

Macroeconomic Context and Fiscal Policy

Europe and Central Asia during 2000–2012

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Abstract

This paper examines the interaction between fiscal policy and the broader macroeconomic context in open economies. It asks two questions. First, what was the relationship between fiscal policy and current account balances in countries in Europe and Central Asia during the past dozen years? Second, how might changes in (a) output composition and (b) financial sector profitability affect revenues and thus, the assessment of the underlying structural fiscal balance? The study finds that, for flexible exchange rate countries, expansionary fiscal policy has

been associated with wider current account deficits. Moreover, changes in net exports and in financial sector profitability may have significant impacts on fiscal balances because of changes in revenues from the value-added tax and the corporate profits tax as a share of gross domestic product. These findings suggest that the countries of Europe and Central Asia have reason to be prudent in terms of fiscal policy choices, even as gross domestic product rises.

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Macroeconomic Context and Fiscal Policy Design

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Introduction

This paper explores a number of interactions between fiscal and other macroeconomic variables in the Europe and Central Asia region in the period immediately preceding the 2008 financial crisis and its aftermath. Specifically, it asks two questions: (1) Did the fiscal stance have a destabilizing influence on external balances in the pre-crisis period; and (2) What are the implications of the new global macroeconomic conditions for fiscal outcomes and policy? Two main conclusions emerge from this analysis. First, that fiscal policy was indeed destabilizing for many ECA countries in the pre-2008 period in that structural fiscal deficits increased when external balances were increasingly in deficit. Second, with lower capital inflows and a changing composition of output, fiscal revenues may remain lower in terms of GDP for some countries, even as GDP recovers. Together, these factors imply that greater prudence in fiscal policy is desirable in the longer term, if it is to stabilize economic prospects. In view of existing revenue and current account constraints and weaker growth prospects, this translates into a policy that constrains real expenditure growth and government size in ECA countries. In essence, this will also require that greater attention be paid to the composition of government expenditures and revenues.

Of the last dozen years, the period since 2004 has been one of substantial volatility in global markets. The first part of this period is marked by a commodity and financial boom until 2008. For many non-commodity exporters, it also meant a period of rising current account deficits. These developments were followed by a collapse in financial markets and commodity prices by the end of 2008 and in 2009. The financial and economic crisis led to banking problems in many countries and a sovereign debt crisis in several markets. While commodity prices have recovered, financial markets are still wavering. Growth prospects are still weak in developed countries and weakening in emerging markets; public finances are less strong relative to other regions.² Policymakers in each country have struggled to find the appropriate balance between supporting longer term growth, protecting the vulnerable and stabilizing economies in response to short-term fluctuations.

This paper examines the links between fiscal and other macroeconomic outcomes. It does not investigate the extent to which domestic policies in ECA countries affected the magnitude or type of capital inflows into each country,³ but instead, asks whether fiscal policies might have had an impact on the magnitude and direction of the current account balance. The objective is to determine whether fiscal policy could have been more “stabilizing” given global market conditions characterized by low global

² See Islam and Smits (2013).

³ Push and pull factors affecting capital inflows have been discussed in papers since the crisis.

interest rates and a general optimistic view of emerging market risk-reward trade-offs.⁴ If one of the goals of fiscal policy is to moderate troughs in growth, then symmetrically, it should also be reining back economic activity during temporary booms. Failure to be sufficiently prudent in peak times makes it more difficult to adjust during troughs.

Another question this paper addresses, namely, the implications of the global macroeconomic scenario for fiscal policy focusses on the impact on fiscal revenues. It considers two linkages between macroeconomic outcomes and fiscal revenues that, if considered, would help better understand true structural balances in ECA countries. In conjunction with a period of slower growth, ECA countries are likely to continue collecting lower tax revenues as a share of GDP than in the pre-crisis period because of changes in output composition and financial sector profitability. Specifically, the large current account deficits of the pre-crisis period are unlikely to be sustained. Current accounts improved substantially in the crisis as domestic demand collapsed dramatically, offsetting the large decline in export demand faced by ECA countries. In some cases, current account balances have since widened, but countries are increasingly aware that high external deficits (and a corresponding accumulation of debt), may make their economies more vulnerable to capital outflows during periods of financial stress in global markets, and, accordingly, more volatile. If capital inflows and corresponding current account deficits continue to be lower than before the crisis, revenues from the VAT, which vary directly with the value of net exports, will decline as net exports to GDP decline.

Another source of revenue “weakness” may appear as a result of lower financial sector profitability. Financial sector conditions affect the profits of the financial sector (which in some countries is large), and, in addition, they affect the profits of non-financial firms. When financial sector conditions are good and credit is easily available at low interest rates, firms face lower interest payments and are able to expand operations easily (in good times, domestic and global lenders are less risk averse). The condition of domestic financial sectors in ECA is closely linked to global financial markets. In addition, financial sector booms are not perfectly correlated with GDP cycles. Thus tighter credit markets and lower financial sector profitability may be expected to reduce corporate profits as a share of GDP. Lower profits would be expected to reduce tax revenues from this sector relative to the boom period (*ceteris paribus*).

⁴ One way to think of the optimistic view of emerging market risk and investor confidence is to consider the spreads on credit default swaps for a number of ECA countries and their risk ratings.

These three interactions between external markets and fiscal outcomes are chosen as the focus of this paper as these have been under-researched in the past and are of relevance to ECA countries. There are, however, differences among countries in the ECA region in terms of their initial conditions and outlook and some of these differences will be explored in the paper. For example, oil exporting countries have very different economic and tax structures from others in the region; fixed exchange rate countries face constraints on policies relative to flexible exchange rate countries; EU countries are perceived differently by financial markets or have different tax structures from the other countries in the group. Part I of the paper addresses the link between internal and external deficits. Part II of the paper examines the potential impact of changes in output composition and financial booms on tax revenues.

Part I: Twin Deficits

Several theoretical and empirical papers have highlighted the links between fiscal outcomes (public savings or dis-savings) and current account outcomes. Fiscal policy may have an effect on the current account through various channels. Most directly, changes in government demand can translate into changes in the trade balance. Fiscal policy, by changing demand can also affect the real exchange rate and/or interest rate. If it induces a real exchange rate appreciation for example, the current account could worsen. Fiscal expansion may raise risk premia and therefore external interest payments (it may also cause capital flight and a forced narrowing of the current account deficit). The actual effect varies between countries. This paper adds to the existing empirical literature on this topic by its coverage of countries and time period. It considers 28 countries in Eastern and Central Europe and Central Asia, of which some are high income, while others are classified as emerging or developing countries. The period of analysis is 2000-2011/12.

Among the most recent papers written about the “twin deficits” of the fiscal and current accounts, Atoyan, Jaeger, and Smith (2012) study the link between fiscal deficits and current account balances for emerging Europe during 2000-07. They find that push factors -low returns in flow-originating countries- rather than pull factors -high returns in flow destination countries- drove most of the private capital flows to emerging Europe. They also find that anti-cyclical fiscal policy acted as a brake on capital inflows, but conclude that fiscal policy alone is unlikely to be an effective tool to put an effective brake on sudden capital flow surges. They measure the stance of fiscal policy by adjusting for the automatic changes in fiscal outcomes which are the result of endogenous changes in the absorption gap. They define the absorption gap to be the sum of the output gap and the gap between the actual and the sustainable current account deficits. Katrakilidis and Trachanas (2013) find evidence in favour of the twin deficits

hypothesis in their analysis of five highly indebted countries in Europe-Portugal, Ireland, Italy, Greece, and Spain. Endegnanew, Amo-Yartey and Turner-Jones (2012) examine the link between fiscal policy and the current account balance for microstates using panel regression and panel vector auto-regression. Panel regression shows that a percentage point improvement in the fiscal balance improves the current account balance by 0.4 percentage points of GDP. Their panel VAR results indicate that an increase in government consumption results in real exchange rate appreciation and a temporary deterioration in the current account.

