.2	41.7	31.2	39.2	35.8	40.3	30.9	51.4	37.1
2002	41.3	35.5	41.7	29.8	38.9	35.5	39.7	32.5	51.0	37.0
2001	42	34.6	42.2	31.6	39.3	35.4	39.4	32.1	52.9	38.5
2000	42.7	34.5	44.0	33.3	39.6	35.2	39.3	33.2	54.7	38.7

Source: Eurostat.

As it can be seen from the Table 3.5 above, Sweden has the highest level of tax revenue in the EU. Romania belongs to the group of countries that have a relatively low level of tax revenue in terms of GDP, at around 30%[14]. Arguably, tax levels are only one of many

[14] The group comprises of Ireland (31.2%), Slovakia (30.9%), Latvia (29.1%) and Lithuania (28.7%). Data for the last two countries is not reported in Table 3.5.

determinants of economic performance[15]. But an important element in assessing the relevance of tax revenue level on the overall economic performance is the identification of what exactly goes into the public sector and how much to spend on it. For this reason, the pursuit of achieving a level of tax revenue close to the EU-25 average *per se* could be damaging for the Romanian economy if it would involve an increase in taxes or be accompanied by a rise in public sector inefficiency. The problem is compounded by the fact that the measurement of the later is becoming increasingly difficult as the output of government services is particularly hard to assess.

If the experience of other East European countries on the effects of EU integration could be of any guidance to Romania, Table 3.6 below displays values for the budget deficits, public debt and current account for the Czech Republic, Hungary and Poland for the period 2001-2004. A first observation is that, after joining the EU became a certainty in 2001, all three countries experienced both internal and external balances deterioration. The pressures brought about by compliance with EU requirements have led to the emergence of large budget deficits which, in the case of Czech Republic and Hungary has been accompanied by similar current account deficits.

Table 3.6 Budget deficit, public debt and current account for Czech Republic, Hungary and Poland, 2001-2004 period, (% of GDP).

	% of GDP	Czech Republic	Hungary	Poland
2001	Budget Deficit	-5.0	-4.7	-5.3
	Public Debt	22.9	53.5	41.0
	Current account	-5.4	-3.3	-2.9
2002	Budget Deficit	-6.7	-9.4	-6.3
	Public Debt	25.5	57.1	46.7
	Current account	-5.6	-4.1	-2.6
2003	Budget Deficit	-6.2	-6.0	-5.8
	Public Debt	27.9	59.1	51.6
	Current account	-6.2	-5.5	-1.9

[15] For data and analysis on government spending and expenditure on more countries see Bailey (2004).

2004 (forecast)	Budget Deficit	-7.0	-4.6	-7.2
	Public Debt	31.3	59.5	54.4
	Current account	-5.5	-5.3	-2.3

Source: IMF

On the other hand, Hungary and Poland are close to the 60% public debt Maastricht criterion which will further restrict their governments' borrowing capabilities.

The data in Table 3.6 above seem to suggest that Romania could follow a similar path – since it is likely to incur the same pressures. To minimise such risks it is essential that monetary and fiscal policy are co-ordinated within a medium term framework and that the EU accession costs are assessed realistically.

4. Model Specification and Simulations

Given the importance of fiscal sustainability for macroeconomic stability it is desirable for the government to implement its policies in a fiscal framework that would allow for both short and medium term analyses of various tax and/or expenditure changes. This should reduce the chances that large swings from one year to the next occur in government budget deficits or public debt. However, it is well known that forecasting the public finances inevitably involves a significant margin of uncertainty. Fiscal balances are especially prone to such uncertainty since they represent the differences between two very large aggregates. Because economic activity influences the tax base – and thus the tax proceeds – it is important that the sensitivity of budget items to the economic cycle is assessed adequately. The main problem here however, is how to define the cycle. Usually, these definitions involve the concept of long-run equilibrium output, for which in practice exists several alternative calculation methods. In Romania this problem is compounded by the shortage of data sample and the uncertainties that surround the path of future changes which will affect the country's economic structure. The next sub-section attempts to estimate the GDP elasticities on tax revenue components.

4.1 Estimation of GDP elasticities on tax revenue components

At present, the budgetary policy in Romania is devised under a fixed set of assumptions. The drawback with this approach is that it allows little room for contingency plans analyses. Tax revenues tend to be synchronised with the economic cycle, i.e. they are pro-cyclical, since significant portions of the tax base, such as private income and personal consumption, are pro-cyclical. On the other hand, at the moment, most of the Romanian government expenditure is non-discretionary. This makes it rather difficult for the authorities to implement sizeable cuts in their expenditure programmes. Thus, unfavourable fluctuations in output could push the budget deficit higher, over the budget draft limit. While such outcomes may happen, it would be useful for the government to have some quantitative measures of the deviations in budget deficits in order to adjust the course of fiscal policy accordingly.

The present multi-annual budgetary exercise is an attempt to allow for such uncertainties to be quantified. The model consists of two blocks, one for the tax revenues and the second one for government expenditures. The period under consideration is 2005-2008. An issue of interest is how variable are government revenues to fluctuations in output. One would expect corporate tax revenues to exhibit a higher volatility since corporate profits fluctuate over the cycle. On the other hand, indirect tax will depend, mainly, on private consumption so that the GDP elasticity of the tax revenue of indirect taxes should be close to one. Table 4.1 below presents the effects of a one per cent increase in GDP on government revenue items. The data is quarterly and covers the period 1999q1 – 2004q1. The estimated coefficients are obtained by running an ordinary least squares regression on a constant and the logarithm of GDP.

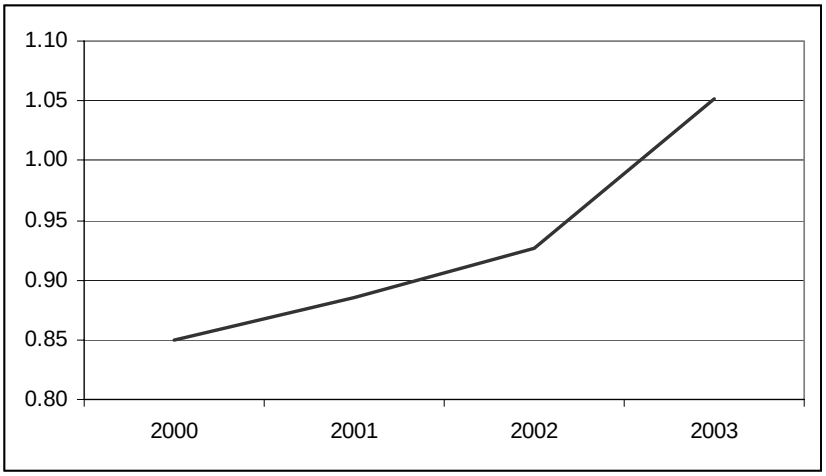
Table 4.1 GDP elasticities on tax revenue components (OLS estimates, t – statistic in parentheses).

	Constant	Log(GDP)	R squared	DW statistic
Total Revenue	0.96 (1.39)	0.83 (15.13)	0.92	1.72
Total direct tax	0.95 (1.34)	0.79 (13.91)	0.91	1.78
Salaries Tax	2.29 (2.94)	0.55 (8.77)	0.80	1.17
Social Security	-1.65 (-1.71)	0.95 (12.36)	0.89	1.66

Other direct tax	2.18 (1.59)	0.47 (4.30)	0.49	1.87
Profit Tax	0.18 (0.19)	0.69 (8.88)	0.80	0.96
Total indirect tax	-1.49 (-2.12)	0.95 (16.87)	0.94	1.82
VAT	-3.33 (-4.04)	1.05 (15.96)	0.93	1.83
Customs Tax	2.58 (3.32)	0.41 (6.67)	0.70	1.71
Excises	-3.2 (-2.61)	0.97 (9.87)	0.84	1.34
Other indirect tax	-1.6 (-1.14)	0.79 (6.99)	0.72	1.70
Non-tax	1.17 (0.77)	0.59 (4.89)	0.56	1.77

Several points are worth mentioned with respect to the Table 4.1 above. First, the total revenue appears to grow less than the increase in GDP over the sample period, a one percent increase in GDP growth would lead to only a 0.83% rise in total revenue. However, this result could be influenced by a number of factors that, one of them being the relatively weak performance of tax collection in earlier years of the data sample. As Figure 4.1 suggests, in the year 2003 the situation has been actually reversed, total revenue grew by 0.5% more than GDP did compared to a year ago.

Figure 4.1 Ratio of the change in total revenue to the change in GDP (%)



Source: Author's calculations from the Ministry of Finance data.

