CENTRAL BANK OF
THE REPUBLIC OF AZERBAIJAN

WORKING PAPER SERIES
№ 04/2017

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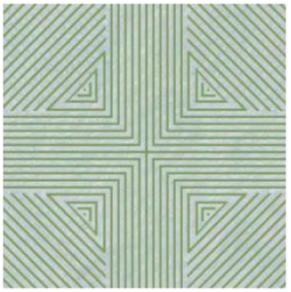
December 5, 2017



Structural Budget Balances in Oil-rich Countries: The Cases of Azerbaijan, Kazakhstan, and Russia[1]

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December 5th, 2017

Abstract

This study aims to analyze discretionary fiscal policy in Azerbaijan, Kazakhstan, and Russia for the period of 2003-2015 using structural fiscal balance (SBB). SBB takes into the consideration the permanent component of oil revenue and therefore clearly defines the discretionary fiscal position and the aggregate demand effect of fiscal policy. The structural balances in Azerbaijan and Russia experience deficit for the most of the analyzed period. The moderate level of SBB surplus is observed in Kazakhstan. The estimated SBBs also demonstrate that fiscal policies tend to be mainly pro-cyclical in Kazakhstan and Russia. Azerbaijan conducted counter-cyclical fiscal policy for the half of the investigated period. Moreover, governments gave more importance to economic stabilization in 2009 due to the global financial crises.

JEL classification: E62, H60.

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[1] The authors are greatly indebted to Prof. Ugo Panizza for his guidance and useful feedbacks throughout the course of the project and are also grateful to the BCC program, the SECO and the Graduate Institute for their support. The authors would like to thank Salman Huseynov, Fuad Mammadov and other colleagues at the CRD for their fruitful comments and suggestions. The views expressed in this working paper are those of the authors and do not necessarily represent the official views of the Central Bank of the Republic of Azerbaijan.

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Keywords: fiscal policy, structural budget balance, oil-rich countries, Azerbaijan, Kazakhstan, Russia.

Introduction

The three fold decline of crude oil prices in mid-2014 and persistency of low oil prices led to the deterioration of the budget deficits in Azerbaijan, Kazakhstan, and Russia due to high oil price transmission to the fiscal revenues. To reduce the dependence on oil revenues, policymakers have considered designing the counter-cyclical fiscal policy and establishing a medium-term budget framework.

The counter-cyclical fiscal policy cannot be effectively implemented if there exists no effective analytical toolkit for the sound analysis of the fiscal policy. The literature proposes several indicators suitable for assessing fiscal policies in the oil-rich economies, such as non-oil primary balance, structural budget balance (SBB), and modified SBB (Zakharova and Medas, 2009; Hagemann, 1999; Bornhorst *et al*., 2011). Among them, the most comprehensive is the modified SBB, which shows the true fiscal position of a government controlling for the budgetary effects of the business cycle and the movements in commodity prices (Bornhorst *et al.*, 2011). In other words, the SBB demonstrates what the financial position of general government would be if the utilization of the production factors were at the midway of the business cycle.

The majority of the studies examining fiscal policy in Azerbaijan, Kazakhstan, and Russia employed the non-oil primary balance in the analysis (Zakharova and Medas, 2009; Villafuerte and Lopez Murphy, 2010; Erbil, 2011). Their study shows that the fiscal policies in these countries are mainly pro-cyclical. To our best knowledge, the only study employing the SBB approach to assess the fiscal policy in oil-rich CIS countries belongs to Platonov (2012). The author, who focuses his research on Russia in 2003-2010, concludes that the fiscal policy in this country was pro-cyclical in this period.

This paper extends the study by Platonov (2012) in several ways. First, in the analysis, we will use the modified SBB, which along with standard cyclical adjustment corrects for deviations in the oil prices from their long-term trend. Second, it uses the estimated revenue items-to-output elasticities but not the assumed ones. In particular, we estimate how business cycle and oil prices affect different tax categories of the government revenues. Third, in addition to Platonov (2012), we conduct analysis over three oil-rich countries instead of one country. The multi-country nature of the study provides evidence on how country heterogeneities - the extent of the oil dependency, level of oil reserves, degree of maturity in oil production affect fiscal policy patterns. Fourth, the study incorporates recent statistics, which contains information on more than one oil price cycle. Given these extentions to the existing framework by Platonov (2012), the present study delivers more accurate estimates of fiscal policy performance dependence on oil price volatility.

The results of the empirical analysis conducted over 2003-2015 show that the pro-cyclicality of fiscal policy is still a problem in Azerbaijan, Kazakhstan, and Russia, which needs to be addressed to safeguard medium-term fiscal sustainability and to smooth economic growth. The estimated revenue categories-to-output gap elasticities in Azerbaijan and Kazakhstan are lower than those of Russia. Such results can be due to either relatively better tax administration or tax system or both in Russia.

The article is organized as follows. The next two sections present the theoretical background and a review of relevant literature. The fourth and fifth sections describe the methodology of the research and employed data. The results and its comparative discussion will subsequently be reported and the final section will conclude the article.

Theoretical background

In practice, the efficiency of fiscal policy largely depends on adequacy of measures of fiscal balance, which the authorities take into consideration when they make a decision regarding budget expenditure. The use of inappropriate measures can have a high cost for the society as the ineffective fiscal policy can adversely affect the economic performance of the country. The traditional measures used to assess the fiscal stance are the overall and primary budget balances.[5] If the fiscal authorities use these indicators to implement fiscal policy, then, to keep the budget balanced, they need keep their budget expenditure in line with their revenues, which usually co-moves with the output. Such strategy will lead to the pro-cyclicality of fiscal policy and can further exacerbate the economic situation during recession through tightening aggregate demand. This does not accord with both the Keynesian and neoclassical theories stating that fiscal policies need, in fact, to be countercyclical. Thus, in times of recession, the government needs to reduce tax rates and increase expenditure (government debt increases), while in times of boom, it needs to raise taxes and reduce spending (government debt decreases). In other words, there has to be a positive relationship between changes in output and budget balance. This idea led to the development of the new measure of fiscal balance - cyclically adjusted balance, which represents an indicator of the fiscal stance net of the business cycle effects (Hagemann, 1999). To target this measure, the fiscal authorities need to adjust their spending not in accordance with the changes in actual output but in accordance with the changes in potential output.

[5] The overall fiscal balance in contrast to the primary fiscal balance also accounts for interest payments on government liabilities.

For oil-producing countries, the use of the overall and primary balances in assessing fiscal stance is inadequate as it does not produce true policy conclusions. For example, a temporary increase in oil prices can be associated with large budget surpluses in oil-producing countries and this can encourage authorities to increase expenditure. Broad fiscal expansion in times of economic boom when the output is already above its potential level has a negative efficiency gains. However, when, in the medium term, the oil prices move back to their trend, the response of authorities will be the reduction of the public spending, which will narrow aggregate demand and therefore will have an adverse effect on economic performance. For this reason, oil-producing countries were advised to use non-oil fiscal indicators such as non-oil overall balance and non-oil primary balance (Zakharova and Medas, 2009). The non-oil overall balance is defined as a difference between non-oil revenues and non-oil expenditures; the non-oil primary balance is also defined as a difference between non-oil revenues and non-oil expenditures excluding interest payments.

The non-oil fiscal indicators reduce the influence of oil revenues on fiscal policy, but they are still affected by the business cycle effects originating in the non-oil sector. Therefore, Villafuerte and Lopez-Murphy (2010) suggest using the cyclically adjusted non-oil balance instead of the conventional non-oil balance as a better measure of the fiscal stance. However, the disregard for the oil sector can be inappropriate because the oil sector will remain to be an important part of oil-rich economies at least in the medium term. In light of this argument, a comprehensive assessment of fiscal policy in these countries requires a measure, which will account for both temporary fluctuations in oil prices and business cycle effects of the non-oil sector. Such a measure of the fiscal stance can be the structurally adjusted fiscal balance, which corrects the conventional fiscal balance not only for cyclical effects, but also for the factors beyond the business cycle (Bornhorst *et al.*, 2011). In practice, we divide the fiscal revenues and expenditures into oil and non-oil parts

and adjust them respectively for temporary oil price fluctuations and cyclical effects to compute a structurally adjusted fiscal balance for oil-rich countries.