IMF (2011) finds that the current account responds substantially to fiscal policy. For 19 advanced countries, they estimate that a fiscal consolidation of 1 percent of GDP typically improves the current account balance by over 0.5 percentage points of GDP. Permanent fiscal adjustment is estimated to have a larger impact on the current account than temporary measures. Abbas, Bouhga-Hagbe, Fatas, Mauro and Velloso (2011) examine the relationship between fiscal policy and the current account for a sample of 88 countries. The sample includes advanced, emerging and low-income countries and uses a variety of estimation methods: panel regressions, panel vector autoregressions, and an analysis of large fiscal policy and current account changes. On average, across the various estimation methods, they find that a strengthening of the fiscal balance by 1 percentage point of GDP improves the current account by about 0.3 percentage points of GDP. The association is stronger in emerging markets, low-income countries, in countries that are more open to trade and when the economy is overheated. Bluedorn and Leigh (2011), using a new dataset for 17 OECD countries that focusses only on fiscal policy changes whose motivation is deficit management, find that a 1 percentage point of GDP consolidation improves the current account balance to GDP ratio by 0.6 percentage points.⁵

Among some older, but relevant papers, Kumhof and Laxton (2009) find that permanent fiscal deficits in large countries can significantly raise the world interest rate. In the short run they cause a short run current account deterioration equal to around 50 percent of the fiscal deficit deterioration. In the longer run, the current account deterioration equals almost 75% for a large economy such as the United States, and almost 100% for a small open economy. Chinn and Ito (2005) investigate the medium-term determinants of the current account and find that the government budget balance is an important determinant of the current account balance in industrial countries. They also find that countries with more developed equity markets are more likely to run current account deficits. Salvatore (2006) empirically confirms the relationship between the current account and fiscal deficits for the G7 countries

⁵ Other studies, not discussed here, have found that a 1 percent reduction in the fiscal balance to GDP ratio reduces the current account to deficit ratio by 0.1-0.3 percentage points.

for the 1973 – 2005 periods. Corsettin and Muller (2006) find evidence supporting the twin deficits hypothesis for Australia, Canada, the UK and the US; the relationship is stronger when the country is more open. Kaminsky, Reinhart and Vegh (2004) examine 104 countries and find some interesting patterns regarding international financial flows, fiscal and monetary policies. They also find countries with (a) capital inflows are pro-cyclical and (b) fiscal policy is pro-cyclical for most developing countries. This means that more expansionary fiscal policy is positively related to higher capital inflows (or larger current account deficits). For OECD countries, Piersanti (2000) finds that expectations of future budget deficits (such as those engendered by tax cuts) are associated with higher current account deficits.⁶ Kearney and Monadjemi (1990) use VAR analysis on eight industrialized countries and confirm the twin deficits hypothesis for the period 1972- 1987.

Empirical Estimation of the Twin Deficits Hypothesis

This section examines the relationship between fiscal and current account balances in the ECA countries. The main question of interest is whether fiscal deficits were destabilizing in the sense that they (or rather, the discretionary component of them) tended to be larger when current account deficits were larger. In order to investigate this relationship, panel regression analysis is used. The main regression of interest estimated in levels is of the following form:⁷

$$(1) \frac{CAB}{GDP} = \beta_0 + \beta_1 \frac{PSB}{GDP} + \beta_2 TOT + \beta_3 \frac{OUTPUT\ GAP}{GDP} + \beta_4 \frac{CAB_{t-1}}{GDP_{t-1}} + \beta_5 \frac{DEBT}{GDP} + \beta_6 \frac{OPEN}{GDP} + \beta_7 \frac{PSB}{GDP} \times FIX$$

CAB/GDP is the current account balance as a ratio to GDP. In order to focus on discretionary elements of fiscal outcomes rather than those influenced by cyclical fluctuations and past actions, I use the cyclically adjusted primary fiscal balance as a ratio to GDP as a measure of the fiscal stance. The adjustment used focuses on revenues, rather than expenditures as described in Annex 1.⁸ The list of countries included in the empirical estimation is in Annex 1.

Other explanatory variables included in various specifications, as prescribed by theory and related empirical papers, are the lagged current account balance to GDP ratio, the output gap relative to GDP, the terms of trade (TOT), a measure of trade openness (OPEN/GDP), a measure of financial indebtedness

⁶ Expectations of future budget deficits are instrumented with past values of the deficit.

⁷ In alternative specifications, a measure of the real exchange rate is also used as an explanatory variable.

⁸ This implies that all expenditures changes were discretionary. Clearly, in some of the ECA countries, automatic stabilisers on the expenditure side may be large (though revenue effects are larger). Thus, the adjustment done for this paper would overestimate the deficit in bad times and underestimate it in good times (when output is above potential).

(DEBT/GDP),⁹ a measure of whether the exchange rate is fixed or not (FIX), and interactions of the primary fiscal balance to GDP ratio with these other variables. The lagged current account ratio is included to account for persistence in current account. An increase in the terms of trade might have a positive impact on the current account balance (depending on how demand for exportables versus other goods changes). Countries' external debts to GDP ratios are used as explanatory variables as higher debt ratios may signal greater access to finance in international markets, or, alternatively, they may signal greater risk to lenders. Greater trade integration may be associated with larger external imbalances, though the effect may vary across time depending on domestic and international market conditions and output responses. Greater trade integration is represented by the value of imports and exports as a share of GDP.¹⁰

Cyclical output changes may also affect current account balances and leaving these effects out would tend to bias estimates on the public sector balance. However, the effect may be either to reduce or raise the external deficit.¹¹ For example, if output being above potential means that a higher proportion of domestic demand is met through imports, the current account balance would deteriorate as the output gap becomes positive, and the deficit accordingly smaller. However, if the output gap is driven by a boom in export demand, then the current account impact would be positive and the deficit accordingly smaller. Thus a measure of the output gap is added as a regressor. Net foreign assets as a share of GDP was also used as a regressor to see if financial openness had an impact on current account balances.

Table 1 below shows some summary statistics for the main variables of interest. The Table shows the wide variation among outcomes in the dataset, particularly in the measures of trade integration and external debt.

⁹ A measure of financial openness was also used, but was not significant in most specifications. A measure of the real exchange rate was also used and found to be insignificant.

¹⁰ An interaction term of trade integration with the primary balance is also tried in some specifications. That is, structural deficits may have a stronger impact on current account balances in countries that are more open because part of the higher demand for goods would be met by imports.

¹¹ $Output\ Gap = \frac{(Y_t - Y_t^{Potential})}{Y_t}$

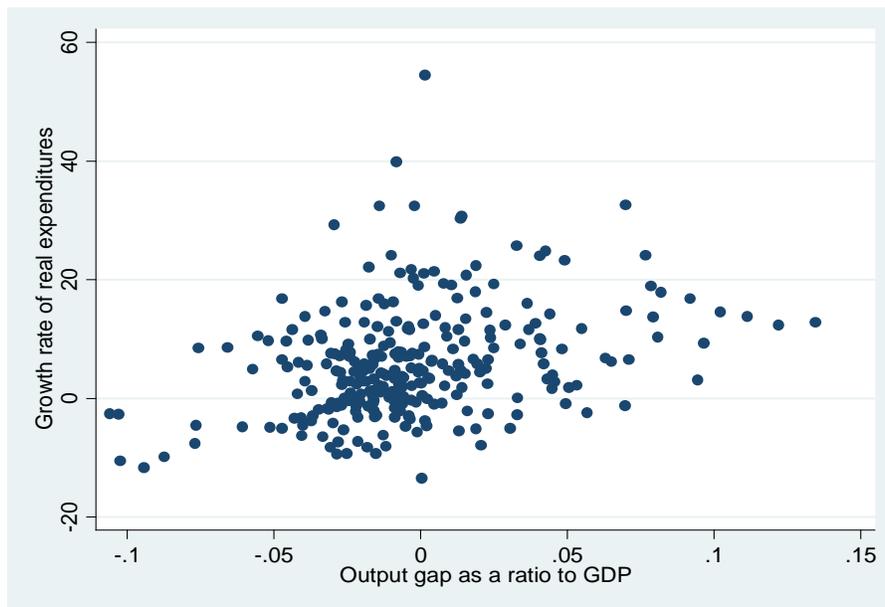
Table 1: Summary statistics, 2000-2012

Variable	Obs.	Mean	Std. Dev.	Max.	Min.
cbagdp	356	-5.86	9.12	33.68	-50.60
psbgdp	344	-0.24	3.47	17.66	-9.21
open	350	101.98	31.77	199.68	41.62
nfagdp	320	11.77	12.90	41.18	-37.95
debtgdp	302	50.03	33.05	190.26	1.34
tot	306	104.84	22.71	252.10	25.63

cbagdp = Current account balance as a ratio to GDP,
psbgdp = Cyclically adjusted primary fiscal balance as a ratio to GDP,
open = (Exports+Imports)/GDP,
nfagdp = Net Foreign Assets as a share of GDP,
debtgdp = External debt as a ratio to GDP,
tot = Index (goods and services, 2000 = 100).