Secondly, total direct tax revenues vary less with economic activity than total indirect tax revenues. The GDP elasticity of social security tax is 0.95, the higher amongst the

components of direct tax revenues[16]. This is partly due to the existence of statutory contribution ceilings which are defined in per capita terms. The GDP elasticity of salaries tax, 0.55, looks rather small. One reason for this could be attributed to the existence of the informal sector, especially in agriculture and construction. While the outputs of these sectors are recorded in GDP, a large share of the labour input that is used to produce these outputs is not officially registered and, therefore, does not pay salaries tax. Thirdly, both VAT excises tax revenues show an almost one to one response to changes in GDP growth. This happens because – on average - indirect tax revenue is mostly proportional with private consumption.

Some of the t' statistics of the log(GDP) coefficients in table 4.1 above, such as those for salaries and profit tax, tend to indicate the presence of positive first order autocorrelation. To see whether the results can be improved in this respect the model equations have been also estimated by two stage least squares (TSLS). The results are presented in Table 4.2 below.

Table 4.2 GDP elasticities on tax revenue components (TSLS estimates, t – statistic in parentheses). The instruments used in all equations consist of a constant and a trend.

	Constant	Log(GDP)	R squared	DW statistic
Total Revenue	-0.20 (-0.25)	0.92 (14.53)	0.91	1.96
Total direct tax	-0.16 (-0.21)	0.87 (13.49)	0.90	2.00
Salaries Tax	1.61 (1.87)	0.60 (8.75)	0.79	1.17
Social Security	-2.85(-2.64)	1.05 (12.11)	0.88	1.88
Other direct tax	0.46 (0.30)	0.61 (4.94)	0.45	2.02
Profit Tax	-1.01 (-0.93)	0.78 (9.02)	0.79	1.06
Total indirect tax	-2.68 (-3.29)	1.04 (16.03)	0.93	2.04
VAT	-4.71(-4.94)	1.16 (15.24)	0.92	2.06
Customs Tax	2.75 (3.26)	0.40 (5.97)	0.70	1.74

[16] This is in line with observed values in various countries. Paul van den Noord (2000) documents values for the GDP elasticity of social security tax ranging from 0.5 to a little above 1 in both OECD and developing countries.

Excises	-4.42 (-3.26)	1.06 (9.81)	0.83	1.41
Other indirect tax	-2.47 (-1.61)	0.86 (6.97)	0.71	1.80
Non-tax	-0.06 (-0.04)	0.69 (5.20)	0.54	1.79

As a general remark, the GDP elasticities of tax revenue components estimated by TSLS are, on average, higher by around 0.1 compared to the OLS results while the DW statistics look slightly better. As it is well documented, however, different choices of instruments are likely to yield different results. Another problem that arises in the context of estimating elasticities is that these could change over time due to changes in the structure of tax rates. Given the fact that the estimation procedure above is based on a time series analysis[17] and that over the estimation period there have been several changes in the tax structure it would be of more interest to obtain interval estimates instead of point estimates for the GDP elasticities of tax revenues. In order to do that a so-called bootstrap procedure is employed. This would yield 95% confidence interval limits for each of the estimated coefficients in Table 4.1. The procedure starts by saving the residuals of individual equations obtained by OLS estimation. Next, 1,000 pseudo-samples of dependent variables are created using randomly drawn errors, by adding these errors to the fitted values of the dependent variables. This process is done independently for each estimated equation. Then, the equations are re-estimated by OLS yielding 1,000 pseudo-values for the equations coefficients. Table 4.3 below presents the results.

Table 4.3. Bootstrap results for the GDP elasticities on tax revenue components*.

	95% confidence interval limits for the coefficients of log(GDP)
Total Revenue	0.72 – 0.93
Total direct tax	0.67 – 0.88
Salaries Tax	0.42 – 0.67
Social Security	0.81 – 1.08
Other direct tax	0.24 -0.66

[17] Elasticities can be computed with the aid of a simple formulae, using data in a given year only. See for example Creedy and Gemmell (2004).

Profit Tax	0.54 – 0.84
Total indirect tax	0.84 – 1.05
VAT	0.92 – 1.17
Customs Tax	0.30 – 0.53
Excises	0.76 – 1.14
Other indirect tax	0.56 – 1.00
Non-tax	0.34 – 0.83

*Full results of the bootstrap simulations are reported in Appendix 1.

As expected, the 95% confidence intervals encompass the values obtained by OLS and TSLS. For some tax revenues, such as other indirect and direct taxes or non-tax revenues the coefficients range is pretty large suggesting a relatively large variability in these tax revenues with the level of GDP. The results in Table 4.3 show why the margin of error is so large when one tries to forecast tax revenues. The errors become even larger over longer forecast time horizons.

4.2 Model Structure and Simulations

For the purpose of the subsequent analysis the tax revenues block uses the equations coefficients estimated in Table 4.1. Although using quarterly data makes the analysis slightly more complicated, this helps in offering a better view of the likely impact of fiscal policy changes – given that the timing of these changes does not necessarily correspond to the fiscal year dates. In order to get an estimate for each of the tax revenue components, a baseline projection of GDP for the period of interest should be obtained first. This is done by assuming a future path for annual real GDP growth and inflation (Table 4.1)

Table 4.1. Main Assumptions for Baseline Projections, 2005-2008.

Year	2005	2006	2007	2008
Annual GDP Growth	5%	5%	5%	5%
Average Annual Inflation Rate	8.2%	6%	5%	4%
Exchange Rate, Leu/Euro	37,500	36,500	36,000	35,500

Interest Rate	11.5%	9%	8%	7%

Quarterly GDP forecast values are calculated assuming that GDP follows a similar cyclical behaviour as observed over the last years. These central assumptions about GDP growth are used to generate a baseline projection for each of the tax revenue components. In Table 4.1 there are no estimates for capital revenues, for simplicity these are forecast at 0.2% of GDP in each year. Also, donations and sponsorships are not included in tax revenues. According to the Ministry of Finance forecasts the latter could be quite large, up to 4.4% of GDP in 2008, given the expected increasing amounts of non-reimbursable funds to be received from the EU. However, these can be easily incorporated into the model as soon as the timing and value of disbursements are known.

Once the quarterly baseline projections for output and tax revenues are obtained, the model computes the annual values for each variable in part. To interpret the results more easily the model's output displays tax revenue as a percentage of GDP.

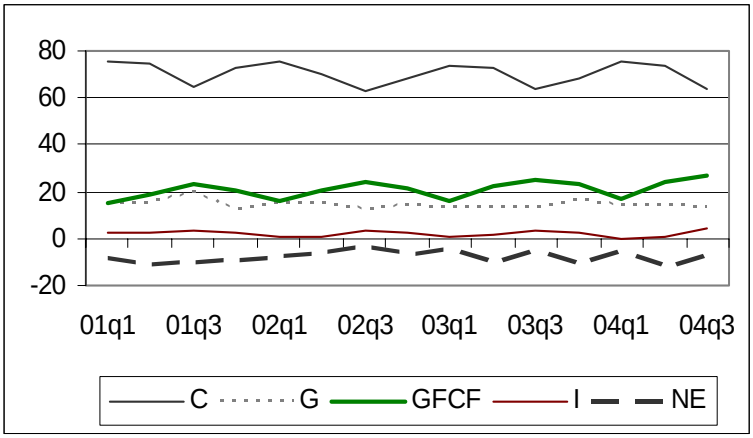
The next step in the simulation procedure is to allow for different realisations in the quarterly output - which is equivalent with a multi-scenario analysis. In the current model specification there are different ways to do this, what it is important however, is to specify the output errors processes accordingly. For example, projections of quarterly GDP can be obtained for any given range of output growth, instead of a unique central value. Subtracting the baseline GDP nominal values from the lower and upper bound of those projections would yield the distribution of the expected error process. This distribution can be either symmetric (to the baseline values), if the lower and upper bounds are equidistant to the central projection, or asymmetric. After the forecast distribution of shocks to output growth is obtained, the model performs a bootstrap procedure[18] which yields probability distributions for each tax revenue components over the chosen time period. Each outcome in a probability distribution can be interpreted, in effect, as a possible 'state of the world' in which output realisation (and hence tax revenues) can be higher or lower depending on the sequence of shocks that hit the economy.

[18] The bootstrap procedure involves drawing randomly (with replacement), in succession, 16 errors from the errors distribution. The procedure is repeated over 1,000 times to generate the required probability distributions.

Arguably, the assumption that each component of tax revenues is a function of GDP alone is a simplistic one, and has been used here mainly because of data limitations. A better estimate of income tax collections, for example, would be feasible if data on the number of employees and their corresponding income bands was available. Similarly, for forecasting revenues from excises there is a need for an estimation of market demand for those products first. Then, the impact of appreciation/depreciation of the Leu should be taken into consideration, possibly by adding the exchange rate variable on the right hand side of the regression.

The VAT revenues are also, in practice, expected to vary with the sum of consumption, government spending, investment, and imports. However, as it can be seen from Figure 4.2, GDP seems to be a good proxy for the sum of the above variables.