Literature review

Conditionally, the literature examining fiscal policy in oil-rich countries taking into account the resource dependence can be divided into three generations. The first generation studies suggest the use of the non-oil primary balance instead of the overall primary balance to examine cyclicality of fiscal behavior of oil-rich countries (Zakharova and Medas, 2009; Villafuerte and Lopez-Murphy, 2010; Erbil, 2011). The non-oil primary balance has been defined as the overall fiscal balance, excluding oil revenues and expenditures and net interest payments. This measure of the fiscal balance allows revealing difficulties in balancing budget revenues and expenditures as high oil prices can conceal the looseness of the fiscal policy. Using the concept of the non-oil primary balance, Zakharova and Medas (2009) access the fiscal stance in a group of oil producing countries, such as Algeria, Nigeria, Qatar, Russia, and Saudi Arabia during 2001-2006. They find that although the primary balance in this period was positive, the non-oil primary balance was negative and large. Additionally, for fiscal analysis of the oil producing countries, the authors suggest to use non-oil revenues and non-oil expenditures. Villafuerte and Lopez Murphy (2010) analyze the fiscal responses of oil-producing countries to fluctuations in oil prices using the non-oil primary balance among a few other indicators. Their sample also contained Azerbaijan, Kazakhstan, and Russia. The authors conclude that fiscal policy was mainly pro-cyclical. In the particular, they find that in the boom periods of 2004-2008, the governments implemented expansionary fiscal policy, but in 2009 due to fall of oil prices, which began in the second half of 2008, the governments

turned to tight fiscal policy. The authors also establish that the extent of pro-cyclicality of fiscal policy is negatively associated with income level. Erbil (2011) uses a set of indicators including non-oil primary balance to analyze the fiscal behavior in 28 oil-producing countries, including Azerbaijan, Kazakhstan, and Russia, between 1990 and 2009. The conducted empirical analysis using the differenced GMM estimator show that the non-oil primary balance is pro-cyclical, in other words, an increase in output leads to an excessive increase in spending, which ultimately leads to the deterioration of the balance. As Villafuerte and Lopez Murphy (2010), Erbil (2011) also conclude that fiscal policy in low income oil-rich countries are more likely to be pro-cyclical than fiscal policy in high-income oil-rich countries.

Fluctuations in budget balance reflect changes in budget revenues and expenditures, which are subject to permanent and temporary shocks. For example, budget receipts in oil countries can temporary decline (increase) in response to a temporary negative (positive) change in oil supply. However, the structural changes induced by demand or supply factors e.g. a technological change will have a permanent effect on budget revenues. As volatility in public spending adversely affects economic performance of countries, it is necessary to ensure that budget spending changes only if there is a permanent change in revenues. The standard non-oil primary balance indicator allows assessing the vulnerability of fiscal policy to an oil factor, but it does not distinguish between permanent and temporary changes in budget. To account for temporary influences on the budget balance, Hagemann (1999) presents the methodology for computing so-called structural budget balances (SBBs), which IMF computed for developed countries. The computation of SBB assumes subtracting the cyclical part of the budget balance from the overall budget balance. The cyclical part attributed to temporary budget income and spending

shocks has been computed using information on the output gap and cyclicality of budget expenditures and revenues.

The introduction of the SBB concept led to the emergence of the second generation of the literature in this area. For example, Pastor and Villagomez (2007) use this approach to compute the SBB for Mexico over the period from 1980 to 2003. The analysis of the dynamics of the SBB shows that the fiscal policy in Mexico during this period was pro-cyclical. Furthermore, the retrospective analysis of the consequences of such fiscal policy shows that it was not only inefficient, but also counterproductive. Platonov (2012) estimates the SBB for Russia from 2003 to 2010 using the same approach. The author finds that the fiscal policy in Russia is pro-cyclical and concludes that the effects of the discretionary fiscal policy were negative for the economic performance.

The SBB methodology described by Hagemann (1999) adjusts the fiscal balance for temporary fluctuations associated with changes in the output gap. However, adjusting only for cyclical effects is not sufficient to obtain adequate assessment of the fiscal policy, there are other factors such as commodity price or asset price fluctuations, which cannot be well captured by the movements in the output gap. For this reason, Bornhorst *et al.* (2011) suggest to go beyond simple cyclical adjustment to obtain a more satisfactory characterization of the fiscal stance. In particular, for resource-rich countries, the authors propose to modify the standard cyclical adjustment through correction for large deviations of commodity prices from their long-run levels. This improvement in the methodology of the SBB calculation led to the establishment of the third generation of the studies. For example, Ardanaz *et al.* (2015) use the refined approach to estimate the SBBs to assess fiscal policy in 20 Latin American and Caribbean countries during the 1990 to 2012 period. Their sample includes oil-rich countries such as Ecuador, Mexico, Trinidad and Tobago, and Venezuela, which are significantly dependent on oil

revenues on the fiscal side. Their analysis supports the general view that Latin American countries pursue the pro-cyclical fiscal policy. Additionally, they find that countries with relatively low degrees of pro-cyclicality tend to have better institutions. Although the structural budget balance analysis was mainly conducted for resource-rich countries in Latin America, there was an attempt to estimate structural budget balances adjusted for oil price fluctuations in Saudi Arabia - the largest oil producer and exporter. Thus the IMF estimates of structural budget balance show that from 2006 to 2012, the structural budget balance was in surplus, while in 2013, it was zero (Galal Eid, 2015).

The present paper will contribute the existing literature in several ways. First, the study will compute structural adjusted balance for Azerbaijan and Kazakhstan for the first time. Second, calculating structural adjusted balance for Russia, it will extend the paper of Platonov (2012), which estimated only cyclical adjusted balance without specifically taking into consideration the effect of oil price fluctuations. Additionally, in this paper, we use two-step procedure to produce the estimates of tax elasticities for main categories of taxes, which have not been done before for these countries. These estimates of tax elasticities can be used in other studies and analysis. In fact, Platonov (2012) estimated tax elasticities for Russia but he used one-step procedure, which is a less precise method comparatively to the two-step procedure.

Methodology

The methodology of the research on the calculation of Structural Budget Balance consists of three steps. The first step comprises of the estimation of potential output and the corresponding output gap. The estimation of tax elasticities to the output gap is the second step. The third step consists of adjustment beyond the business cycle, the effects of oil prices on fiscal revenues and obtaining the structural balance.

The first step: Estimation of potential output and the corresponding output gap

There are a few primary methodological techniques of the potential output estimation. The most complex method, which is broadly employed by OECD is building upon the production function (Mourre *et al.*, 2014; Mc Morrow *et al.*, 2015). We are unable to choose the production function method, because of lack of data on capacity utilization, which is used for calculation of Total Factor Productivity and low quality of labor and capital stock datasets.

The simplest methodological approach of potential output calculation is based on statistical methods. We will apply Univariate Hodrick-Prescott filter (Hodrick & Prescott, 1997) and Univariate Kalman filter (Clark, 1987).

Univariate HP filter: The Hodrick-Prescott (HP) filter is one of the extensively applied methods for the decomposition of a time series into its trend and cyclical parts.

$$Y_t = Y_t^p + Y_t^c \qquad \textbf{(1)}$$

where Y_t is seasonally adjusted real GDP, Y_t^p is potential output and Y_t^c is the cycle (the output gap at time t).

The trend component (potential output) is taken out from the time series by minimizing the function:

$$\min_{y_t^p} \sum_{t=1}^{T}(y_t - y_t^p)^2 + \lambda \sum_{t=2}^{T-1}[(y_{t+1}^p - y_t^p) - (y_t^p - y_{t-1}^p)]^2 \qquad \textbf{(2)}$$

where y_t is an observation of the time series at time *t*, y_t^p is the trend component at time *t*, and λ is the Lagrange multiplier.

Relatively simple implementation of the HP filter is its considerable advantage. However, the HP filter also has some shortcomings. The choice of parameter λ has an effect on both the calculated potential output and the output gap. Although the selection of λ can substantially alter the output of the filter, there is no theoretical background for justification of any specific value choice.