Figure 1 shows a measure of fiscal policy behavior during the decade. It graphs growth in real expenditures against the output gap in ECA countries. The scatterplot indicates that real expenditure growth and the output gap have a positive association – real expenditures growing more when the output gap is larger (and positive). Figure 2 shows the output gap as a ratio to GDP graphed against the primary structural balance (oil exporters excluded). These figures suggest that public finances were not stabilizing output changes in the region during the period under consideration.

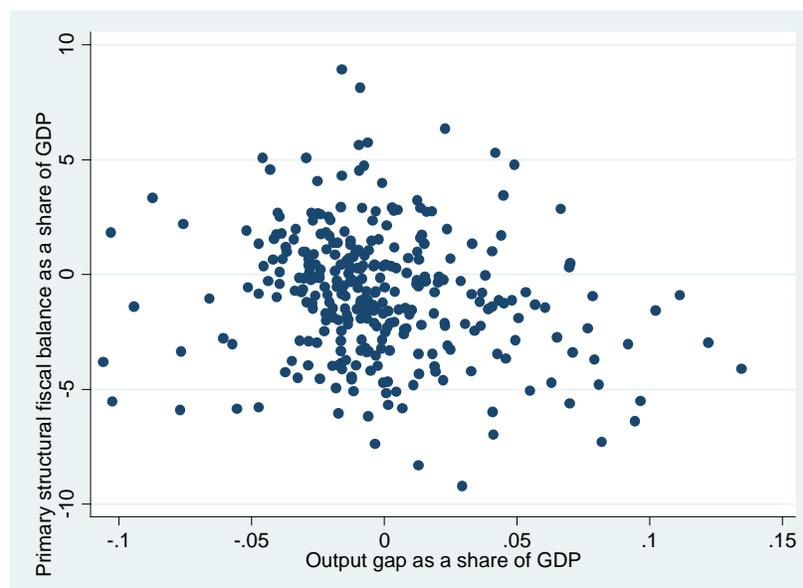
Figure 1: Real expenditures and the output gap show a positive association during 2000-2012



Source: World Bank staff estimates based on government accounts.

Note: Oil Exporters are excluded from this graph.

**Figure 2: The primary structural deficit and the output gap rise and fall together
ECA, 2000-2012**



Source: World Bank staff estimates based on government accounts.

The following empirical estimation considers how this stance may have influenced external balances. Table 2 below shows some of the results from the first set of regressions. Almost all regressions exclude the oil exporters.¹² The first column is the simple OLS regression. In the fixed effects regression (3), ECA countries (excluding oil exporters)¹³ do not exhibit a consistent pattern in terms of the relationship between external balances and fiscal balances. However, when the group of countries with fixed exchange rates is distinguished from those with flexible rates; the results show different and consistent patterns for the two groups during the period under consideration. In the first specification, there is an interaction term of the primary structural deficit with the exchange rate regime.¹⁴ ¹⁵ The interaction term between the exchange rate regime and the primary structural balance is constructed by multiplying the primary structural balance with a dummy variable that takes the value 1, if the country has a fixed exchange rate system. Changes in the structural primary deficit are always significantly and positively associated with changes in the current account balance, once the interaction term for countries with fixed exchange rate systems is included. Moreover, for almost all specifications, the magnitude is around 0.3. The countries in the sample that have fixed exchange rates show different results: their

¹² However, the basic results hold and the effects are larger when oil exporters are included.

¹³ Including oil exporters makes the twin deficits stronger; even in this specification, when oil exporters are included, with country and time fixed effects, the primary structural deficit enters with a significant coefficient.

¹⁴ The countries that are denoted as fixed exchange rate countries are the Baltic countries, Bosnia-Herzegovina, Bulgaria, Kosovo, Montenegro, Slovenia and the Slovak Republic (see IMF Annual Report on Exchange Rate Arrangements, Oct, 2012).

¹⁵ Inclusion of oil exporters strengthens the relationship.

primary structural balances were not positively associated with their current account balances during this period.¹⁶ For countries with flexible exchange rates, deterioration in the primary balance would magnify the current account impact of the fiscal change because of exchange rate appreciation.

A positive output gap has a negative effect on the current account balance, implying that when output is above potential, the current account deficit tends to be greater. This reflects the higher import demand (and possibly, real exchange rate appreciation), associated with higher output. The openness of a country is negatively associated with current account balance and the effect is found to be significant across all specifications. An increase in aggregate demand is more likely to be met through imports if the country is more open. The size of net financial assets as a ratio to GDP was added as an indicator of financial openness, but was not significantly associated with the current account balance. However, debt to GDP ratios (reflecting past current account deficits), are positively associated with current account balances.

¹⁶ A scatterplot of the current account balance and the primary structural deficit for fixed exchange rate countries (not shown) shows this pattern.

Table 2: OLS and FE Panel Regression with Current Account Balance as dependent variable

Independent variable	Dependent variable				
	Current account balance/GDP				
	(1)	(2)	(3)	(4)	(5)
	OLS ^{2/}	FE ^{1/, 2/}	FE ^{1/, 2/}	FE ^{1/, 2/}	GMM one-step ^{2/3/}
L[current account balance/GDP]	0.816*** (0.034)	0.635*** (0.053)	0.636*** (0.051)	0.555*** (0.059)	0.317*** (0.098)
Structural primary fiscal balance/GDP	-0.205** (0.091)	0.046 (0.114)	0.337*** (0.129)	0.333** (0.140)	0.250* (0.149)
Openness = (Export+Imports)/GDP				-0.048** (0.02)	-0.096** (0.038)
(Structural primary fiscal balance/GDP) * (Dummy variable equal to 1 if country has fixed exchange rate regime)			-0.823*** (0.193)	-1.000*** (0.219)	-0.597** (0.250)
Output gap/GDP				-37.144*** (11.29)	-45.53*** (16.553)
L[GDP per capita]				0.000 (0.001)	-0.000 (0.001)
Debt/GDP				0.037* (0.02)	0.102*** (0.028)
Constant Term	-1.411*** (0.348)	-1.689* (0.873)	-1.422* (0.846)	-0.295 (2.95)	1.771 (5.280)
R-sq	0.673				
Adj. R-Sq	0.671				
R-sq: within		0.54	0.572	0.617	
# of observations	282	282	282	239	215
<i>Notes:</i>					
This table reports beta coefficients and standard errors from OLS and FE regressions.					
L is the lag operator and L (X _t) = X _{t-1} .					
***, ** and * denote significance at 1%, 5% and 10% levels respectively.					
1/ Fixed effects with country and year dummies.					
2/ Regression excludes oil exporters.					
3/ Standard and GMM-type instruments are used for differenced equations.					