Figure 4.2 Output Components as % of GDP. (C – private consumption, G – government spending, GFCF – gross fixed capital formation, I – change in inventories, NE – net exports)



Source: IMF Database

One additional source of error could come from the estimated coefficients. The recent changes in tax rates that have been implemented in Romania are likely to modify these coefficients. The analysis performed in the previous section shows that there are going to be re-distributional effects following the fiscal policy reform. To account for these changes in the current model set-up one possibility is to add (or subtract) the estimated changes to each tax revenue (expressed as percentage of GDP) or expenditure item.

Because most of the expenditures are non-discretionary, the forecast values for these is obtained by some form of indexation. In addition to this other estimated costs, such as infrastructure or environmental costs could be added to overall government expenditures to see how these will impact on the probability distribution of budget deficit (and public debt dynamics). Thus, while fluctuations in output could generate higher or lower tax revenues, the expenditures are fixed unless there is some sort of policy intervention to change them. This, in turn, will yield a higher or lower budget deficit. The full model equations are described in Appendix 2.

The interest rate payments on domestic and foreign debt are treated separately. Essentially, the real interest rate can be computed as:

$$r = w * r_d + (1 - w) * (r_f - \gamma) \qquad (4.1)$$

where r is the real rate of interest on debt, w is the weight of domestic debt in total debt, r_d is the interest rate on domestic debt, r_f is the interest rate on foreign debt and γ is a measure for the Leu appreciation/depreciation (a real appreciation implies $\gamma > 0$).

Once the expected probability distributions for tax revenues and expenditures are obtained it is possible to evaluate the sustainability of public debt dynamics. This can be done by using the government budget constraint as given in equation 4.2 below.

$$\frac{\Delta M_t}{Y_t} + \frac{\Delta B_t}{Y_t} = (g - t)_t + r_t B_t \qquad (4.2)$$

where $\frac{\Delta M_t}{Y_t}$ is the ratio of the growth rate of money supply to output (seignorage revenue), $\frac{\Delta B_t}{Y_t}$ is the change in public debt as percentage of GDP, $(g - t)_t$ is the budget deficit as percentage of GDP and $r_t B$ is the interest rate payments on public debt.

The current framework for fiscal policy analysis could be easily enriched to capture the effects of additional error processes, such as one for the exchange rate for example.

To illustrate the behaviour of the model two simulation exercises are presented in the Appendix 3. The first simulation, sim1, is performed under the assumption that there are no changes in either government spending or tax revenues. This would correspond to the situation existent prior to the fiscal policy reform. The graphs display differences from the base run of the budget deficit for each year of the forecast period. As it can be seen by looking at the mean of the distributions, on average, the chances are higher to actually overstate the budget deficit by around 0.26% of GDP in the first year. This is also true for the remaining 3 years of the forecast sample.

The second simulation, sim2, assumes that income taxes are reduced to 16%. With no other changes in either tax rates or expenditure now the budget deficit grows higher - as expected. This difference is larger in the first year and levels off afterwards.

The current simulations offer an insight of the type of analysis that can be performed. However, to obtain any meaningful results in policy analyses exercises there is a need for a better specification of the recent changes in fiscal reform. Moreover, the expenditures have to be clearly identified by breaking them down according to each type. By obtaining a forecast path for each type of expenditure, pressures on the budget deficits would be assessed more realistically.

5. Conclusions

The aim of this paper has been to provide a framework in which variations in the budgetary items could be assessed from a multi-annual perspective. Forecasting public finances inevitably involves a significant margin of uncertainty because these represent the differences between two very large aggregates.

The importance of obtaining a quantitative measure for the distributions of the estimated outcomes for both tax revenues and expenditures is at least twofold. Firstly, future costs such as those related to EU accession, pensions' reform, health care, infrastructure, etc. are set to burden the budget in the years to come. There is a need for a realistic assessment of the costs these would entail as well as the timing when they are going to be incurred. This is necessary in order to minimise the risk of emerging macroeconomic balances that could pose a threat to sustainable economic growth.

Secondly, there is a risk that the effects of a short-sighted fiscal reform could cause public dissatisfaction with government economic policies. The examples in other East European countries are illustrative in this respect. Already, socialist governments in the Czech Republic, Hungary and Poland are losing support as they cut welfare and state jobs to meet EU requirements on deficits and debt. The prime ministers in all three countries bowed to public pressure and resigned since their countries joined the EU, in May 2004. Also, coalitions led by socialists in the Czech Republic, Hungary and Poland suffered defeat in June 2004 European Parliament elections.

In this respect it is necessary that fiscal policy in Romania is devised in a medium term framework – at the least - in which future costs are assessed realistically.

The advantage of the current modelling framework is that it allows for a range estimation of tax revenue components and the budget deficit. In the model, output realisations as well as interest and exchange rates, are all stochastic and this allows for an estimation of a range of outcomes for the variables of interest. The estimation of tax revenue components is indeed simplistic since these are function of GDP only, however, it could provide a reasonable indicator for the medium term evaluation of budget deficits once the amounts and timing of expenditure components are specified more clearly. Also, ideally,

one would like to have output, interest and exchange rates endogenously determined, possibly within a macroeconometric model. Building such a model is going to constitute a subject for future research.

References:

Atkinson, Paul and Van den Noord, Paul (2001), "Managing Public Expenditure: Some Emerging Policy Issues and a Framework for Analysis", OECD Economics Department Working Papers No. 285.

Bailey, J. Stephen (2004). Strategic Public Finance. Palgrave Macmillian.

Buiter H. Willem and Grafe Clemens (2004), "Patching Up the Pact", Economics of Transition, Vol. 12 (1), pg. 67-102.

Creedy, John and Gemmell, Norman (2004), "The Income Elasticity of Tax Revenue: Estimates for Income and Consumption Taxes in the United Kingdom", Fiscal Studies, vol. 24, no.1, pp. 55-77.

Ehtisham, Ahmad and Leonardo, Martinez (2004), "On the Design and Effectiveness of Targeted Expenditure Programs". IMF Working Paper WP/04/220.

IMF (2004a), World Economic Outlook (WEO).

IMF(2004b) – IMF Country Report No. 04/319, October 2004.

IMF (2001), Manual on Fiscal Transparency, Fiscal Affairs Department, Washington D.C.

IMF and the WB (2002), Guidelines for Public Debt Management: Accompanying Document, November.

Kopits George and Craig Jon (1998), Transparency in Government Operations, IMF Occasional Paper 158.

Kopits George and Symansky Steven (1998), "Fiscal Policy Rules", IMF Occasional Paper 162.

Uribe D. Jose and Lozano I. Luis (2003), "Fiscal Issues and Central Banks in Emerging Markets: the Case of Columbia", Bank of International Settlements, BIS Papers No. 20.

Van den Noord, Paul (2000), "The Size and Role of Automatic Fiscal Stabilizers in the 1990s and Beyond", OECD Economics Department Working Papers No. 230.

World Bank (2004), Restructuring for EU Integration – The Policy Agenda. Country Economic Memorandum, Vol. 2, Report No. 29123-RO.

Appendix 1
Bootstrap results for GDP elasticities of tax revenue components, 1,000 replications.

Tabulation of CUSTOMS TAX
Included observations: 1000
Number of categories: 8

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.2, 0.25)	2	0.20	2	0.20
[0.25, 0.3)	12	1.20	14	1.40
[0.3, 0.35)	120	12.00	134	13.40
[0.35, 0.4)	297	29.70	431	43.10
[0.4, 0.45)	312	31.20	743	74.30
[0.45, 0.5)	184	18.40	927	92.70
[0.5, 0.55)	55	5.50	982	98.20
[0.55, 0.6)	18	1.80	1000	100.00
Total	1000	100.00	1000	100.00

Tabulation of EXCISES
Included observations: 1000
Number of categories: 7

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.6, 0.7)	3	0.30	3	0.30
[0.7, 0.8)	41	4.10	44	4.40
[0.8, 0.9)	225	22.50	269	26.90
[0.9, 1)	392	39.20	661	66.10
[1, 1.1)	268	26.80	929	92.90
[1.1, 1.2)	64	6.40	993	99.30
[1.2, 1.3)	7	0.70	1000	100.00
Total	1000	100.00	1000	100.00

Tabulation of INCOME TAX
Included observations: 1000
Number of categories: 10

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.3, 0.35)	1	0.10	1	0.10

[0.35, 0.4)	12	1.20	13	1.30
[0.4, 0.45)	51	5.10	64	6.40
[0.45, 0.5)	152	15.20	216	21.60
[0.5, 0.55)	308	30.80	524	52.40
[0.55, 0.6)	287	28.70	811	81.10
[0.6, 0.65)	141	14.10	952	95.20
[0.65, 0.7)	42	4.20	994	99.40
[0.7, 0.75)	5	0.50	999	99.90
[0.75, 0.8)	1	0.10	1000	100.00
Total	1000	100.00	1000	100.00