Taking into the consideration of the relatively small size of the investigated economies, we will take λ equal to 100 for the quarterly data.

The HP filter also has the end-bias problem - a severe downside at the end of the sample. The minimized function aiming to decompose the trend and cycle of the time series includes the future values. Those future values are unknown at the end of any time series. Thus, when those values are known, the HP filter becomes symmetric. The period of the real GDP data ends in 2017Q1, which helps us to diminish relatively the end-point bias.

Univariate Kalman filter: The methodology proposed by Clark (1987) is another statistical method, which decomposes a time series into a trend and cyclical components.

Clark suggested a model specification that is bottomed on an equation (1). A supplementary assumption about the individual components is added to the main equation. Specification of potential output is a random walk with a drift:

$$y_t^p = y_{t-1}^p + d_t + \varepsilon_t \qquad \textbf{(3)}$$

where d_t is the average growth rate of potential output, ε_t is a residual which on average is zero and its variance equals to $\sigma_{y^p}^2$. Additionally, it is assumed that a variable rate of potential growth follows a random walk:

$$d_t = d_{t-1} + \eta_t, \qquad \eta_t \sim N\,(0, \sigma_d^2) \qquad \textbf{(4)}$$

The cyclical component is specified as the autoregressive process of the second order:

$$y_t^c = \omega_1 y_{t-1}^c + \omega_2 y_{t-2}^c + v_t \qquad \textbf{(5)}$$

The cyclical part at time t is bound up with two of its lags. ω_i is the parameters, which is estimated and v_t is a residual, $v_t \sim N\,(0, \sigma_v^2)$. Subsequently, the model is converted into a state-space format and is estimated applying the Kalman filter by maximizing the likelihood function. Then, the filtered estimates are “smoothed”.

The variability of potential output in time is considered in the model and equation **(5)** indicates that the output gap (cyclical component) is zero on average.

The second step: Estimation of tax elasticities to the output gap

We use the two-step methodology developed by Van deen Noord (2000) and improved by Girouard and André (2005) and Price *et al.* (2015) to estimate the elasticities of the revenue categories with respect to the output gap. According to this method, revenues from personal income tax, corporate income tax, social security contributions and indirect taxes are assumed as cyclically sensitive. The elasticity of other revenue and total expenditure is considered to be zero. The output gap elasticity of revenue categories will be estimated by calculating the revenue-to-base elasticity, $\varepsilon_{R_i/base}$, and the base-to-output gap elasticity, $\varepsilon_{base/OG}$. Then, the estimated elasticities will be multiplied in order to obtain the elasticity of revenue item with respect to the output gap, $\varepsilon_{R_i/OG}$. It can be illustrated as:

$$\varepsilon_{R_i/OG} = \varepsilon_{R_i/base} * \varepsilon_{base/OG} \qquad \textbf{(6)}$$

I. a) The elasticities of tax revenues with respect to their bases will be estimated empirically.

The tax base of personal income tax (PIT) and social security contributions (SSC) is the compensation of employees (less social security contributions). The tax base of Corporate income tax (CIT) is gross profit. The tax base for indirect taxes is the household consumption expenditure.

We employ Autoregressive Distributed Lag (ARDL) models. ARDL method is chosen, as it can be used with a mixture of I(0) and I(1) data. Additionally, it involves just a single-equation set-up, which implies easy implementation and interpretation. Finally, different variables included in the model can be assigned different lag-lengths.

The short-term tax revenue to base elasticities are estimated using an ARDL

equation:

$$lnR_{i,t} = \alpha_0 + \alpha_1 lnBase_{i,t} + e_{i,t} \qquad \textbf{(7)}$$

In equation (7), $e_{i,t}$ denotes the error term of tax category *i* in year *t* and α_1 denotes the short-term tax revenue elasticity. It indicates how much tax revenue changes to the unit percentage change in the tax base.

We can also directly assume the elasticity of indirect tax revenue to base (private consumption) close to unity, as Belinga *et al.* (2014) and Mourre *et al.* (2014) shows that over the medium run the elasticity is not far from one for most countries.

II. The tax bases-to-output gap elasticities is also computed from time series data.

The model is specified as:

$$ln\left(Base_t/Y_t^p\right) = \alpha_0 + \alpha_1 ln\left(Y_t/Y_t^p\right) + u_t \qquad \textbf{(8)}$$

where *Base* denotes the tax base, *Y* denotes output and Y^p potential output, α_1 represents the short-run elasticity.

Finally, estimated the revenue item-to-base elasticities and the base-to-output gap elasticities are into equation **(6)** to obtain the revenue item-to-output gap elasticities.

The third step: Adjustment for the effects of oil prices on fiscal revenues and obtaining the SBB.

The methodology of this stage is devised in Bornhorst *et al.* (2011) and Ardanaz *et al.* (2015):

$$SBB = \sum R_i \left(\frac{Y^p}{Y}\right)^{\varepsilon_{R,i}} + R^{OR}\left(\frac{P^{LR}}{P}\right)^{\alpha} - G\left(\frac{Y^p}{Y}\right)^{\varepsilon_G} \qquad \textbf{(9)}$$

where SBB is the structural budget balance, R_i is the revenue categories, R^{OR} is the revenue from oil resources, Y^p is potential output, Y is actual output, P is the price of a barrel of Brent oil, P^{LR} is the long-run price of Brent oil, which is the previous ten year moving average of Brent oil price, $\varepsilon_{R,i}$ and ε_G are the output gap-elasticity

of each revenue category and expenditure, respectively, α is the elasticity of oil revenues with respect to oil prices, and G is the total fiscal expenditure. The elasticity of oil revenues with respect to oil prices is estimated empirically as follows:

$$lnR_t^{OR} = \alpha_0 + \alpha_1 lnP_{t-1} + e_{i,t} \quad \textbf{(10)}$$

where R_t^{OR} is the revenue from oil resources, P_{t-1} is the Brent oil price of a budget preparation year.

Data

In our analysis, we use quarterly data for nominal GDP, real GDP, aggregate budget revenue and expenditure, revenue of personal income tax, corporate profit tax, VAT, and excise, social security contributions, compensation of employees, gross profit, household consumption, and Brent oil price. More information on the definitions and sources of the data can be found in the Appendix.

The nominal and real GDP data used for estimation of the output gap is obtained from the State Statistical Committees of the respective countries. Although the SBB analysis covers the period from 2003Q1 to 2015Q4, the data which we use to estimate the output gaps begin from 1996Q1 for Russia, from 2000Q1 for Kazakhstan and from 2001Q1 for Azerbaijan and ends in 2017Q1, in quarterly intervals. The reason behind using longer time series than necessary is to avoid the beginning and end point bias problems, which univariate filters, such as the HP and Kalman filters suffer from.

The state budget together with the State Social Protection Fund is chosen for Azerbaijan, the state budget is taken for Kazakhstan, the consolidated budget is also selected for Russia. The time series from official sources used to estimate the elasticities for Azerbaijan and Kazakhstan covers the periods of 2003Q1-2015Q4,

but dataset for Russia ranges from the 2004Q1 to 2015Q4. Brent oil price data is obtained from IMF.

Following the mainstream literature, we identify several tax categories as being cyclically sensitive: 1) personal income tax; 2) social security contributions; 3) corporate income tax; 4) indirect taxes (VAT and excise); 5) social tax (only exists in Kazakhstan).

The respective tax bases are taken as compensation of employees (less social security contributions) for personal income tax, social security contributions, and social tax, the gross profit for corporate profit tax and household consumption for indirect taxes. We employ the regression-based temporal disaggregation method proposed by Chow and Lin (1971) using real and seasonally adjusted GDP as an indicator to obtain quarterly data for the compensation of employees, gross profit, and social security contributions in Azerbaijan. In Kazakhstan, the State Statistical Committee has begun to report quarterly data of compensation of employees and gross profit only after 2007. As a result, we have applied Chow and Lin (1971) interpolation method for the mentioned data from 2003 to 2006. Social security contributions of Russian budget have been interpolated using Chow and Lin (1971) method for the entire period.