Part II: Fiscal revenues, output composition and financial cycles

The literature analyzing the relationship between tax receipts and output composition is limited. Gabriela Dobrescu and Ferhan Salman (2011) discuss the relationship between a country's fiscal stance and domestic absorption. Specifically, they show that just as ignoring output gaps can bias assessments of a country's true fiscal stance, so can ignoring domestic absorption cycles -cycles during which net exports boom and fall- bias assessments. They find net exports to be anti-cyclical in many emerging and advanced economies. In tax systems that rely heavily on indirect taxes, periods of low net exports will be associated with high fiscal revenues, *ceteris paribus*. Thus a period of high GDP growth and low net exports will be a period during which indirect tax receipts will be higher relative to GDP than a period of high GDP growth associated with high net exports. If net exports change in an anti-cyclical fashion, then periods of recession will see tax revenues to GDP fall more than would be expected with net exports remaining constant. Standard measures of cyclically adjusted fiscal balances would not capture this additional impact of GDP composition, which may vary with the GDP cycle, on revenues. These authors conduct a cross country analysis covering 59 advanced and emerging economies during 1990-2009 and examine fiscal outcomes during domestic absorption changes. They find that absorption booms (periods when net exports are low because domestic absorption is higher than normal) are associated with pro-cyclical fiscal policy. They conclude that pro-cyclicality arises because policymakers mistake absorption booms for permanent (structural) increases in revenues.

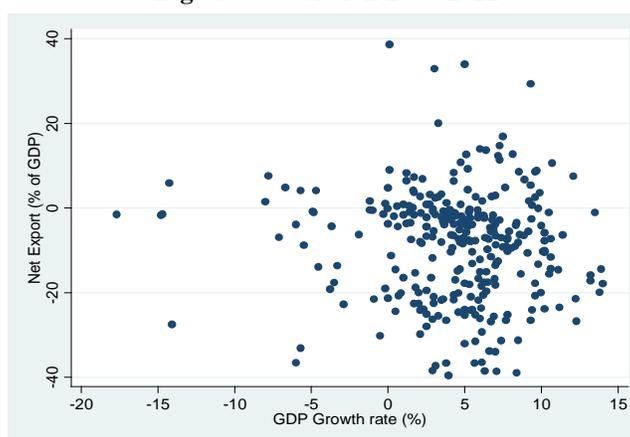
Li and Lopez-Murphy (2010) examine tax revenue downturn episodes, that is, episodes where tax revenue to GDP ratios decline sharply, and explore the relationship between tax revenues and imports. Their analysis covers 63 countries during 1977-97 and 26 countries during 1995-2007. They find that tax revenue to GDP ratios in emerging and developing countries are almost twice as volatile as in advanced countries; import to GDP ratios are also much more volatile in emerging and developing countries. They also find that expenditure taxes account for the bulk of the downturn in emerging and developing countries, while income taxes account for the bulk in developed countries. Changes in the import to GDP ratio are a statistically significant determinant of changes in the tax revenue to GDP ratio even when controlling for changes in real output and the terms of trade. Rahman (2010) examines pro-cyclicality of revenues and expenditures with respect to output and domestic absorption in Eastern Europe during 2003-2007. She concludes that short term revenue booms during higher output gaps were driven more by increases in domestic absorption than output gaps. She finds that when domestic absorption was high, short term revenue booms were taken for longer term revenue growth; at the same time, there was pro-cyclicality in expenditure growth.

Papers estimating the impact of financial sector volatility on financial/corporate sector profits and associated tax revenues are limited. EC (2010) estimates that the GDP weighted average share of the contribution of the financial sector to total corporate tax collection in the EU 29 was 20% before the crisis and fell to 17% in 2008. Moreover, they expected accumulated losses to reduce future tax payments via loss carry forward. IMF (2009) finds that the decline in financial sector profits during 2008/2009 affected tax revenues by 0.2 percent of GDP in the UK and US during 2008/2009. In this section, I examine whether financial sector profitability affects tax outturns beyond the impact through the GDP cycle so that corporate profits and tax revenues as a share of GDP are affected in the ECA region.

Empirical Estimation I: Tax Revenues and GDP Composition

In this section, I take a closer look at the revenue implications of potential changes in GDP composition; specifically changing net exports to GDP, given growth. As global capital markets have weakened leading to reduced external financing, many countries have had to contain their current account deficits. Another factor tending to reduce imports and increase net exports has been much weaker consumption demand in many ECA countries. As a result, consumption based tax revenues have declined. I explore how value added taxes are affected by changes in net exports. Value added taxes are likely to decline more than the amount estimated by declining GDP if net exports rise relative to GDP. Figure 3 shows how net exports tend to be anti-cyclical, being more negative when GDP growth is high and higher when GDP growth is low in ECA countries. In other words, net export patterns may worsen revenue declines during recessions and improve them during booms.

Figure 3: Net Export as a share of GDP & GDP growth rate show negative association 2000-2012



Source: World Bank staff estimates based on government accounts.

Note: Extreme values (GDP growth rate >20%; Net Export/GDP >40% or <-40%) are excluded from this graph¹⁷

¹⁷ This amounts to leaving out Azerbaijan for one year due to a very high growth rate and to omitting Bosnia-Herzegovina in the pre-2004 period, Kosovo, and Moldova for some years.

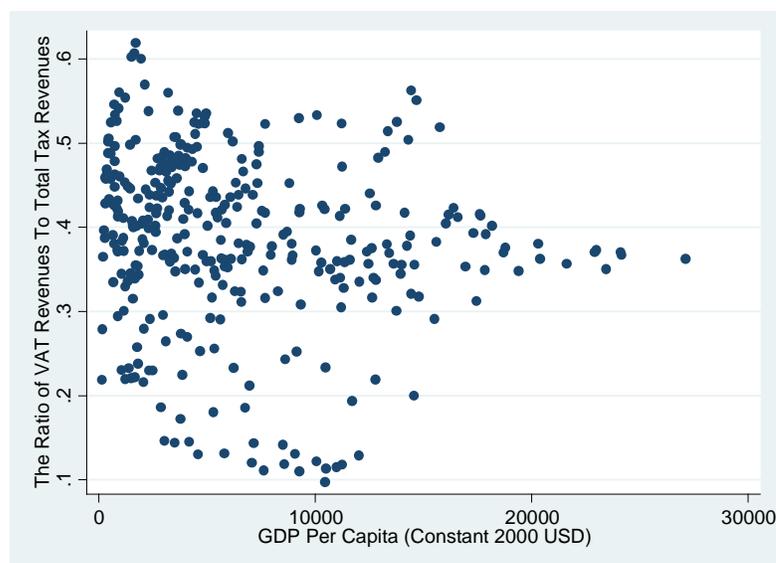
VAT revenues vary in importance between countries; the lowest ratios are found in the oil exporting countries. For these countries, oil revenues are the single most important source of fiscal revenue but these revenues do not accrue to the government through the VAT. Table 3 below shows VAT revenues as a share of GDP for the Balkan countries, the CIS and South Caucasus, the EU11, the Oil Exporters and the ECA average for 2007, 2009 and 2011.¹⁸ They are the most important, as a share of GDP, in the Balkans. Figure 4 shows that the importance of VAT revenues varies with per capita income in ECA countries. VAT revenues as a share of overall revenues, as depicted along the Y axis, tend to decline with increases in per capita income.