Tabulation of NON FINANCIAL TAX
Included observations: 1000
Number of categories: 9

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.1, 0.2)	1	0.10	1	0.10
[0.2, 0.3)	4	0.40	5	0.50
[0.3, 0.4)	50	5.00	55	5.50
[0.4, 0.5)	170	17.00	225	22.50
[0.5, 0.6)	304	30.40	529	52.90
[0.6, 0.7)	289	28.90	818	81.80
[0.7, 0.8)	139	13.90	957	95.70
[0.8, 0.9)	38	3.80	995	99.50
[0.9, 1)	5	0.50	1000	100.00
Total	1000	100.00	1000	100.00

Tabulation of OTHER DIRECT TAXES
Included observations: 1000
Number of categories: 7

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.1, 0.2)	7	0.70	7	0.70
[0.2, 0.3)	61	6.10	68	6.80
[0.3, 0.4)	190	19.00	258	25.80
[0.4, 0.5)	350	35.00	608	60.80
[0.5, 0.6)	277	27.70	885	88.50
[0.6, 0.7)	103	10.30	988	98.80
[0.7, 0.8)	12	1.20	1000	100.00
Total	1000	100.00	1000	100.00

Tabulation of OTHER INDIRECT TAXES
Included observations: 1000
Number of categories: 8

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.4, 0.5)	2	0.20	2	0.20
[0.5, 0.6)	31	3.10	33	3.30
[0.6, 0.7)	164	16.40	197	19.70
[0.7, 0.8)	314	31.40	511	51.10
[0.8, 0.9)	321	32.10	832	83.20
[0.9, 1)	139	13.90	971	97.10
[1, 1.1)	28	2.80	999	99.90
[1.1, 1.2)	1	0.10	1000	100.00
Total	1000	100.00	1000	100.00

Tabulation of PROFIT TAX
Included observations: 1000
Number of categories: 10

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.45, 0.5)	6	0.60	6	0.60
[0.5, 0.55)	23	2.30	29	2.90
[0.55, 0.6)	94	9.40	123	12.30
[0.6, 0.65)	185	18.50	308	30.80
[0.65, 0.7)	244	24.40	552	55.20
[0.7, 0.75)	225	22.50	777	77.70
[0.75, 0.8)	142	14.20	919	91.90
[0.8, 0.85)	63	6.30	982	98.20
[0.85, 0.9)	17	1.70	999	99.90
[0.9, 0.95)	1	0.10	1000	100.00
Total	1000	100.00	1000	100.00

Tabulation of SOCIAL SECURITY
Included observations: 1000
Number of categories: 6

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.6, 0.7)	1	0.10	1	0.10
[0.7, 0.8)	20	2.00	21	2.10
[0.8, 0.9)	234	23.40	255	25.50

[0.9, 1)	470	47.00	725	72.50
[1, 1.1)	254	25.40	979	97.90
[1.1, 1.2)	21	2.10	1000	100.00
Total	1000	100.00	1000	100.00

Tabulation of VAT
Included observations: 1000
Number of categories: 10

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.8, 0.85)	1	0.10	1	0.10
[0.85, 0.9)	12	1.20	13	1.30
[0.9, 0.95)	46	4.60	59	5.90
[0.95, 1)	144	14.40	203	20.30
[1, 1.05)	270	27.00	473	47.30
[1.05, 1.1)	292	29.20	765	76.50
[1.1, 1.15)	171	17.10	936	93.60
[1.15, 1.2)	57	5.70	993	99.30
[1.2, 1.25)	6	0.60	999	99.90
[1.25, 1.3)	1	0.10	1000	100.00
Total	1000	100.00	1000	100.00

Tabulation of TOTAL DIRECT TAXES
Included observations: 1000
Number of categories: 8

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.6, 0.65)	8	0.80	8	0.80
[0.65, 0.7)	54	5.40	62	6.20
[0.7, 0.75)	191	19.10	253	25.30
[0.75, 0.8)	353	35.30	606	60.60
[0.8, 0.85)	280	28.00	886	88.60
[0.85, 0.9)	101	10.10	987	98.70
[0.9, 0.95)	12	1.20	999	99.90
[0.95, 1)	1	0.10	1000	100.00
Total	1000	100.00	1000	100.00

Tabulation of TOTAL INDIRECT TAXES
Included observations: 1000
Number of categories: 8

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.75, 0.8)	3	0.30	3	0.30

[0.8, 0.85)	34	3.40	37	3.70
[0.85, 0.9)	150	15.00	187	18.70
[0.9, 0.95)	300	30.00	487	48.70
[0.95, 1)	329	32.90	816	81.60
[1, 1.05)	153	15.30	969	96.90
[1.05, 1.1)	29	2.90	998	99.80
[1.1, 1.15)	2	0.20	1000	100.00
Total	1000	100.00	1000	100.00

Tabulation of TOTAL REVENUE

Included observations: 1000

Number of categories: 8

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.6, 0.65)	1	0.10	1	0.10
[0.65, 0.7)	6	0.60	7	0.70
[0.7, 0.75)	64	6.40	71	7.10
[0.75, 0.8)	194	19.40	265	26.50
[0.8, 0.85)	369	36.90	634	63.40
[0.85, 0.9)	274	27.40	908	90.80
[0.9, 0.95)	83	8.30	991	99.10
[0.95, 1)	9	0.90	1000	100.00
Total	1000	100.00	1000	100.00

Appendix 2. Model Equations

A. Tax Revenue Components

Income Tax:	$T_{I,t} = 2.29 + 0.55 y_t$
Social Security Tax:	$T_{SS,t} = -1.65 + 0.95 y_t$
Other Direct Taxes:	$T_{OD,t} = 2.18 + 0.47 y_t$
Profit Tax:	$T_{Y,t} = 0.18 + 0.69 y_t$
VAT:	$T_{VAT,t} = -3.33 + 1.05 y_t$
Customs Tax:	$T_{C,t} = 2.58 + 0.41 y_t$
Excises Tax:	$T_{E,t} = -3.2 + 0.97 y_t$
Other Indirect Taxes:	$T_{OI,t} = -1.6 + 0.79 y_t$
Non-financial Tax:	$T_{NT,t} = 1.17 + 0.59 y_t$
Capital Revenues:	$T_{K,t} = -6.21 + y_t$

Variables are in natural logarithms and '*t*' indexes time (quarters) taking the values from 1 to 16 for the forecast period.

Forecast equations for *nominal* output:

$$Y_{2005,i} = (1 + g_{2005})(1 + \pi_{2005})\left[\frac{Y_{2004}}{4} + Y_{c,i}\right] + \varepsilon_t,$$

$$Y_{2006,i} = (1 + g_{2006})(1 + \pi_{2006})\left[\frac{Y_{2005}}{4} + Y_{c,i}\right] + \varepsilon_t$$

$$Y_{2007,i} = (1 + g_{2007})(1 + \pi_{2007})\left[\frac{Y_{2006}}{4} + Y_{c,i}\right] + \varepsilon_t$$

$$Y_{2008,i} = (1 + g_{2008})(1 + \pi_{2008})\left[\frac{Y_{2007}}{4} + Y_{c,i}\right] + \varepsilon_t$$

where $Y_{2005,i}$ represents annual nominal output in year 2005, for example, with the '*i*' subscript indexing quarters and taking values from 1 to 4. Then, y_t in the tax revenue equations above takes successive values such as y_1 would correspond to $Y_{2005,1}$, y_2 would correspond to $Y_{2005,2}$ and so on with y_{16} being $Y_{2008,4}$.

$Y_{c,i}$ is a cyclical component of output computed as the deviation from the average quarterly GDP (at 2004 values and kept constant for the forecast period). Average real output growth rate is *g* and average inflation rate is π. The shocks, ε_t, are zero for the baseline forecast nominal output. For the simulation exercises they are withdrawn from the distribution of the residuals obtained by estimating the following equation (OLS, over 1999Q1-2004Q1):

$$Y_t = 11.87 + 0.07 * TIME_t - 0.47 * D_{1,t} - 0.27 * D_{2,t} - 0.09 D_{3,t}$$

D_1, D_2 and D_3 are seasonal dummies for Q1, Q2, and Q3 respectively.

B. Expenditure Components

For the current simulation purposes the expenditure forecast is assumed to be yearly.

Wages: $E_w = m_w e_{2004}(1+g_s)(1+\pi_s)$

Government Consumption: $E_c = m_c e_{2004}(1+g_s)(1+\pi_s)$

Subsidies: $E_s = m_s e_{2004}(1+g_s)(1+\pi_s)$

Transfers: $E_T = m_T e_{2004}(1+g_s)(1+\pi_s)$

Capital: $E_K = m_K e_{2004}(1+g_s)(1+\pi_s)$

Loan Payments: $E_L = m_L e_{2004}(1+g_s)(1+\pi_s)$

Interest Rate Payments: $E_r = m_r e_{2004}(1+g_s)(1+\pi_s)$

The '*m*'s are the shares of each category of government expenditure in total spending and e_{2004} is the share of government spending in GDP. All values are kept constant at their

2004 values for the whole forecast period[19]. The 's' indexes years for the forecast period, from 2005 to 2008 respectively.