The corresponding literature considers only spending relating to unemployment as cyclically sensitive. The unemployment spending in the investigated countries is negligible, thus the elasticity of budget expenditure will be assumed as zero. It implies that we regard budget expenditure as cyclically-insensitive.

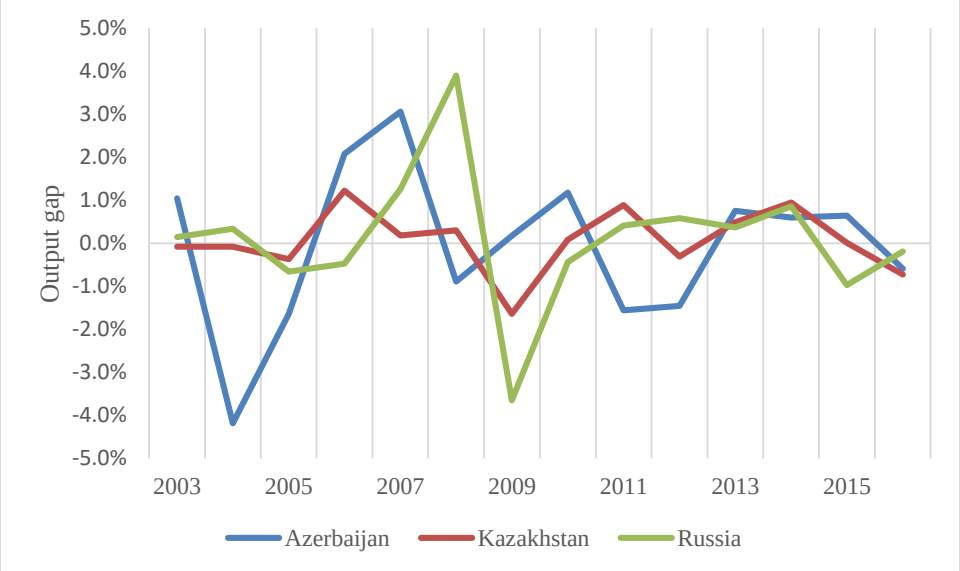
Empirical Results and Discussion

Output gap

Hodrick-Prescott filter and Kalman filter produce almost the same results for the output gap for all three countries. Arbitriraly, we choose the output gap and

potential output obtained from the HP filter for the calculation of the elasticities. Figure 1 displays that the output gap of Azerbaijan has been positive since 2006. The average yearly output gap from 2003 to 2016 is close to -0.1% for Azerbaijan and 0.1% for Kazakhstan and Russia. The output gap ranges between -4.2% and 3.1% for Azerbaijan, -1.6% and 1.2% for Kazakhstan, and -3.6% and 3.9% for Russia. As we can see, Azerbaijan and Russia have much larger range of output gaps than Kazakhstan. Figure 1 shows that the recent decline in oil prices affected output gaps in all three oil producing countries. The output gaps became negative in Azerbaijan and Kazakhstan in 2016, while in Russia, the gap had been negative since 2015. The financial crisis of 2008 also had an impact of the gap dynamics. In Azerbaijan, the output became negative immediately in 2008, in Kazakhstan and Russia, the output gap became negative only in the following year. There were also negative gaps in other years not driven by global factors and were due to internal economic processess.

Figure 1. Yearly output gaps, HP filter



Elasticity Estimates

Using the disaggregated approach, we find that the output gap elasticity of total revenues is 0.26 for Kazakhstan, 0.39 for Azerbaijan, and 0.79 for Russia. The lower elasticity of total revenues to output gap for Kazakhstan and Azerbaijan implies that budget revenues are less cyclically sensitive than in Russia. The evidence of lower elasticity of revenues reflects, among other factors, the poor quality of the tax administrations and the weaker formalization of the economies.

Elasticity estimates produced using disaggregated methodology give interesting insights. Elasticity results of different revenue categories across all three countries show a certain degree of heterogeneity (Table 1). In Azerbaijan and Kazakhstan, a 10% change in the compensation of employees will result in a short-run change of 4.5% in the personal income tax revenue. Tax revenues of the Russian budget, especially personal income and indirect tax revenues, are more sensitive to changes in respective tax bases than they are in Azerbaijan and Kazakhstan. It can signal relatively low level of tax collection as a share of the economy in Azerbaijan and Kazakhstan, compared with Russia and its peers. For policymakers, it implies the need to advance the quality of tax administrations and to reduce the size of the shadow economy. Additionally, we find that the compensation of employees and gross profit sensitivity to output gap is higher in Kazakhstan and Russia than in Azerbaijan.

Table 1. Tax revenues to tax bases and tax bases to output gap elasticities

	Azerbaijan	**Kazakhstan**	**Russia**	**CEE, simple arithmetic average**	**CEE, range**
Personal income tax to Compensation of employees	0.45** *(0.1852)*	0.45*** *(0.1529)*	1.04*** *(0.1946)*	1.73	1.11-2.43
Corporate profit tax to Gross profit	0.70*** *(0.2050)*	0.07 *(0.1090)*	0.71*** *(0.2608)*	1.83	1.23-2.72

Social security contributions to Compensation of employees	1.15*** *(0.1407)*	0.23*** *(0.0824)*	0.34 *(0.3118)*	1.04	0.93-1.36
Social tax to Compensation of employees	-	0.01 *(0.0203)*	-	-	-
Indirect taxes to Household consumption	0.17*** *(0.0554)*	0.31*** *(0.0820)*	0.64*** *(0.1718)*	1.00	1-1
Compensation of employees to Output gap	0.77*** *(0.1238)*	1.50*** *(0.4087)*	1.24*** *(0.3095)*	0.81	0.62-1.04
Gross profit to Output gap	0.44*** *(0.1472)*	5.90*** *(0.2634)*	2.68*** *(0.7039)*	1.20	0.99-1.45
Household consumption to output gap	0.70* *(0.4294)*	0.72* *(0.4104)*	0.48** *(0.1900)*	1.00	1-1
Oil revenue (year t) to Oil price (year t-1)	0.68*** *(0.2057)*	0.94*** *(0.1433)*	1.40*** *(0.1814)*	-	-
Final elasticities for Structural Fiscal Balance estimation					
Personal income tax to Output gap	0.35	0.68	1.29	1.62	1.15-1.93
Corporate profit tax to Output gap	0.31	0.00	1.90	2.19	1.58-3.76
Social security contributions to Output gap	0.89	0.35	0.00	0.85	0.61-1.40
Social tax to Output gap	-	0.00	-	-	-
Indirect taxes to Output gap	0.12	0.22	0.31	1.00	1-1
Oil revenue (year t) to Oil price (year t-1)	0.68	0.94	1.40	-	-

Note: Standard errors are provided in parentheses. Asterisks indicate relative significance levels: ***p<0.01, **p<0.05, *p<0.1

To understand where Azerbaijan, Kazakhstan, and Russia stand in terms of the capacity to collect taxes, we compare our elasticity results with those for CEE countries[6] (Mourre et al., 2014), as all these countries used to belong the socialist camp . As Table 1 shows, estimated tax revenue elasticities with respect to tax base

[6] Estonia, Latvia, Lithuania, Czech Rep., Slovakia, Hungary, Poland, Romania, Bulgaria, Slovenia, Croatia

and overall final elasticities for Azerbaijan and Kazakhstan stood even below the minimum elasticities for CEE countries. It probably reflects high unofficial tax burden, tax evasion, corruption, and poor institutional quality of the tax systems. The elasticity results of Russia are higher than for Azerbaijan and Kazakhstan and nearly similar to those of CEE economies, so one can suggest that Russia has relatively better tax system and tax administration.

Oil revenue[7] to oil price elasticities are positive and high for all three countries. One percent change in the Brent oil price will result in a change of 0.7% and 0.9% in the transfers from Sovereign Wealth Funds (SWFs) to the state budgets in Azerbaijan and Kazakhstan, respectively and a change of 1.4% in the oil revenue in Russia. In our opinion, the reason behind the higher elasticity with respect to oil price in Russia is a high elasticity of oil and gas production and progressive export duty scheme.