Table 3: VAT Revenue as Share of GDP in 2007, 2009 & 2011

Country Group	VAT Revenue		
	2007	2009	2011
Balkans Average	11.1	10.5	10.7
CIS & South Caucasus Average	9.7	9.3	9.5
EU11 Average	8.4	7.8	8.1
Oil Exporters Average	5.3	4.7	4.4
ECA Average	8.7	8.2	8.4

Source: World Bank staff calculations based on government accounts

Figure 4: VAT revenues are a less important share of taxes in higher income countries



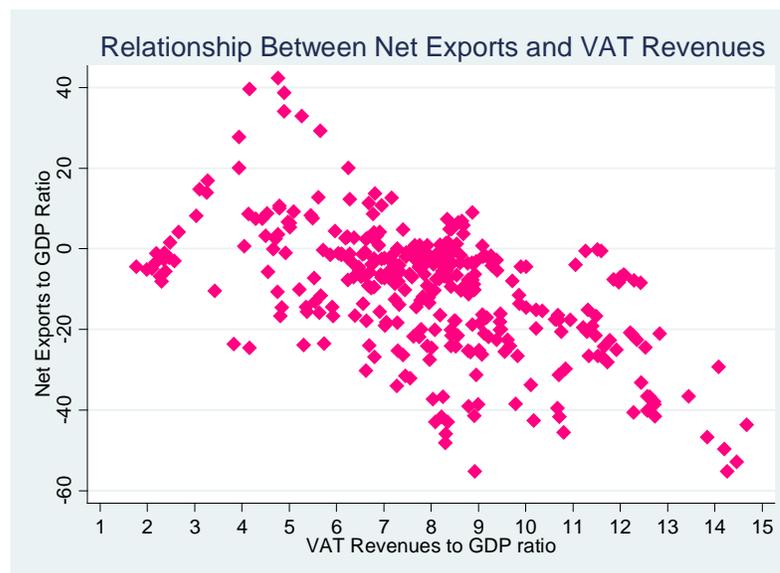
Source: World Bank staff estimates based on government accounts.

Finally, Figure 5 below shows a scatterplot of the VAT revenue to GDP ratio graphed against the net export to GDP ratio. The graph indicates a strongly negative relationship. Figures 4 and 5 together imply that similar changes in net exports would have larger effects on countries with lower GDP.

¹⁸ These numbers are based on data received during 2012.

Following other papers that have researched the impact of changes in GDP composition on tax revenues, I conduct a formal empirical analysis of how VAT revenues as a share of GDP are affected by changes in net exports as a share of GDP.

Figure 5: The relationship between net-exports and VAT revenues as a share of GDP is negative 2000-2012



Source: World Bank staff estimates based on government accounts.

In order to do explore the relationship further, I use the basic regression below:

$$(2) \frac{VAT}{GDP} = \beta_0 + \beta_1 \frac{VAT_{t-1}}{GDP_{t-1}} + \beta_2 TOT + \beta_3 GDP \text{ GROWTH} + \beta_4 \frac{NET \text{ EXPORT}}{GDP} + \beta_5 GDP \text{ PER CAPITA} + \beta_6 OUTPUT \text{ GAP}$$

Where VAT/GDP is the ratio of VAT revenues to GDP, TOT is an index of the terms of trade, GDPGROWTH is the growth rate of real GDP, NETEXPORTS/GDP is the ratio of net exports to GDP and GDPPERCAPITA is constant per capita GDP. The lagged VAT share is included to account for persistence in revenues. GDP growth is expected to affect tax revenues: in good times tax collection improves. The output gap is added as a regressor to account for additional revenue effects related to boom and bust periods. Regression results are shown in Table 4. The results indicate that, as expected, net exports and revenue collection from the VAT as a share of GDP are negatively related and the relationship is always strongly significant. The first regression shows the OLS pooled simple regression, the second column shows the same regression augmented by country fixed effects. The magnitude and significance of the coefficient on the net export share increase in the second specification. Subsequent specifications add the variables that theory dictates would predict VAT revenues and include either time

and country fixed effects or both or are GMM estimations. In all these specifications, the coefficient on the net exports ratio is between -0.05 to -0.07.

The terms of trade and the VAT share do not show a significant association and there is (a statistically) significant and substantial persistence in the current account as shown by the large coefficient on the lagged value of the VAT share. Including both time and country fixed effects does not reduce the significance of the variable of interest. The coefficient on the TOT is not robust to alternative specifications. In particular, it is not significant when the sample is broken into non-EU11 countries. Neither is it significant in the GMM specifications. The coefficient on log GDP per capita is usually significant and positive, though not always once other controls are added. A positive coefficient indicates that countries become better at collecting taxes as they become richer. Surprisingly, GDP growth is not a significant predictor of VAT revenues when the output gap is added as an explanatory variable. The output gap has a negative relationship with VAT revenues, even after controlling for net exports, when oil exporters are excluded from the sample.¹⁹ In other words, it is probably capturing the effect of booms related to export earnings.

What do these regressions reveal about the magnitude of the impact of a change in net exports on the VAT revenue ratio? I take a value of 0.05 for the coefficient- looking at regressions (3)-(7). Taking the change in the net export to GDP ratio for Albania from 2008 to 2012, the immediate impact on the VAT share is predicted to be 0.33 percentage points of GDP (6.6x.05). The effect is even larger in the “long run”. The “long run” coefficient on net exports (1-.4) is .05/.6 or .08. Using this coefficient implies a reduction of 3.5 percentage points in the VAT ratio! In other words, the longer the decline in net exports exists, the larger the effect on VAT revenues, *ceteris paribus*. A similar number is obtained for the change in revenue for the Kyrgyz Republic from 2008-09. Equation (9) in Table 5 shows the estimation for the EU11 countries only. Net exports have a much larger impact on VAT revenues as a share of GDP for this group, the coefficient being 0.09. For Bulgaria, where the net export ratio rose 18.92 points between 2008 and 2011, and using the coefficient in equation (9), the fall in VAT revenues would be 1.7 pp of GDP (for the rise in net exports during 2008-09, the impact would amount to 1pp of GDP) ! These figures imply that changes in domestic absorption may have significant and lasting effects on indirect tax revenues. GMM estimation shown in (10) and (11) indicates that every percentage point change in net exports is associated with a 0.05-0.06 percentage point change in the VAT/GDP ratio.²⁰

¹⁹ It is not significant in regressions including oil exporters. Moreover, the VAT share in GDP declines with GDP growth when oil exporters are included.

²⁰ Various lag lengths were tried to test the robustness of the results to changes in the instrument set.

Table 4: OLS and FE Regressions with VAT Revenue as share of GDP as dependent variable

Independent variable	Dependent variable						
	VAT Revenue/GDP						
	1	2	3	4	5	6	7
	OLS	FE	FE	FE ^{1/}	FE ^{1/}	FE ^{1/}	FE ^{1/}
L[VAT Revenue/GDP]	0.90*** (0.02)	0.61*** (0.04)	0.44*** (0.05)	0.43*** (0.05)	0.42*** (0.05)	0.40*** (0.05)	0.37*** (0.05)
Net Exports/GDP	-0.02*** (0.00)	-0.03*** (0.01)	-0.05*** (0.01)	-0.05*** (0.01)	-0.05*** (0.01)	-0.06*** (0.01)	-0.05*** (0.01)
GDP Growth			-0.00 (0.01)	-0.02* (0.01)	-0.01 (0.02)	-0.01 (0.01)	-0.01 (0.01)
Terms of trade, index			0.01** (0.00)	0.01** (0.01)	0.01** (0.01)	0.11** (0.00)	0.01* (0.00)
Output gap/GDP					-3.04* (1.75)	-6.60*** (1.87)	-8.35*** (1.96)
(Net Exports/GDP)*(Output Gap/GDP)						-0.41** (0.10)	-0.42*** (0.09)
Log of GDP per capita							1.16*** (0.44)
Constant Term	0.83*** (0.17)	2.94*** (0.27)	2.90*** (0.64)	2.91*** (0.67)	2.82*** (0.67)	3.02*** (0.64)	-5.38 (3.26)
R-sq	0.90						
Adj. R-Sq	0.90						
R-sq: within		0.67	0.59	0.64	0.65	0.68	0.69
# of observations	279	279	221	221	221	221	221
<i>Notes:</i>							
This table reports beta coefficients and standard errors from OLS and FE regressions.							
All regressions exclude oil exporters.							
L is the lag operator and L (Xt) = Xt-1.							
***, ** and * denote significance at 1%, 5% and 10% levels respectively.							
1/ Country and time fixed effects.							
2/ Regression exclude EU11 countries.							
3/ Regression include EU11 countries only.							