The interest rate payment specification is a temporary proxy – a re-specification needs a timetable for public sector debt payments (amounts and currency denomination).

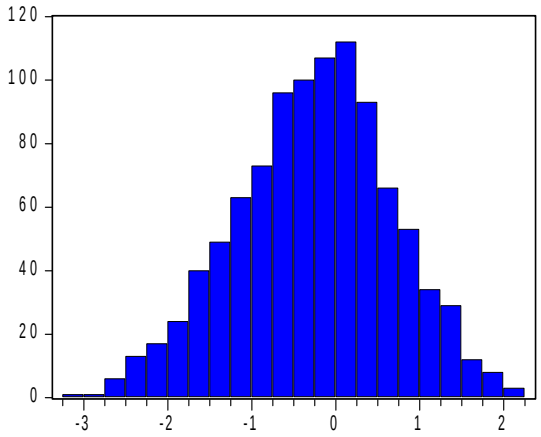
The budget deficit is calculated as the difference between the sum of total revenues and the sum of government expenditures – as percentage of GDP.

[19] m_w=0.154, m_C=0.225, m_S=0.066, m_T=0.37, m_K=0.1, m_L=0.034, m_r=0.048 and e_{2004}=0.327.

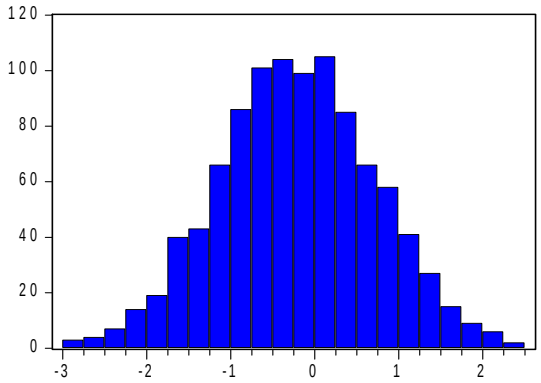
Appendix 3

Frequency distributions for differences from the base run of the budget deficit. Forecast period values.

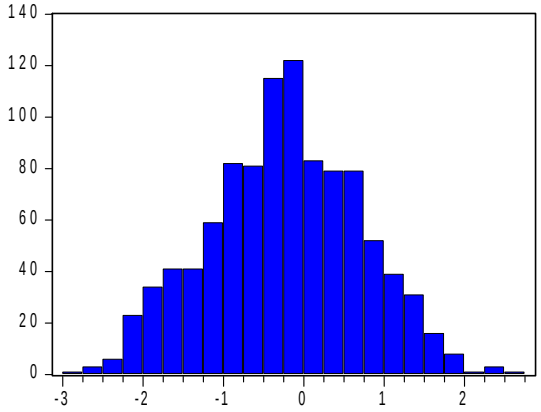
Simulation 1. Assumes that tax revenues and expenditures remain unchanged (budget deficit as percentage of GDP on the horizontal axis).



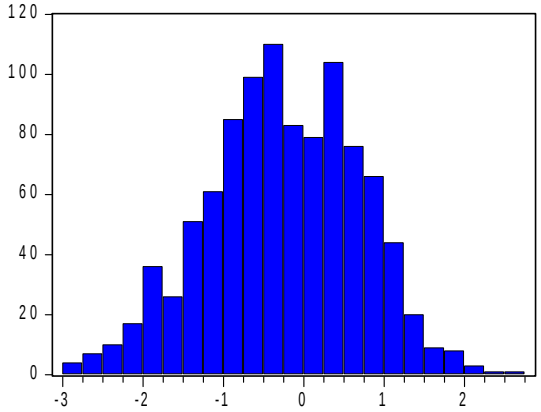
Series: SIM1_2005	
Sample 2001 3000	
Observations 1000	
Mean	-0.258923
Median	-0.207696
Maximum	2.052611
Minimum	-3.001956
Std. Dev.	0.928331
Skewness	-0.154475
Kurtosis	2.782250
Jarque-Bera	5.952736
Probability	0.050978



Series: SIM1_2006	
Sample 2001 3000	
Observations 1000	
Mean	-0.211227
Median	-0.207526
Maximum	2.370482
Minimum	-2.944003
Std. Dev.	0.929439
Skewness	-0.008262
Kurtosis	2.810147
Jarque-Bera	1.513217
Probability	0.469255

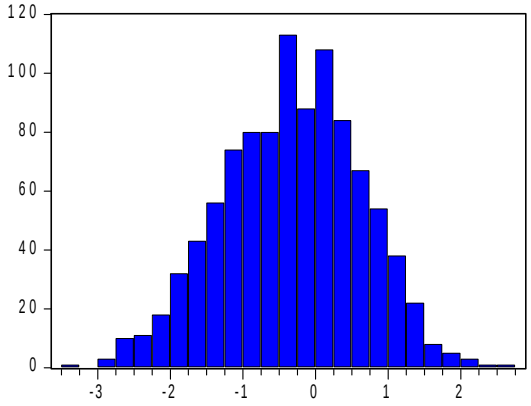


Series: SIM1_2007	
Sample 2001 3000	
Observations 1000	
Mean	-0.235032
Median	-0.216790
Maximum	2.582246
Minimum	-2.912318
Std. Dev.	0.942339
Skewness	-0.041469
Kurtosis	2.710401
Jarque-Bera	3.781107
Probability	0.150988

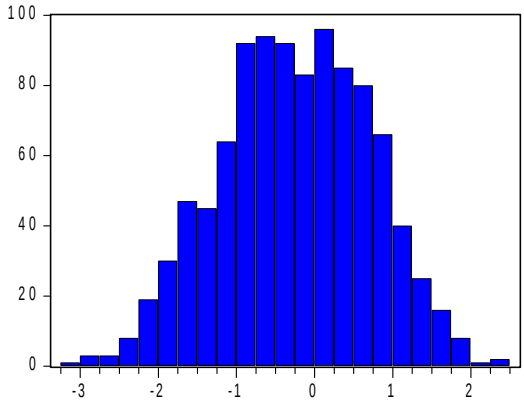


Series: SIM1_2008	
Sample 2001 3000	
Observations 1000	
Mean	-0.253704
Median	-0.260306
Maximum	2.609204
Minimum	-2.822660
Std. Dev.	0.945631
Skewness	-0.151075
Kurtosis	2.681283
Jarque-Bera	8.036460
Probability	0.017985

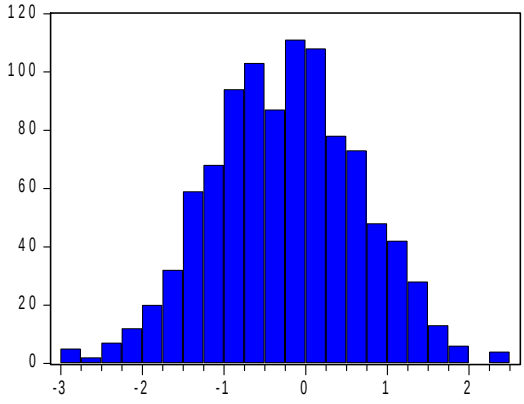
Simulation 2. Assumes that income tax is reduced to 16% and that no other changes in either tax rates or expenditures are made.