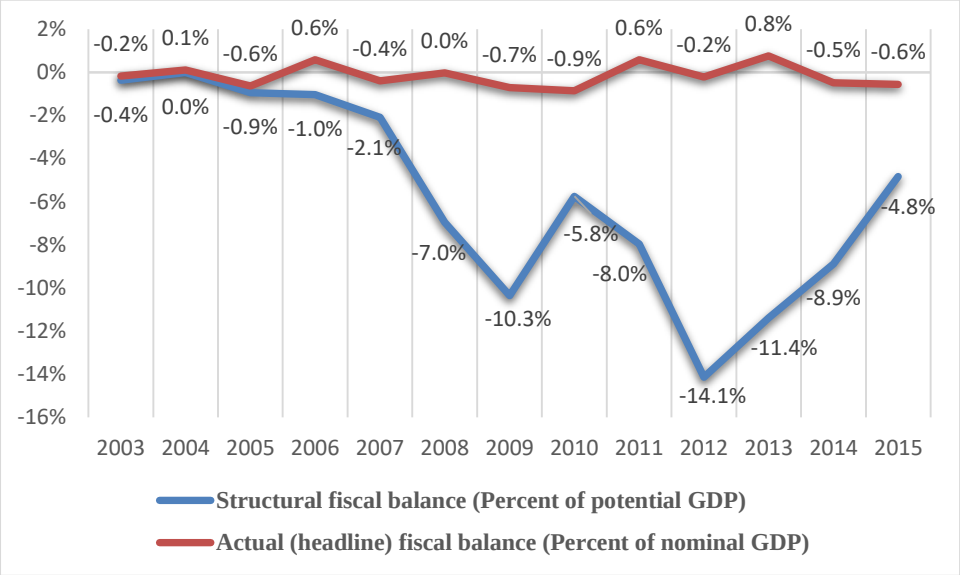
A noteworthy point is that the impact of the oil price on the government revenues of Azerbaijan reflects just the effects of wealth fund transfers. Due to the lack of data, we were unable to include corporate tax revenues from the oil sector into the calculation of the oil price elasticity. Thus, the elasticity of the oil revenue to the oil price probably is higher than the estimated one.

Structural Fiscal Balance Results

This subsection discusses structural fiscal balance estimates. Figure 2 presents the SBB estimates for Azerbaijan, comparing those with the actual (headline) fiscal balance values.

[7] With oil revenue, we mean transfers from national wealth funds to the state budgets for Azerbaijan and Kazakhstan, complete oil and gas revenue of the budget for Russian Federation. Budget transfers for Kazakhstan include both guaranteed and targeted transfers.

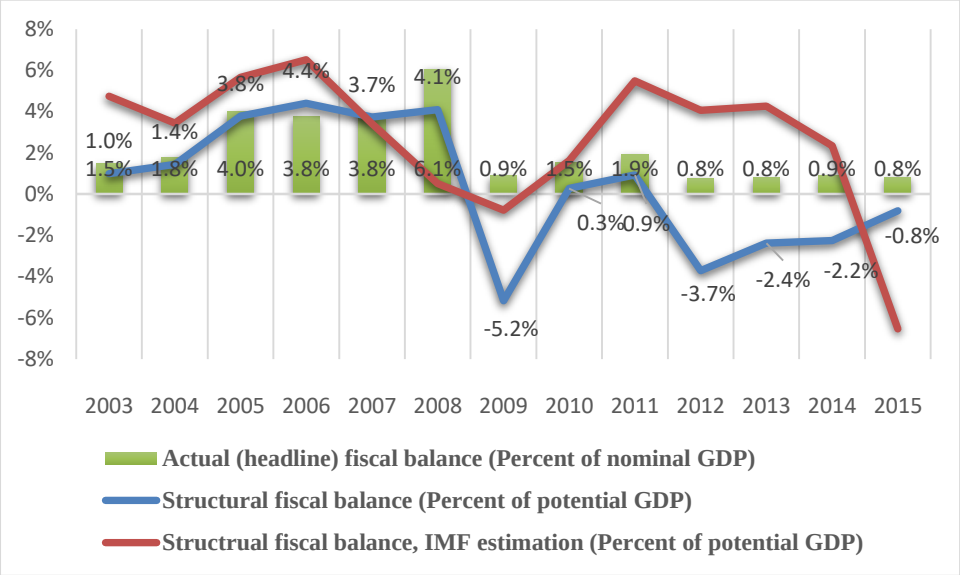
Figure 2. Comparison of Structural and Actual Fiscal Balances of Azerbaijan



Note: Actual (headline) fiscal balance is the difference between revenue and expenditure divided by nominal GDP.

Our final results show that, from 2003 to 2015, the average structural balance of the state budget of Azerbaijan was -5.7%, much smaller than the unadjusted fiscal balance average of -0.2%. This means that the average annual contribution of cyclical and commodity fiscal revenues to the budget balance have been 5.5% since 2003. The relatively large difference in the average of structural and headline budget balances hides periods of considerable decoupling between these series during the oil price boom after 2006 (Figure 2).

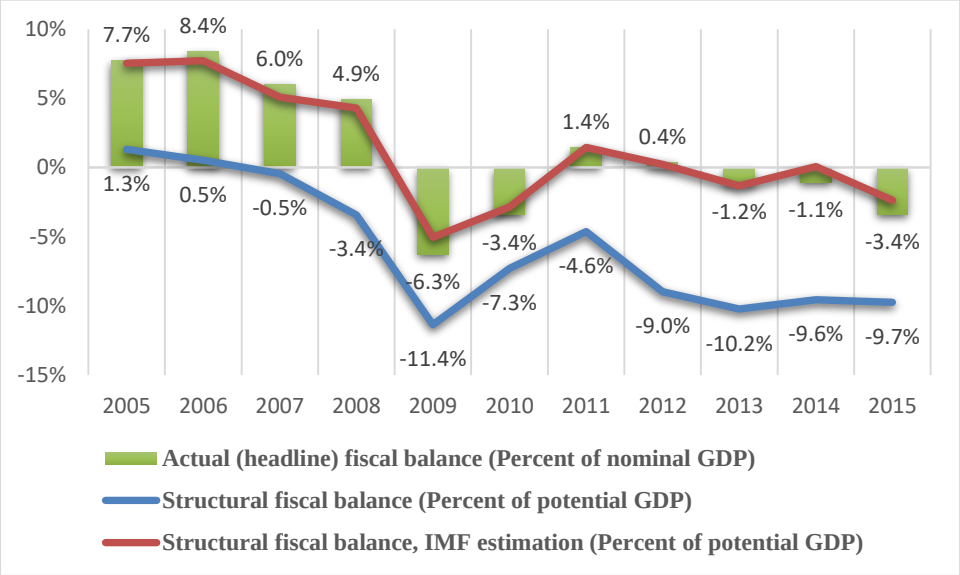
Figure 3. Comparison of Structural and Actual Fiscal Balance of Kazakhstan



Note: Actual (headline) fiscal balance is the difference between revenue and expenditure divided by nominal GDP. IMF estimation of Structural Fiscal Balance is obtained from World Economic Outlook database.

In 2009, the effects of global financial crises and lower oil prices became evident in all three countries (Figures 3-5). In Azerbaijan and Kazakhstan, budget revenue declined more than a decrease in expenditure, and this led to a record deficit since 2003. For Russia, the structural deficit accelerated further after the collapse of Lehman brothers, as the government decided to use fiscal policy to reverse a steeper economic slowdown. Generally, the gap between structural and actual fiscal balances has increased since 2011 in Kazakhstan and Russia. However, contrary to Azerbaijan and Russia, SBB in Kazakhstan experienced a moderate level of surplus for the most of the period, except the years of lower oil price - 2009 and 2015.

Figure 4. Comparison of Structural and Actual Fiscal Balance of Russian Federation



Note: Actual (headline) fiscal balance is the difference between revenue and expenditure divided by nominal GDP. IMF estimation of Structural Fiscal Balance is obtained from World Economic Outlook database.