**Table 5 : OLS and FE Regressions with VAT Revenue as share of GDP as dependent variable,
EU11 group & non-EU11**

Independent variable	Dependent variable			
	VAT Revenue/GDP			
	8 FE ^{1/2/}	9 FE ^{1/3/}	10 GMM one-step ^{4/}	11 GMM two-step ^{4/}
L[VAT Revenue/GDP]	0.52*** (0.06)	0.21** (0.09)	-0.02 (0.12)	0.03 (0.25)
Net Exports/GDP	-0.04*** (0.01)	-0.09*** (0.02)	-0.06*** (0.01)	-0.05*** (0.01)
GDP Growth	-0.03** (0.02)	0.05*** (0.02)	0.02* (0.01)	0.02 (0.02)
Terms of trade, index	0.00 (0.01)	-0.01 (0.01)		
Output gap/GDP	2.86 (2.10)	-14.59*** (2.41)	-6.16*** (1.30)	-5.62* (3.17)
(Net Exports/GDP)*(Output Gap/GDP)	-0.08 (0.08)	-0.60*** (0.14)	-0.26*** (0.09)	-0.29 (0.21)
Log of GDP per capita	0.56 (0.52)	0.64 (0.57)	1.02*** (0.26)	0.86*** (0.25)
Constant Term	-0.69 (3.51)	0.95 (4.12)	-0.99 (1.83)	-0.15 (1.77)
R-sq: within	0.66	0.64		
# of observations	141	113	250	250
<i>Notes:</i>				
This table reports beta coefficients and standard errors from OLS and FE regressions.				
All regressions exclude oil exporters.				
L is the lag operator and L (X _t) = X _{t-1} .				
***, ** and * denote significance at 1%, 5% and 10% levels respectively.				
1/ Country and time fixed effects.				
2/ Regression excludes EU11 countries.				
3/ Regression include EU11 countries only.				
4/ Standard and GMM-type instruments are used for differenced equation.				

Empirical Estimation II: Revenues from Corporate Taxes and Financial Sector Profitability

Another change that is of relevance to ECA is the impact of the financial sector boom on corporate, and particularly, financial, sector profitability. The magnitude and pattern of the financial sector's booms and busts are not perfectly correlated with that of the output cycle. Yet, financial sector volatility may have substantial effects on revenues through its effect on the profits of financial and non-financial firms. A sustained reduction in financial sector profitability would be expected to have an impact on the share of the corporate income tax in GDP. This poses a potential concern for ECA countries- will tighter financial market conditions and lower returns in the financial sector have implications for tax revenues? Table 6 shows corporate income tax revenues as a share of GDP during 2007, 2009 and 2011. On average, CIT revenues tend to be a more important source of revenue for the higher income countries in ECA while VAT tends to be a relatively more important source of revenue for countries with lower income, as shown in Figure 6 below.

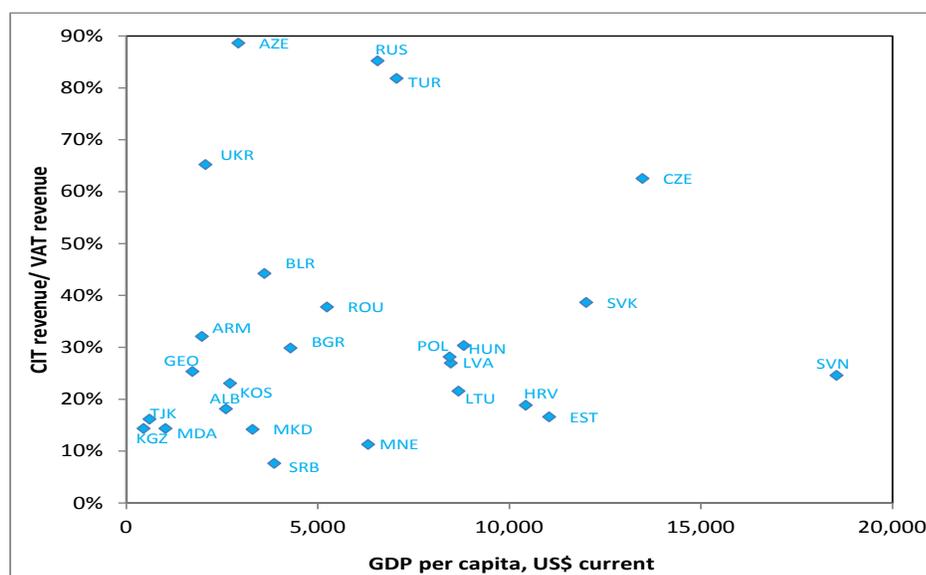
Table 6: CIT Revenue as a percent of GDP in 2007, 2009 & 2011

Country	CIT Revenue		
	2007	2009	2011
Balkans Average	1.74	1.45	1.21
CIS & South Caucasus Average	2.82	2.23	2.42
EU11 Average	3.05	2.33	1.93
Russia & Oil Exporters Average	8.99	4.75	5.33
ECA Average	3.36	2.39	2.3

Source: World Bank staff calculations based on government accounts.

Source: World Bank staff estimates based on government accounts.

Figure 6: CIT revenue/GDP vs. GDP per capita, average, 2000-2012



Source: World Bank staff estimates based on government accounts.

Note: Oil Exporters are excluded from the graph

In order to examine the effect of financial sector profits on corporate tax revenues, an exercise similar to the one conducted for VAT revenues, was done for the share of corporate income taxes in GDP. The main regression of interest is shown below:

$$(3) \frac{CIT}{GDP} = \beta_0 + \beta_1 \frac{CIT_{t-1}}{GDP_{t-1}} + \beta_2 ROE + \beta_3 TOT + \beta_4 GDP \text{ GROWTH} + \beta_5 GDP \text{ PER CAPITA} + \beta_6 \frac{NFA}{GDP} + \beta_7 OUTPUT \text{ GAP}$$

Where CIT/GDP is the share of corporate tax revenue in GDP and ROE is the return on equity for financial sector firms. The return on equity is used as a proxy for financial sector profits.²¹ The lagged share of CIT is included to account for persistence in the revenue share of GDP from one period to the next. As for the regressions concerning the VAT, GDP growth is included as an explanatory variable: tax revenues collected are expected to be higher in good times. The TOT are expected to affect profits tax revenues, particularly in cases where corporate profits are strongly linked to oil revenues; moreover, the country's (and financial system's) creditworthiness may be affected by the TOT. If so, movements in the TOT would be correlated with movements in the return on equity. GDP per capita is included as a control variable as richer countries are expected to have higher corporate/financial sector tax revenues relative to GDP. Financial openness is expected to affect the CIT/GDP ratio as it is likely to have an impact on financial flows. Lower net foreign assets relative to foreign debt, implies higher external borrowing; though higher NFA may indicate better ability to repay. The sign could be positive or negative.

In all the cases, the coefficient on return on equity has the expected sign and is significant, usually at the 1% level. The results are shown in Table 7 and 8 below. Most specifications show the coefficient for ROE to be around .006 or greater (in the case of the columns 9 and 10, the coefficient is higher). The magnitude of the coefficient is not very large in the short run, in the sense that the impact effect of a decline in ROE of 9.1 units (as happened in Albania between 2005 and 2009) would be .05 percentage points of GDP. Over the "longer run", it would be .11 points of GDP (.05/.5).²² For Turkey between 2002 and 2006, the model estimates an increase in CIT revenues of 0.5 percentage points of GDP due solely to the increase in the ROE in equity.

In terms of the other variables, GDP growth is not a significant factor in explaining the corporate tax share of GDP, once the TOT and return on equity are included, and if oil exporters are excluded from the sample. However, it is always significant (though not always with the expected sign) in explaining the CIT share once oil exporters are included in the sample. The results are similar for the TOT variable.

²¹ The regressions were also run using the return on assets and similar results were obtained.