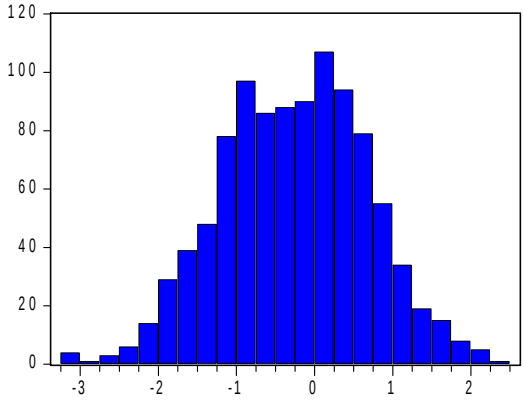
Series: SIM2_2005	
Sample 2001 3000	
Observations 1000	
Mean	-0.326605
Median	-0.297550
Maximum	2.567953
Minimum	-3.287629
Std. Dev.	0.953783
Skewness	-0.131745
Kurtosis	2.763800
Jarque-Bera	5.217392
Probability	0.073631



Series: SIM2_2006	
Sample 2001 3000	
Observations 1000	
Mean	-0.250282
Median	-0.239677
Maximum	2.317929
Minimum	-3.115714
Std. Dev.	0.955354
Skewness	-0.084029
Kurtosis	2.574321
Jarque-Bera	8.726902
Probability	0.012734



Series: SIM2_2007	
Sample 2001 3000	
Observations 1000	
Mean	-0.241320
Median	-0.222590
Maximum	2.462332
Minimum	-2.977614
Std. Dev.	0.911422
Skewness	-0.038762
Kurtosis	2.802220
Jarque-Bera	1.880287
Probability	0.390572



Series: SIM2_2008	
Sample 2001 3000	
Observations 1000	
Mean	-0.258900
Median	-0.237423
Maximum	2.404460
Minimum	-3.097196
Std. Dev.	0.930199
Skewness	-0.081847
Kurtosis	2.776556
Jarque-Bera	3.196798
Probability	0.202220

Comments and Analysis by Professor James Foreman-Peck, Cardiff Business School

Computing theoretical tax liability allows both the estimation of the upper limit to tax revenues and provides an indication of how much might be gained from anti-fraud and evasion activity. On the spending side a zero budgeting approach will be facilitated by output measurement and international comparison, particularly with the EU accession states (for which Eurostat data should be available). Instead of simply forecasting the public sector wages and salary bill by assuming no change in employment and marking up wages by the rate of inflation and some annual 'productivity increase', it should be possible to estimate by comparison with other states what level of employment is necessary to deliver what standard of the various public services to which the government is committed. This target together with a productivity wage would yield a public spending on services theoretical commitment. Transfer payments will be simpler to address in the same fashion- which will also highlight reasonable administrative expenses.

To illustrate the tax computation VAT appears to be the simplest. With no exemptions, theoretical liability is simply consumers' expenditure times 0.19. Consumer expenditure in turn may be predicted as a linear function or a simple ratio of GDP. For income tax the liability is only marginally more complicated, given the flat rate of tax recently adopted. The average tax revenue equation is

T=-a +b(average wages and salary)

where b is the flat rate of tax and –a is derived from the exemption income. If the income below which no tax is payable is c, then, a = b*c. Total theoretical income tax revenue is the number of wage and salary earners times the average tax liability as computed above. The tax base for social security taxes is employees and for corporation tax the less predictable company profits.

Consideration of measurable tax bases leads on to the black economy. The likelihood is that true aggregate Romanian expenditure substantially exceeds reported income. The

strong demand for US dollars in Eastern Europe in the 1990s undoubtedly facilitated spending, employment and income outside the official statistical framework. Taxing this component of the economy would make a useful contribution to the public finances and one of the motivations for the recent income tax cut was to incentivise a return to the legitimate economy. High tax rates undoubtedly encourage the black economy, but so too do a lack of belief in the legitimacy or desirability of swathes of government activity and a simple desire to have more rather than less when the expected values of penalties for 'non-compliance' are low. An accurate prediction of tax revenues must take into account these penalties over the period of the forecast.

Forecasts of tax revenues require predictions of the tax bases. A long term possibility is a full scale econometric model of the relevant variables. In the short term autoregressive univariate models are a possibility. A quick intermediate approach is to estimate the trend rate of growth of GDP and the cyclical component, and use GDP as the proxy for the bases of the principal taxes. A conditional convergence model could indicate the trend rate of growth over the planning horizon, but this requires a knowledge of the conditioning variables and their parameters. Simpler is merely to postulate a time trend, *t*, driven constant rate of real growth either determined by historical experience or imposed, while controlling for changes in capacity utilisation as measured by unemployment (U-U*). Finally a forecast of inflation is needed and can be obtained from the term structure of interest rates or central bank commitments or from the stance of monetary policy.

$$Y^* / P = d_0 e^{d_1 * t}$$

$$(Y / P)_t - Y^* / P = d_2 (U_t - U^*)$$

$$P_t = e^{\ln(P_{t-1} + \pi_t)}$$

Here, d_0, d_1, and d_2, are coefficients while π_t is inflation at time 't'.

So, the current year approximate tax base is:

$$Y_t = e^{\ln(P_{t-1} + \pi_t)} \left[d_0 e^{d_1 * t} + d_2 (U_t - U^*) \right]$$

It is clear from the above equation that, with inflation running at more than the trend growth rate, the inflation rate is the principal determinant of theoretical future tax revenues.

Comments and Analysis by Florin Citu

Another methodology used to understand the dynamic relationship between GDP and fiscal revenues is VAR analysis. This type of analysis is important because it tells the government which taxes respond better to variability in GDP. Based on this information the fiscal authority can devise a fiscal program that will maximize revenues over the business cycle. In this section we use the same data as before, with the GDP series seasonally adjusted.

The standard VAR model used in the literature can be represented by:

(A1) $$A_0 X_t = \sum_{i=1}^{q} A_i X_{t-i} + \varepsilon_t ,$$

where $X_t = (Y_t, Z_t)'$, Z_t is the instrument of the fiscal authority, Y_t are the variables in the fiscal authority's information set, and q is an integer with values $q \geq 0$. It follows from this type of specification that the fiscal authority's rule is linear on the variables in Y_t and their lags. Finally, it is assumed that the residuals ε_t have the following properties:

(A2) $$E[\varepsilon_t] = 0; E[\varepsilon_t'] = \begin{cases} D & \tau = t \\ 0 & otherwise \end{cases}.$$

In general the model in equation (A1) is estimated in two steps. First, the parameters of the corresponding reduced form VAR are estimated:

(A3) $$X_t = \sum_{i=1}^{q} \Phi_i X_{t-i} + \varepsilon_t ,$$

where $\Phi_t = [A_0^{-1} A_1]$. Then, the structural parameters of $(A_i \text{ and } D)$ are recovered by making some identification assumptions. In the VAR literature the most widely used identification assumption is the **recursive** system proposed by Sims (1980). This approach assumes that the structural errors (ε_t) are orthogonal (D=I) and that the matrix capturing the contemporaneous relations between the variables in the VAR (A_0) is block diagonal. Therefore, it is assumed that the variables in X_t can be arranged as $X_t = (Y_{1t}', Z_t, Y_{2t}')'$ and

(A4) $$A_0 = \begin{bmatrix} a_{11} & 0 & 0 \\ a_{21} & a_{22} & 0 \\ a_{31} & a_{32} & a_{33} \end{bmatrix}.$$

Intuitively, the recursive approach implies that the fiscal policy rule Z_t responds contemporaneously to variables in Y_{1t}, but these variables responds to the fiscal policy instrument only with a lag. Similarly, variables in Y_{2t} are contemporaneously affected by the fiscal policy instrument, but they affect the fiscal policy rule only with a lag.

The VAR methodology is has been widely used to determine the effect of fiscal policy on other economic variables. Following from this general presentation of VAR methodology, we estimate a 2-variable VARs in levels of total revenue and GDP, indirect taxes revenues and GDP, direct taxes revenues and GDP, and VAT and GDP for the period 1999q1-2004q1. Next we show the impulse responses and variance decompositions for the 4 estimations. The impulse response graphs show the response of one variable to a surprise change in the other. The forecast error variance decomposition tells us the proportion of the movements in a sequence due to its own shocks versus movements due to shocks from other variables in the model.

1) Total revenues and real GDP

The estimation results are shown below♦:

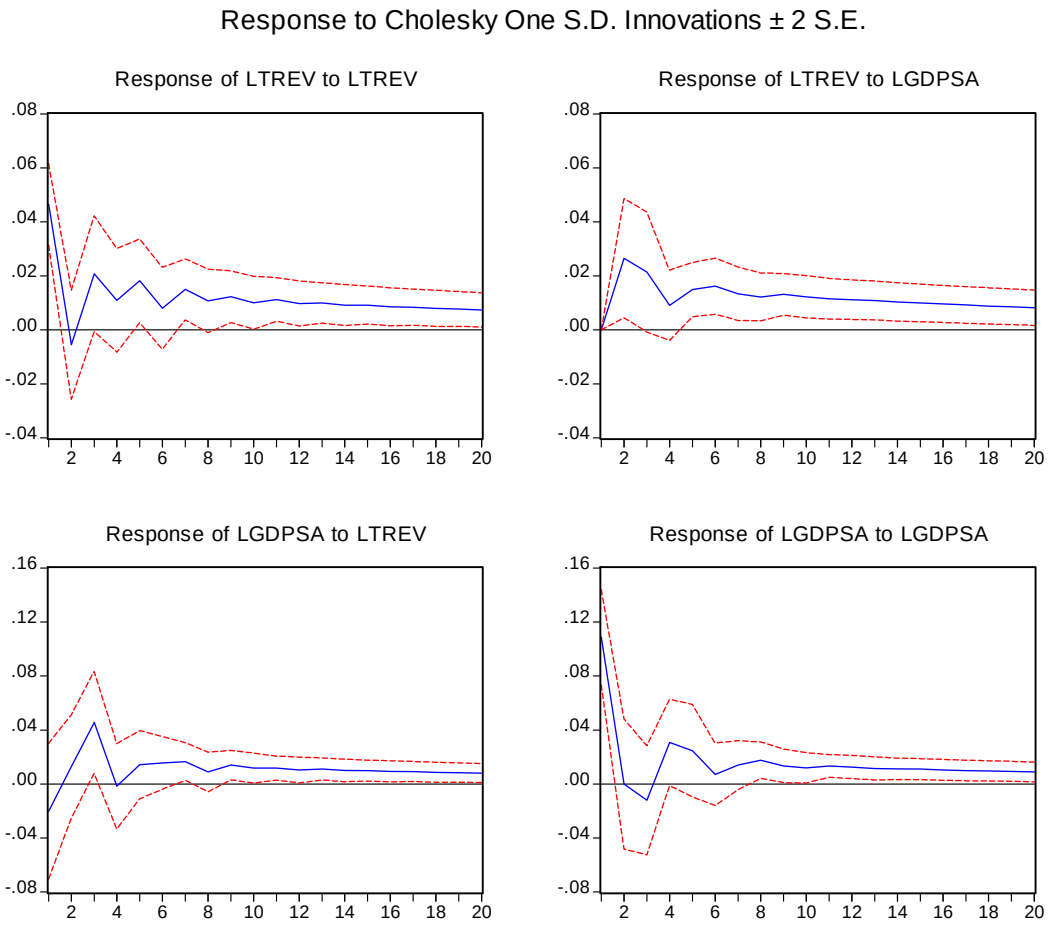
Vector Autoregression Estimates
Date: 03/26/05 Time: 09:22
Sample (adjusted): 1999Q3 2004Q1
Included observations: 19 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LTREV	LGDPSA
LTREV(-1)	-0.0121273657886907 0.168343246760982 [-0.07204]	0.280216586608495 0.400006219679 [0.70053]

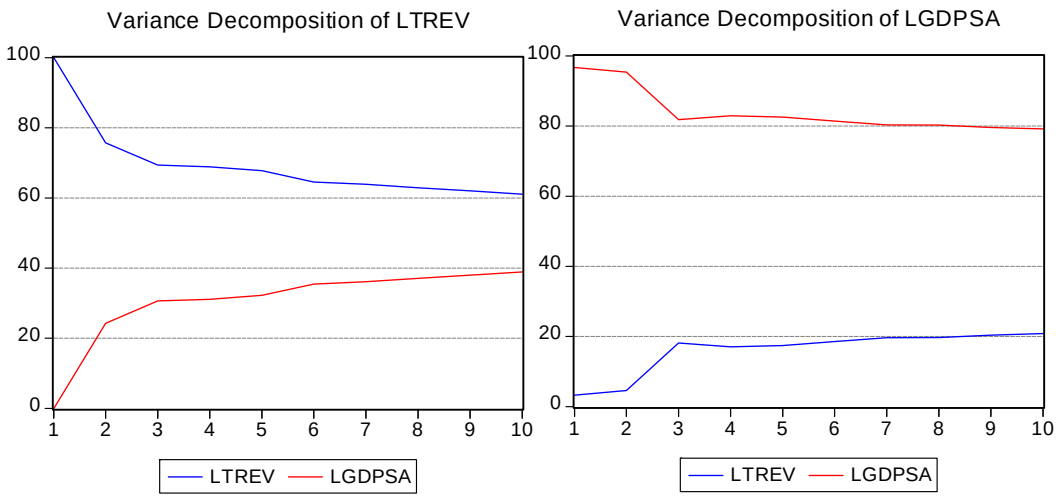
♦ Estimation results for the other VARs are presented upon request.

LTREV(-2)	0.462627380707443	0.934721377764965
	0.149809772582128	0.355968189722696
	[3.08810]	[2.62586]
LGDPSA(-1)	0.243973257014387	-0.000281759058373117
	0.093368396845990 4	0.221855881827448
	[2.61302]	[-0.00127]
LGDPSA(-2)	0.199402232517898	-0.178829368497765
	0.091683610183146 9	0.217852601880457
	[2.17490]	[-0.82087]
C	0.809838781720655	1.09496773242619
	0.313083065660508	0.743927516844105
	[2.58666]	[1.47187]
R-squared	0.988841190867068	0.952353430313241
Adj. R-squared	0.985652959686231	0.938740124688453
Sum sq. resids	0.030321650186698 8	0.171196516559219
S.E. equation	0.046538501868805	0.110581746284695
F-statistic	310.1535411889345	69.957544226372
Log likelihood	34.22332509511411	17.7792988475633
Akaike AIC	-3.076139483699907	-1.34518935237508
Schwarz SC	-2.827602910223422	-1.09665277891023
Mean dependent	11.43370147767767	12.5923754117359
S.D. dependent	0.388535977287852	0.446781713800489

Determinant resid covariance (dof adj.)	2.56053727525122e-05
Determinant resid covariance	1.39020860373751e-05
Log likelihood	52.3233164555582
Akaike information criterion	-4.45508594269034
Schwarz criterion	-3.95801279576063

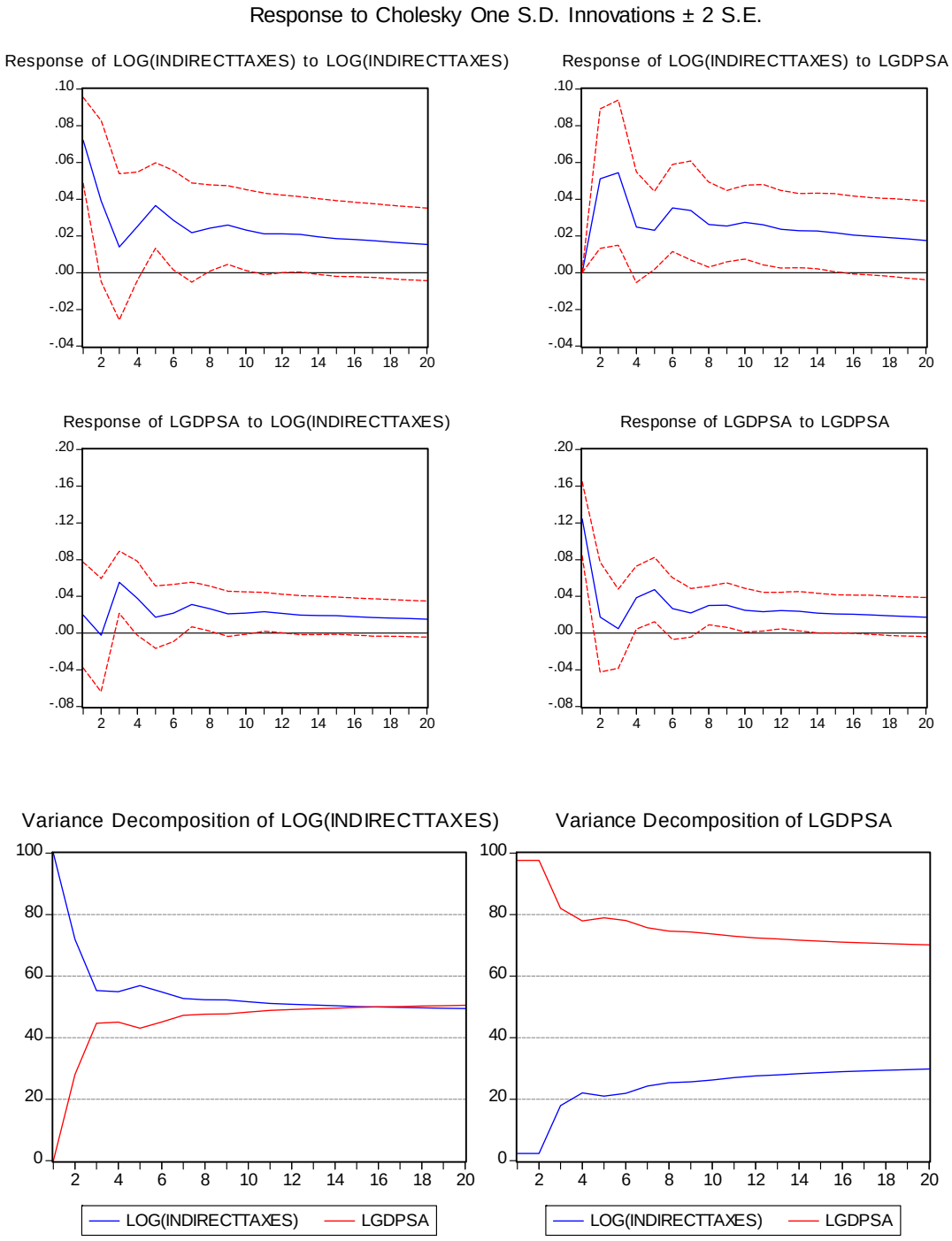


Total revenues respond, after one quarter, positively to a surprise shock in real GDP. After the shock, total revenues return to equilibrium very slow..