After 2005, the policy intentions of governments to raise state investments during an increase in cyclical and oil revenues, led to a faster decrease in the structural budget balance. Generally, structural fiscal balance experienced deficit after 2005 in Azerbaijan, after 2011 in Kazakhstan, and after 2007 in Russia. The estimated structural balance has considerably deteriorated in all three countries during the post-Lehman period. The year of 2010 was a period of staggered recovery.

Although the observed fiscal balance was relatively steady during the investigated period, the estimates of structural balance show considerable changes in the fiscal policy stance across years. The structural balance in Kazakhstan and Russia became progressively worse during the higher oil price period of 2010-2014. In Azerbaijan, SBB has deteriorated from 2010 to 2012, however SBB deficit has been reduced after 2012, gaining momentum in 2014-2015. Contrary to Azerbaijan and Kazakhstan where the SBB experienced a recovery during the recent period of oil price decline, the SBB was relatively stable in Russia. The large change in the

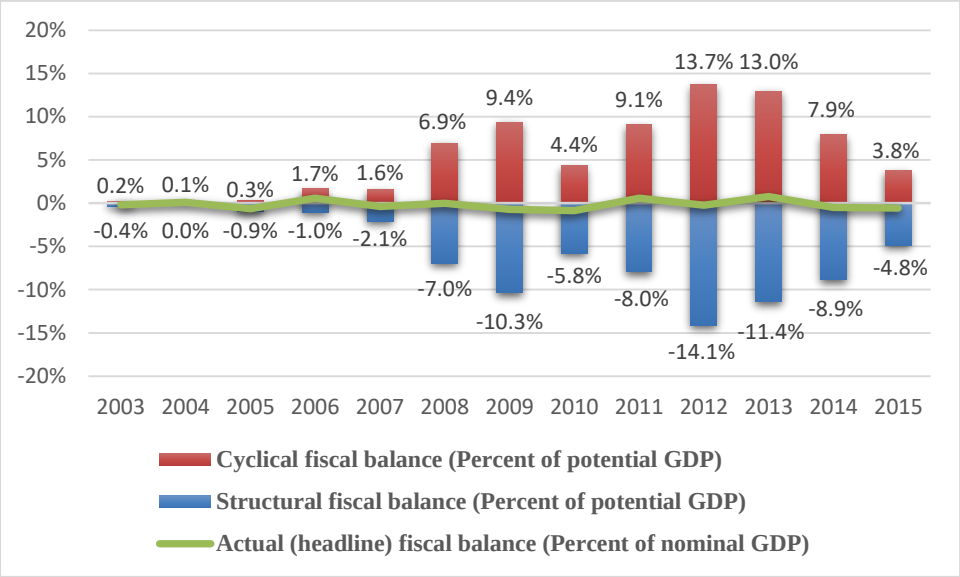
estimated structural fiscal balances bring to light that by assessing the stance of fiscal policy only using the headline budget results can lead to the wrong conclusions.

Cyclical Balance vs. Structural Balance

This subsection discusses the effects of cyclical drivers on budgets of these countries by breaking down the actual budget balance. The cyclical fiscal balance presents the effects of economic cycles on budget performance, particularly the impact of tax collection as automatic stabilizers. The cyclical balance is also interpreted as a passive response of fiscal policy.

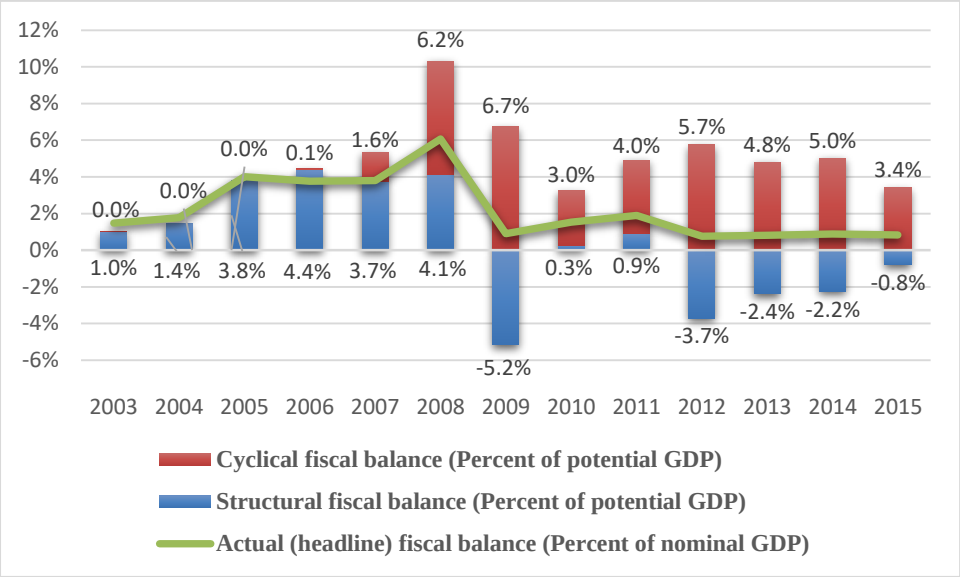
The Azerbaijani estimations of cyclical budget balance (CBB) display a very low level of balance in the early 2000s – averaging at 0.2% of potential GDP (see Figure 5). The results show that, the budgetary effect of business cycles was approximately 7.5% of potential GDP for the period of the oil boom (2006–2013). Because of higher oil dependence, most of the cyclical budget balance in the mentioned period comes from oil revenues and favorable economic environment stemming from higher oil prices. In the year of global financial crisis and a year afterward, the SBB declined significantly. However, the SBB was also negative and very high in normal times, in 2012-2014 when oil prices were very high, this implies that the fiscal authorities were excessively spending extra oil revenues in these years.

Figure 5. Structural and cyclical fiscal balance estimates in Azerbaijan



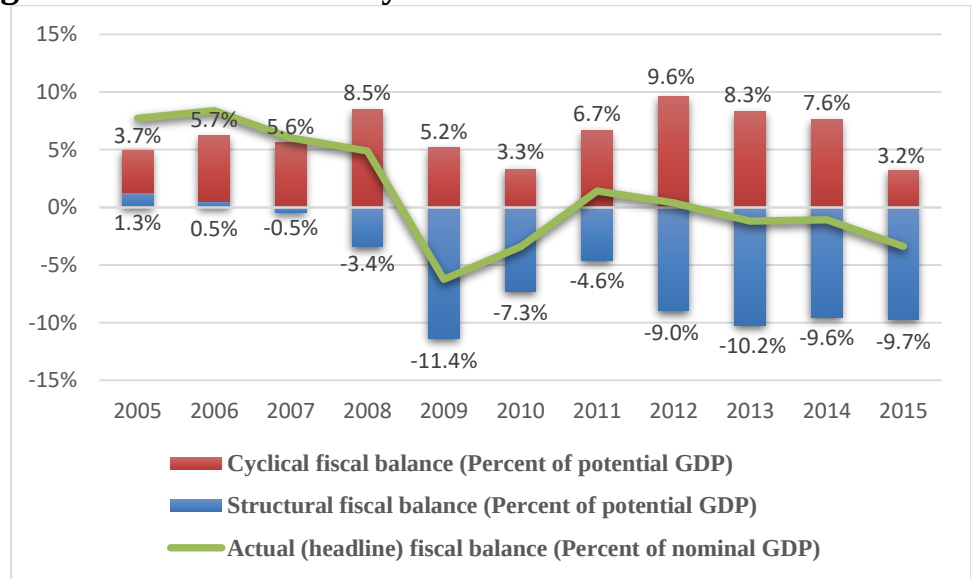
In Kazakhstan, CBB was close to zero in 2003-2006 but increased later (Figures 6). SBB also showed an interesting pattern: it was positive and growing in 2003-2008 and then declined abruptly and remained negative in most years (Figure 6). The SBB dynamics implies that the Kazakh fiscal authorities were conservative in early years of the oil; however, later, they started spend more from temporary increases in oil revenues. Interestingly, in 2009 when the Kazakh economy was hit by the globabl financial crisis, the SBB reached -5.2%, while in 2015 when the oil market collapsed, the SBB was only -0.8%. This fact can indicate indirectly that the Kazakh authorities considered the global financial crisis to be a temporary phenomenon and the decline in oil prices to be a permanent phenomenon.