²² The longer run coefficient is calculated by taking the difference between the current and lagged coefficients of the CIT ratio and dividing the coefficient on ROE by this number.

The NFA coefficient does not add to the explanatory power of the regression. Measures of the output gap are not significantly correlated with the CIT share of GDP when oil exporters are excluded.

Table 7: OLS and FE Regressions with CIT Revenue as share of GDP as dependent variable					
Independent variable	Dependent variable				
	CIT Revenue/GDP				
	(1)	(2)	(3)	(4)	(5)
	(OLS)	FE	FE ^{1/}	FE ^{1/}	FE ^{1/}
L[CIT/GDP]	0.972*** (0.025)	0.686*** (0.052)	0.636*** (0.057)	0.489*** (0.062)	0.435*** (0.065)
Return on equity	0.009*** (0.001)	0.009*** (0.001)	0.006*** (0.001)	0.006*** (0.001)	0.005*** (0.001)
Terms of trade, index				0.016*** (0.003)	0.017*** (0.004)
GDP Growth					-0.024* (0.012)
Constant Term	-0.013 (0.090)	0.817*** (0.161)	0.931*** (0.196)	-0.232 (0.327)	-0.515 (0.343)
R-sq	0.875				
Adj. R-Sq	0.873				
R-sq: within		0.491	0.596	0.633	0.649
# of observations	220	220	220	210	193
<i>Notes:</i>					
This table reports beta coefficients & standard errors from OLS and FE regressions.					
L is the lag operator and L (Xt) = Xt-1.					
***, ** and * denote significance at 1%, 5% and 10% levels respectively.					
1/ Country and year fixed effects					

Table 8: OLS and FE Regressions with CIT Revenue as share of GDP as dependent variable					
Independent variable	Dependent variable				
	CIT Revenue/GDP				
	(6)	(7)	(8)	(9)	(10)
	FE ^{1/, 2/}	FE ^{1/}	FE ^{2/}	GMM ^{2/}	GMM
L[CIT/GDP]	0.425*** (0.075)	0.465*** (0.067)	0.506*** (0.073)	0.513*** (0.104)	0.220*** (0.083)
Return on equity	0.007* (0.004)	0.005*** (0.001)	0.007* (0.003)	0.011* (0.007)	0.009*** (0.002)
Terms of trade, index	-0.002 (0.005)	0.017*** (0.004)	-0.003 (0.005)	0.002 (0.007)	0.028*** (0.010)
GDP Growth	0.003 (0.012)	0.038*** (0.014)	0.007 (0.012)	-0.008 (0.012)	0.007 (0.022)
Output gap as a share of GDP	-0.217 (1.43)	-2.591* (1.435)	-0.132 (1.392)	3.461*** (1.114)	2.650* (1.505)
Log of GDP per capita			-0.017 (0.077)	-0.322 (0.303)	-0.554 (0.558)
Constant Term	1.331** (0.530)	-0.758** (0.367)	1.352* (0.787)	3.295 (2.378)	3.328 (4.139)
R-sq: within	0.504	0.656	0.567		
# of observations	167	193	156	142	162
<i>Notes:</i>					
This table reports beta coefficients and standard errors from OLS and FE regressions.					
L is the lag operator and L (Xt) = Xt-1.					
***, ** and * denote significance at 1%, 5% and 10% levels respectively.					
1/ Country and year fixed effects					
2/ Regression exclude oil exporters.					

Conclusion

Macroeconomic developments resulting from changes in global markets have had a significant impact on fiscal accounts in ECA. Fiscal policies have also had an impact on countries' external balances. This paper has discussed three important linkages between fiscal accounts and the macroeconomy (a) the relationship of external balances with fiscal balances; (b) the effect of output composition on fiscal revenues and (c) the effect of financial sector profitability on fiscal outcomes. By examining these particular macro-fiscal issues, a better understanding of ECA countries' macro-fiscal outcomes is developed.

Three main conclusions from this paper are that (i) Expansionary fiscal policy has been associated with periods of rising external deficits in flexible exchange rate countries (which constitute the majority of ECA countries). In the ECA region, countries with fixed exchange rates did not on average, have fiscal policy as a significant factor in worsening current account balances; (ii) Changes in net exports have affected fiscal revenues as a share of GDP; (iii) Declines in financial sector profitability may also have longer term consequences for profits taxes. The implication of (i) is that countries that are concerned with managing their external balances must adjust fiscal balances accordingly. Points (ii) and (iii) imply that movements in net exports and in financial markets may distort perceptions of revenue sustainability. In ECA countries, trade balances and international financial market conditions have impacts on fiscal revenues. Ignoring changes in these factors could lead to an overestimation of revenue sustainability and lead policymakers to mistake temporary revenue changes for permanent ones. Thus, structural deficits may be under-estimated. These analyses highlight that when adopting fiscal policies, it is important to take account of economy-wide factors, apart from growth, in affecting outcomes.

Annex 1

Structural/Cyclically Adjusted Fiscal Balances

When assessing the stance of fiscal policy, it is useful to think of structural or cyclically adjusted balances instead of actual fiscal balances which also reflect non-discretionary or one-off policy decisions. Structural balances are those from which all transitory factors affecting the fiscal balance have been purged. A complete calculation of structural balances would need to account for the following factors:

- Cyclical revenue and expenditure items: expenditure and revenue outcomes for government depend on both discretionary elements and on elements that increase/decrease with the economic (business cycle). For example, unemployment compensation payments and income tax revenues vary with GDP;
- Items whose cyclical behavior may not be strongly correlated with domestic output but have important transitory effects on revenues or expenditures; and
- Other transitory items that affect the budget only in a single year or a limited number of years such as a civil service reform measure that only induces expenditures in the current and next year, or a one-time fee levied on a transaction.

The first two elements affect the budget automatically as a result of the changes in economic variables. The third element is usually the result of a policy decision.

The concept of the structural fiscal balance used in this paper mostly corrects for the automatic effects of the business cycle (the deviations of actual and potential output) on fiscal balances. They focus on the revenue side. There is no correction for automatic stabilizer effects on the expenditure side (for example, an increase in unemployment compensation payments in recessionary times).

In adjusting for revenues, this study uses an elasticity of 1 with respect to output. Ideally, country specific elasticities should be used. However, there is empirical evidence that 1 is a good approximation of the weighted average of disaggregated elasticity estimates over a range of countries. In addition, for a regional study, this is an appropriate approximation. The elasticity of personal income taxes with respect to the output gap has been found to be approximately between 1-1.7, for corporate income taxes, between 1.2- 1.8, for social security contributions, 0.5-0.9 and for indirect taxes, around 1.²³

Correcting for the behavior of items whose movements are not perfectly correlated with the business cycle, would provide a better estimate of structural balances. However, for the important items

²³ IMF (2011), Girouard and Andre (2005).

in this category, asset and commodity prices, and the composition of output, correction of fiscal balances becomes complex (both theoretically and empirically) even in a single country. Among the reasons are that long run equilibrium prices and cyclical behavior are not easy to establish or distinguish, and the equilibrium composition of output (or say current account balances and net exports) depends on a variety of other endogenous factors. The paper uses empirical relationships between VAT revenues and net exports to GDP to assess the direction of the impact of a contraction in net exports, given growth, on VAT revenues and therefore, to get a better idea of the underlying structural balance. Similarly, it looks at profitability in the financial sector as having a substantial impact on tax revenues.

In-depth knowledge of country fiscal policy decisions are needed to identify one-off or very short-lived expenditure and revenue changes. However, it is often hard to identify measures that are truly one-off. In practice, there are no rules that can be applied across the board. Also, items that seem transitory may be “judged” to be permanent. For example, the EC suggests that deficit increasing measures should not be regarded as one-off measures as expenditure increases intended to be temporary often become permanent. At the same time, fiscal stimulus measures should **not** be taken out of calculations, even if intended to be temporary. A large amount of judgment needs to enter into estimation of a particular countries’ structural deficit.²⁴ In addition, for analytical purposes, if the goal is to examine discretionary fiscal measures, temporary elements should not be removed from the estimation of structural budgets.