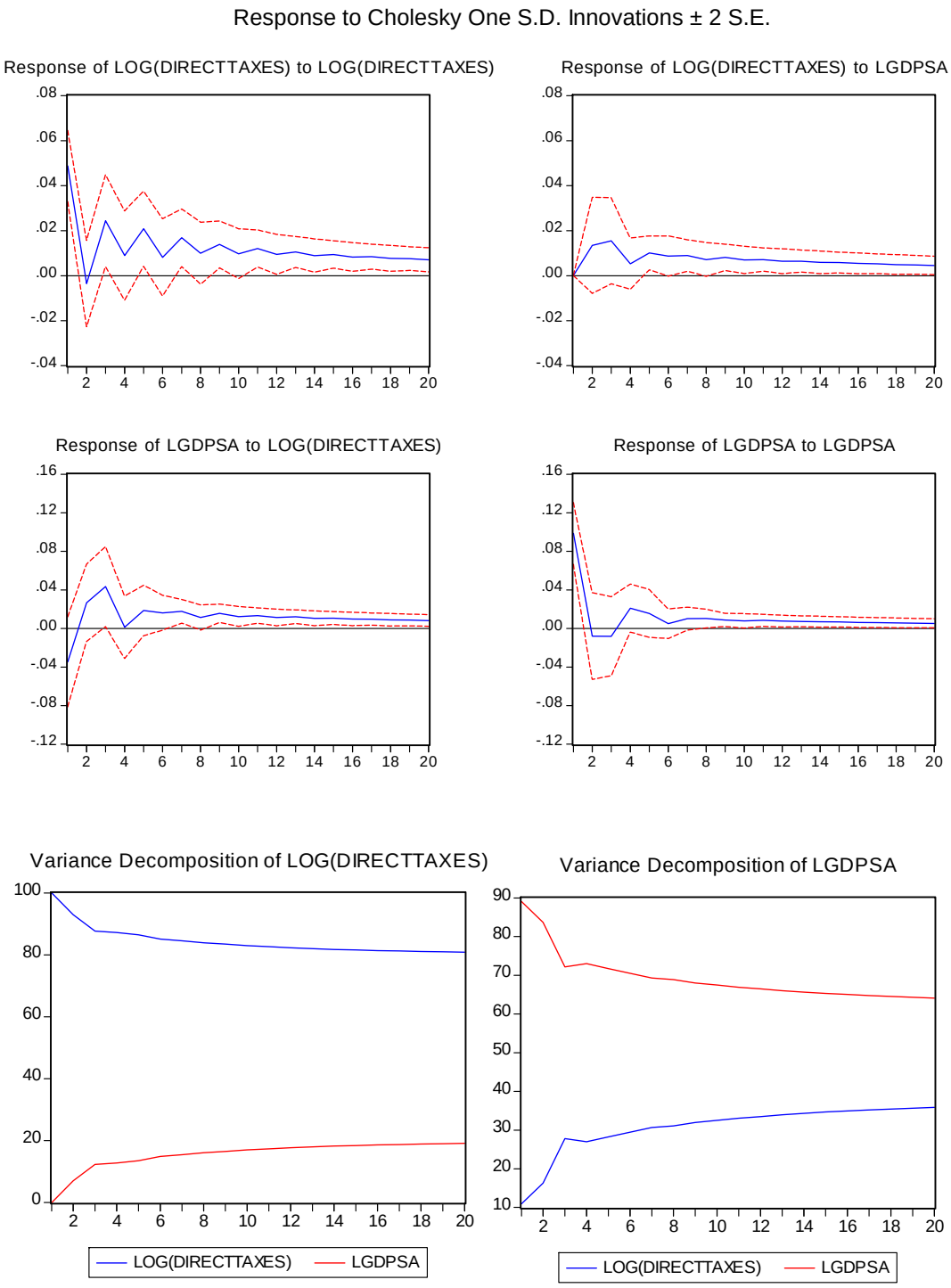
The variance decomposition shows that after 3 quarters total revenues variability is explained 30% by variability in real GDP. And after 9 quarters real GDP explains 40% of variability in total revenues. By contrast, real GDP has 80% variability due to its own shocks (as it should), showing that it is exogenous. This result is expected and confirms the relationship between revenues and real GDP.

2) Indirect taxes revenues and real GDP



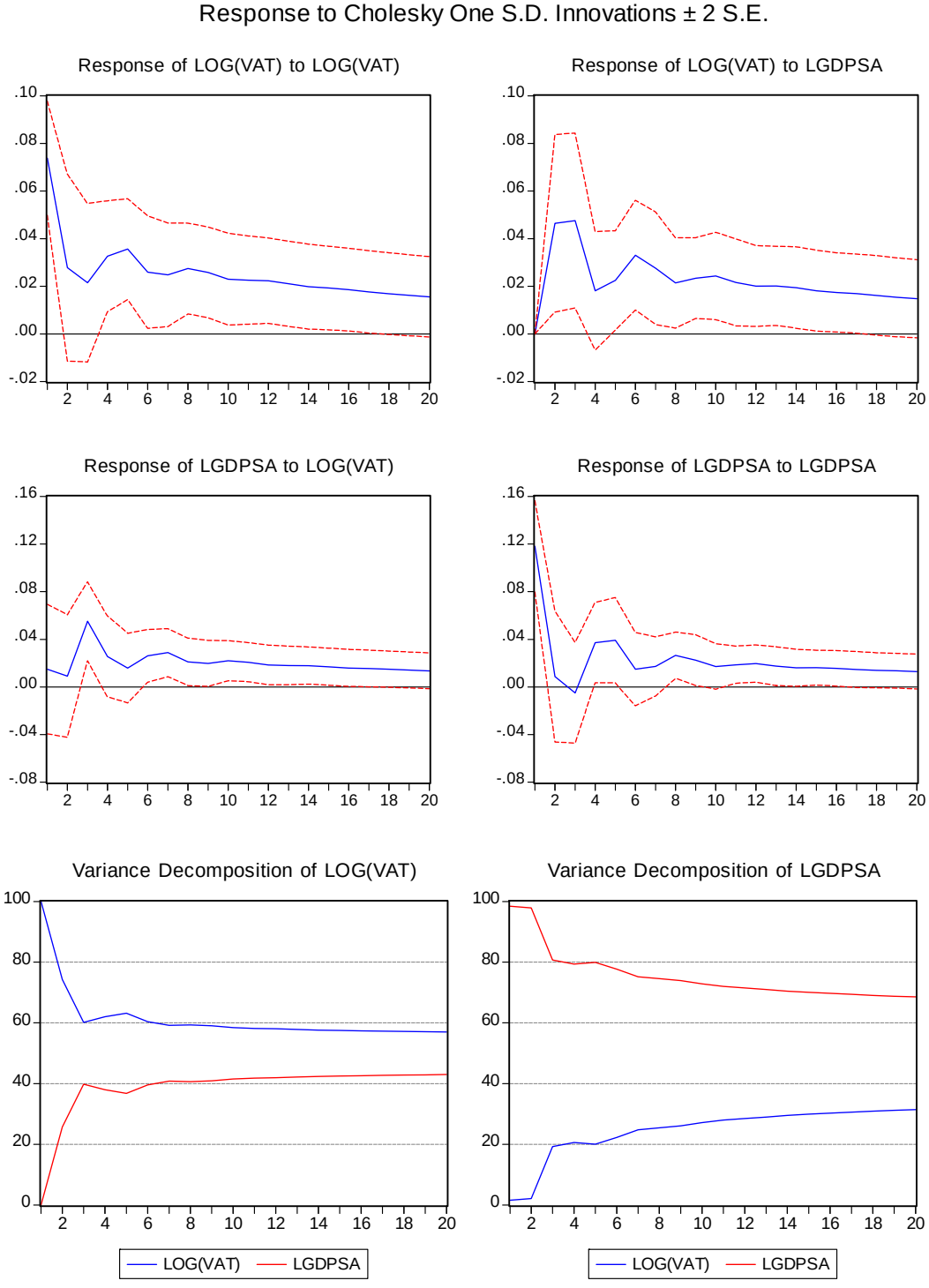
Variability in indirect taxes is explained, very soon after the shock, 50% by shocks in real GDP.

3) Direct taxes revenues and real GDP



Surprisingly direct taxes seem to be exogenous here, and do not respond to shocks in real GDP.

4) VAT and real GDP


Response to Cholesky One S.D. Innovations ± 2 S.E.
Response of LOG(VAT) to LOG(VAT)
Response of LOG(VAT) to LGDPSA
Response of LGDPSA to LOG(VAT)
Response of LGDPSA to LGDPSA
Variance Decomposition of LOG(VAT)
Variance Decomposition of LGDPSA
LOG(VAT)
LGDPSA