Figure 6. Structural and cyclical fiscal balance estimates in Kazakhstan



In Russia, CBB was positive in 2005-2015, while the SBB was negative in all years except 2005-2006 (Figure 7). Such pattern implies that since 2008 the Russian fiscal authorities had always been generous in spending oil revenues on various social and infrastructure projects paying limited attention to the fiscal discipline. Differently from Azerbaijan and Kazakhstan, in Russia, the fiscal authorities did not consolidate their budget in response to an abrupt decline in oil revenues.

Figure 7. Structural and cyclical fiscal balance estimates in Russia



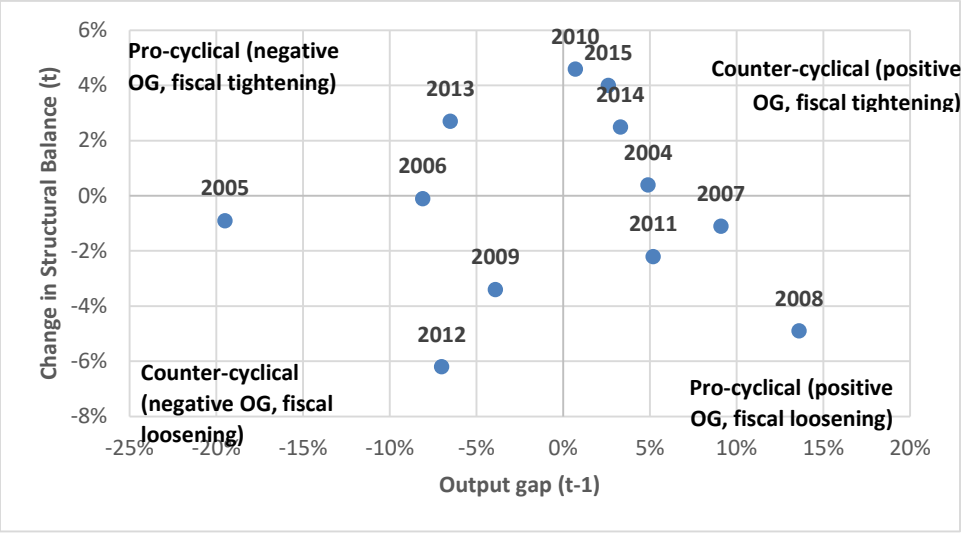
In summary, the breakdown of the observed fiscal balance into the cyclical and structural components endorses the negative relationship between the fiscal policy stance and tax collection as an automatic stabilizer. Actually, the negative correlation between the structural and cyclical fiscal balances demonstrates the pro-cyclicality in fiscal policy of these countries, especially after 2009. Additionally, our results also provide evidence that both oil-price cycles and business cycles play an equally important role as a fiscal driver.

The Fiscal Impulse

The structural budget balance reflects the discretionary fiscal decisions of governments. This implies that the changes in the SBB indicate a fiscal impulse given to an economy. We plot changes in the SBB against the output gap of the previous periods to assess cyclicality of the fiscal policies.

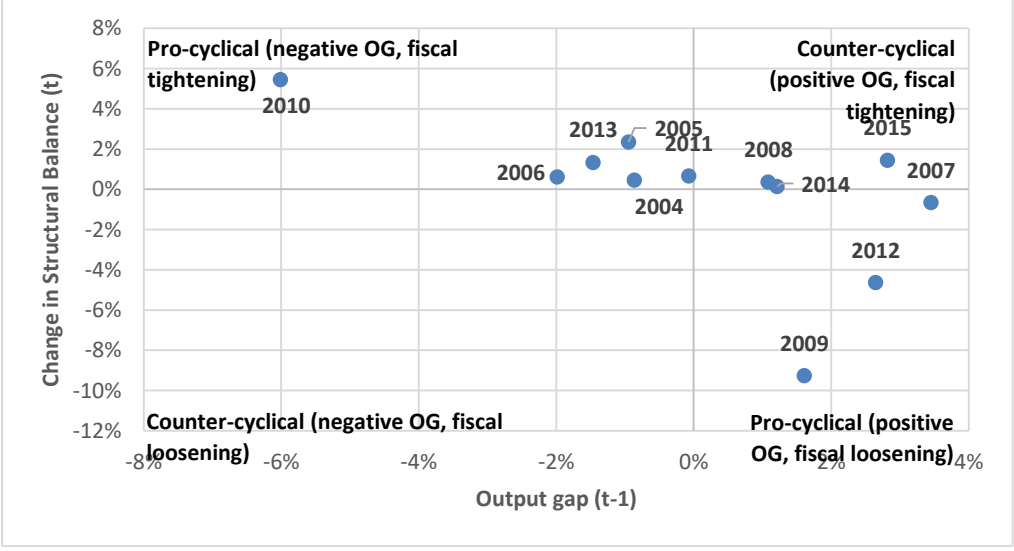
Based on our results, the fiscal policy of Azerbaijan experienced counter-cyclicality and was contractionary in the years of 2004, 2010 and 2014-2015. The estimated fiscal drag was about 3% of potential GDP for the above-mentioned years. Our calculations show a pro-cyclical fiscal expansion in 2007-2008 and 2011, averaging 3% of potential GDP (see Figure 8). The fiscal policy was counter-cyclical and expansionary in 2009, which was the year when the global financial crisis hit the economy. Thus, fiscal policy in Azerbaijan was counter-cyclical for the half of the investigated twelve years.

Figure 8. Structural balance and output gap in Azerbaijan



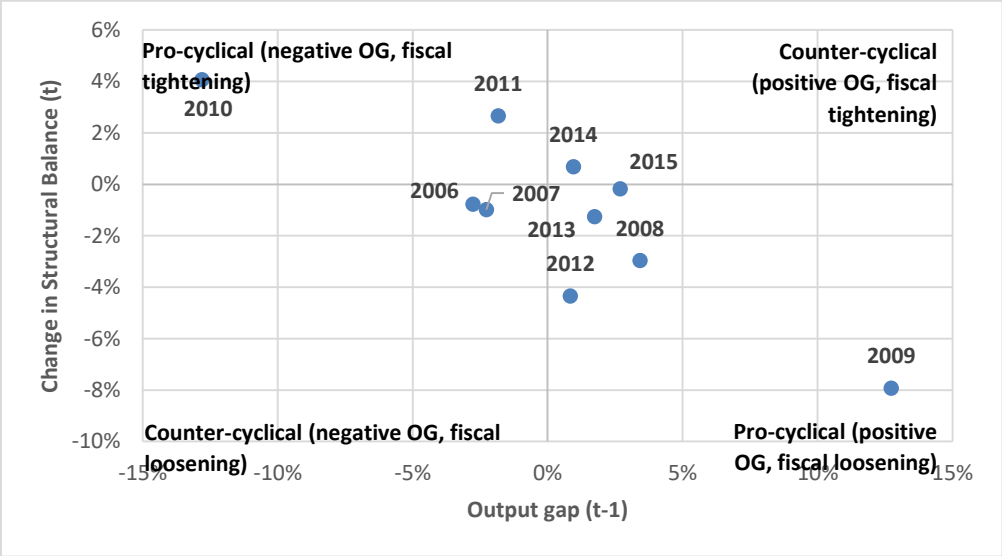
When we compare the two periods of lower oil prices for Kazakhstan (2009-2010 and 2014-2015), we see differences in the type and in the magnitude of the fiscal policy (Figure 9). The figure shows that there was a large fiscal consolidation in 2010 after the strongest fiscal stimulus during the recession of 2009. The government of Kazakhstan also carried out a contractionary fiscal policy in 2014-2015. It is quite interesting that the fiscal policy of Kazakhstan was nearly neutral during a half of the analyzed years (2004, 2006, 2007, 2008, 2011, and 2014). The government conducted counter-cyclical policy only in 2015.