Estimation of the output gap

The Hodrick-Prescott filter is used to decompose output into trend and cyclical components. Hodrick and Prescott (1980) propose the optimization procedure in Equation (1) below to calculate trend output, YT. Filtering implies calculating a moving average with the weights depending on the number of observations and on the parameter lambda. The trend of Y for each year is calculated as the weighted average of all the elements of the original series. A higher lambda gives a smoother trend; a lower lambda means variations from the trend are penalized less; thus, the closer the trend follows the actual series.

$$\min y_t^* \sum_{t=0}^{t=T} ((y_t - y_t^*))^2 - \lambda ((\Delta y_{t+1}^* - \Delta y_t^*))^2 \quad (1)$$

Two problems with the HP filter are recognized and mentioned here: (a) structural breaks bias the HP filter, and (b) end-point estimation is not reliable in the sense that, as one gets closer to the end-point of the series, the actual values of Y dominate the estimate of YT. Extending a time series by

²⁴ Larch and Turrini (2009), (MF (2011)).

forecasts using ARIMA or VAR methods overcomes this problem, but raises questions about the validity of the forecasts. In this paper, forecasts for GDP up to 2015 are provided by Convergence Reports for the 10 European Union countries and IMF WEO projections for non EU countries. We use these estimates,

The choice of lambda in estimating the trend output is important. The lower the value, the more is the variability of the cyclical component underestimated, and that of the trend output level (or potential output) overestimated. For example, with a value of zero, actual and trend outputs would be the same. However, the larger is lambda, the more likely it is that the variability of the cyclical component is overestimated and the trend component underestimated. For quarterly data, Hodrick and Prescott recommend a value of 1600 in their original work. For annual data values from 100-400 have been commonly used, though more recent work uses a value of 6 to 8 for annual data.²⁵ While an ideal value of lambda is hard to determine, a value of 30 is used in this paper. Too low a value of lambda would introduce more variability in the trend and to a certain degree, defeat the purpose of evaluating the fiscal policy stance net of short term booms and busts. It would lead to an overly positive assessment of fiscal policy in booms. However, a large lambda also comes with disadvantages. For example, by overestimating gaps in periods of low growth, deterioration in the underlying budgetary position may go undetected.²⁶

Country Classification and Variable Description for CAB, VAT, and CIT Regressions

<u>Country classification by sub-regions</u>	
Balkans	Albania, Bosnia and Herzegovina, Kosovo, Macedonia FYR, Montenegro, Serbia
CIS and South Caucasus	Armenia, Belarus, Georgia, Kyrgyz Republic, Moldova, Tajikistan, Ukraine
EU-11	Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia
Oil Exporters	Azerbaijan, Kazakhstan, Russian Federation

²⁵ Bouthevillain et al. (ECB 2001)

²⁶ See Bouthevillain et al. (ECB 2001); it uses a value of 30.

Current Account Regression Variables

Countries	28 countries in Europe and Central Asia, excluding Turkmenistan and Uzbekistan
Years	2000-2011

Main Variables	Description	Data Availability	Source
Current Account Balance as a share of GDP		2000-11	World Bank estimates based on government accounts
Structural primary fiscal balance as a share of GDP	The structural balance refers to the general government cyclically adjusted balance. The cyclically adjusted balance is the fiscal balance adjusted for the effects of the economic cycle. Structural Primary Balance is Structural Balance minus net interest payable/paid.	2000-11	World Bank estimates based on government accounts
Output Gap as a share of GDP	The output gaps were calculated as actual GDP less potential GDP as a percent of actual GDP, or Output Gap = $(Y_t - Y_t \text{ filter})/Y_t$	2000-11	World Bank estimates based on government accounts
Openness as a share of GDP	$(\text{Exports} + \text{Imports})/\text{GDP}$	2000-11	World Bank data
Per Capita GDP in US dollars	Constant 2000 US Dollars	2000-11	World Bank, World Development Indicators database
Net Foreign Assets as a share of GDP		2000-11. Data are missing as follows: Kosovo, 2000; Kyrgyz Rep., 2008-11; Montenegro, 2000-01, Slovak Republic, 2009-11; Tajikistan, 2009-11, and Ukraine, 2009-11.	World Bank, World Development Indicators database
Terms of trade index	Index (goods and services, 2000 = 100)	2000-11, 2011 missing for Georgia, Hungary, Kosovo, Latvia, Lithuania, Poland, Slovak Rep., and Slovenia	World Bank, World Development Indicators database
External debt as a share of GDP Real Exchange Rate		2000-11, 2011 missing for Croatia 2000-12	World Bank, International Debt Statistics IFS

Value Added Tax Regression Variables

Countries	28 countries in Europe and Central Asia, excluding Turkmenistan and Uzbekistan
Years	2000-2011

Main Variables	Description	Data Availability	Source
VAT revenues as a share of GDP		2000-11. Data are missing as follows: Bosnia and Herzegovina and Kosovo, 2000-04; Armenia, 2000-03; Macedonia and Montenegro, 2000; Moldova, Ukraine, and Croatia, 2000-04	World Bank estimates based on government accounts
Tax revenues as a share of GDP		2000-11. Data are missing as follows: Bosnia and Herzegovina and Kosovo, 2000-04; Armenia, 2000-03; Macedonia and Montenegro, 2000; Moldova, Ukraine, and Croatia, 2000-04	World Bank estimates based on government accounts
Terms of Trade growth	Year on year growth, terms of trade for goods and services (index 2000=100)	2000-11. Data are missing as follows: Georgia, Kosovo and Montenegro, 2000-11	World Bank, World Development Indicators database
Net Exports as a share of GDP		2000-11	World Bank data
Output gap as a share of GDP	The output gaps were calculated as actual GDP less potential GDP as a percent of actual GDP, or Output Gap = $(Y_t - Y_t \text{ filter})/Y_t$	2000-11	World Bank estimates based on government accounts
Real GDP growth		2001-11	World Bank data

Corporate Income Tax Regression Variables

Countries	23 countries in Europe and Central Asia, excluding: Bosnia and Herzegovina, FYR Macedonia, Kosovo, Montenegro, Serbia, Tajikistan, Turkmenistan and Uzbekistan.
Years	2000-2010

Main Variables	Description	Data Availability	Source
Corporate income tax as a share of GDP		2000-10	World Bank estimates based on government accounts
Rate of Return on Asset	Net income to yearly averaged total assets of commercial banks within each country listed in Bankscope*.	2000-10	FinStats database, 2012
Rate of Return on Equity	Net income to yearly averaged equity of commercial banks within each country listed in Bankscope*.	2000-10. Data are missing as follows: Kazakhstan, 2010	FinStats database, 2012
Real GDP growth		2001-10	World Bank data
Tax revenue in local currency unit		2000-10. Data are missing as follows: Armenia, 2000-02 ; Croatia and Moldova, 2000-01	World Bank estimates based on government accounts
Corporate income tax revenue		2000-10	World Bank estimates based on government accounts
Output Gap as a share of GDP	The output gaps were calculated as actual GDP less potential GDP as a percent of actual GDP, or Output Gap = $(Y_t - Y_t \text{ filter})/Y_t$	2000-10	World Bank estimates based on government accounts
Net Foreign Asset as a share of GDP	Net Foreign Assets are the sum of foreign assets held by monetary authorities and deposit money banks, less their foreign liabilities.	2000-11. Data are missing as follows: Kosovo, 2000; Kyrgyz Rep., 2008-11; Slovak Republic, 2009-11.	World Bank, World Development Indicators database
Terms of trade index	Index (goods and services, 2000 = 100)	2000-10. Data are missing as follows: Georgia, 2000-10	World Bank, World Development Indicators database

*Bankscope contains comprehensive information on banks across the globe.

<http://www.bvdinfo.com/Products/Company-Information/International/Bankscope.aspx>

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