Figure 9. Structural balance and output gap in Kazakhstan



The fiscal policy in Russia was mainly expansionary for the researched period, except for the years of 2010, 2011, and 2014 (see Figure 10). The main similarity between the Russian and Kazakh fiscal policies is pro-cyclicality for the most of the period. Moreover, similar to the fiscal policy in Kazakhstan, the government loosened fiscal policy around 8% of potential GDP in 2009, then there was a fiscal consolidation equal to about 4% of potential GDP. Our calculations show that the fiscal impulse was especially strong in 2009, 2010, and 2012.

Figure 10. Structural balance and output gap in Russia



Conclusions

In this paper, we calculate SBB for Azerbaijan, Kazakhstan, and Russia to analyze discretionary fiscal policy for the period of 2003-2015. For this purpose, we also estimate the elasticities of several tax revenues to tax bases and tax bases to output gap for these three oil-rich CIS countries.

The range of SBBs is much larger in all three countries in comparison with the non-oil Central and Eastern Europe (CEE) countries. It poses a significant fiscal risk and undermines fiscal sustainability. Thus, it is crucial to undertake carefully-

defined fiscal consolidation measures in the medium-term. The estimations reflect that the fiscal policy is still pro-cyclical in Azerbaijan, Kazakhstan, and Russia. However, it implies that there are still areas for continued development in conducting fiscal policy, which stabilizes the economies throughout business cycles. The current budget framework should include incentives for a genuinely counter-cyclical fiscal action.

The estimated elasticities show that revenue categories-to-output gap elasticities are lower in the analyzed countries than in Central and Eastern Europe countries. Improving the institutional quality of tax administrations, reducing tax fraud and tax evasion, broadening tax bases, especially non-oil tax bases, increasing transparency, decreasing the size of the informal economy will contribute to fiscal consolidation on the revenue side and increase elasticities of tax revenues to respective tax bases. Furthermore, taking into the consideration higher elasticities of oil transfers with respect to the oil price in Azerbaijan and Kazakhstan, one can suggest that well-defined deposit and withdrawal rules can increase the effectiveness of the SWF and help on budget stabilization and smoothing public expenditure. For this purpose, we need strong independent oversight bodies, such as Fiscal Councils to prevent circumvention of those fiscal rules.

The main limitation of the research is that we assume the state budget expenditure of the investigated countries as cyclically insensitive. Due to lack of the quarterly current and capital expenditure data, we could not assess empirically the sensitivity of those expenditures to the output gap in a robust way. However, to get some idea, we did some back of envelope calculations using annual data. The results show that current expenditure is a-cyclical, while capital expenditure is pro-cyclical both in Azerbaijan and Kazakhstan. We couldn’t replicate the same exercises for Russia, due to lack of even annual data. Hence, once the data availability improves, there exists need to assess the elasticity if different expenditure categories to increase

precision of the estimated SBBs. Moreover, neither the State Statistical Committee nor the Ministry of Finance of Azerbaijan provides data on corporate tax revenue breaking down the oil and non-oil sectors. Thus, we could not adjust corporate profit tax revenues of the oil sector to the oil price changes for Azerbaijan. Therefore, as the authorities start reporting disaggregated data on corporate profit tax, further studies on Azerbaijan should adjust corporate profit tax of the oil sector to fluctuation in oil prices.

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Appendix: Data Sources

This section provides the description of the data employed in this study and its sources.

Real GDP

Azerbaijan. The State Statistical Committee of Azerbaijan (SSCA) calculates GDP figures using two different methodologies. The GDP data which is used is based on the value-added (production) approach. SSCA calculates real GDP figures based on the average annual prices of 2005. We employ TRAMO-SEATS seasonal adjustment package to obtain seasonally adjusted series.

Kazakhstan. GDP by the production method is obtained from the State Committee of Kazakhstan on Statistics (SCKS). Real GDP is calculated at average annual prices of 2005. We apply TRAMO-SEATS seasonal adjustment package to obtain seasonally adjusted series.

Russian Federation. Real GDP by the production method is published by the Federal State Statistics Service (Rosstat). Quarterly real GDP figures with 2008 prices cover the period 2003-2011. The real GDP for the duration of 2011-2015 is based on the prices of 2011. Thus, we use the period-to-period real growth rates in order to extend the real GDP with 2008 prices beyond 2011.

Budget data

Azerbaijan. The statistics of different categories of tax revenues and total expenditure is collected from the monthly bulletin of "Socio-Economic Development" of the SSCA. Here as well, TRAMO-SEATS package is applied to get seasonally adjusted series. The State Social Protection Fund (SSPF) does not provide complete quarterly data on social security contributions for the period of 2003-2015, even on annual basis. Thus, the annual data on social security contributions is obtained from the ''Statistics'' and ''Press releases'' sections of the official web-site of the SSPF. Then, annual figures are interpolated employing Chow and Lin (1971) methodology. As an explanatory variable, we use seasonally adjusted real GDP.

Kazakhstan. The data on actual tax revenues to the state budget is published by the State Revenue Committee under the Ministry of Finance of Kazakhstan Republic.

Russian Federation. The data on execution of the consolidated budget of the Russian Federation and budgets of extra-budgetary state funds is obtained from the monthly report called ‘’Social and Economic Situation in Russia’’. The annual figures of social security contributions are received from the official web-site of Rosstat. In order to get quarterly data, we apply Chow and Lin (1971) methodology with seasonally adjusted real GDP figures as an explanatory variable.

Oil revenues

Azerbaijan. Transfers from the State Oil Fund of Azerbaijan Republic (SOFAZ) to the state budget is considered as the oil revenue of the budget. The data on transfers is obtained from the quarterly reports of SOFAZ.

Kazakhstan. The data on transfers from the National Fund of Kazakhstan Republic to the state budget is taken from the monthly bulletins of the Ministry of Finance of Kazakhstan Republic.

Russian Federation. The following revenues comprise oil revenues of the consolidated budget of Russian Federation:

- oil and gas production tax (oil, natural gas, gas condensate);
- export customs duty on crude oil;
- export customs duty on natural gas;
- export customs duty on oil products.

This data is calculated from the monthly reports of the Federal Treasury of Russian Federation.

Tax bases

Azerbaijan. The SSCA publishes GDP figures and its components (compensation of employees and gross operating surplus) based on the income approach at current prices on an annual basis since 2005. The SSCA has kindly provided us with the mentioned data for the years 2003 and 2004. Thus, we interpolate the annual values applying Chow and Lin (1971) methodology with seasonally adjusted real GDP figures (production approach) as an explanatory variable. The SSCA reports household consumption expenditure as a part of the quarterly nominal GDP values based on the expenditure approach. Real household consumption expenditure is obtained employing quarterly CPI (2005=100). The TRAMO-SEATS seasonal adjustment package is applied to get seasonally adjusted series.

Kazakhstan. GDP figures and its components based on the income approach have begun to be reported on a quarterly basis by the State Committee of Kazakhstan on Statistics (SCKS) since 2007. We employ Chow and Lin (1971) methodology with seasonally adjusted real GDP figures (production approach) as an explanatory variable in order to obtain quarterly tax bases data for the period 2003-2006. Real GDP data based on the expenditure approach which includes final consumption expenditure of households is published on a quarterly basis. The quarterly domestic CPI (2005=100) is applied to obtain real figures and TRAMO-SEATS package is used to get final seasonally adjusted series.

Russian Federation. The Rosstat quarterly reports nominal GDP data and its components based on the income approach for the investigated period. The quarterly domestic CPI (2008=100) is used to get real series and TRAMO-SEATS package is employed to obtain seasonally adjusted figures.

CPI

Domestic CPI values are collected from monthly Statistical Bulletins of State Statistical Committees of the researched countries. Monthly data for March, June, September and December is taken as respective quarterly figures.

Exchange rate

The data on nominal exchange rates are gotten from the Central Banks of the respective countries. Monthly data is averaged for quarterly figures.

Oil price

Data on Oil price is taken from IMF's monthly updated publication on primary commodity prices. This data is per barrel USD price of crude oil - dated Brent, light blend. Monthly data are averaged to obtain quarterly series. TRAMO-SEATS package is applied to have seasonally adjusted series.