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10 July 2018

Online at <https://mpra.ub.uni-muenchen.de/116918/>
MPRA Paper No. 116918, posted 06 Apr 2023 07:44 UTC

CONSTRUCTING EXOGENOUS OUTPUT ELASTICITY OF TAX REVENUE FOR THE ALBANIAN FISCAL SECTOR

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ABSTRACT

This article presents an estimation of the exogenous elasticity of fiscal revenues in Albania with respect to economic output, a critical parameter of macroeconomic models used for effective macroeconomic policy decision-making. By utilizing the OECD disaggregated approach with the latest available data from 1998 to 2018, which consists in calculating the output elasticities for the main tax components such as Value Added Tax, direct taxes, Excise Taxes, Customs duties, and Social security taxes, the calculated overall output elasticity of tax revenue is found to be 1.3, signifying that on average a 1% increase in economic output generates a 1.3% increase in tax revenue, *ceteris paribus*. The respective regressions are carried out using heteroskedasticity and autocorrelation corrected standard errors, which account for the potential presence of heteroskedasticity and autocorrelation in the data.

Key words: fiscal sector; output elasticity; tax revenue

1. INTRODUCTION

The responsiveness of government tax revenues to macroeconomic developments is a key parameter for the modelling of public finances. Estimates of tax revenue elasticities with respect to economic output or tax bases are needed not only at the Ministry of Finance and Economy, but also at Bank of Albania, for the fiscal parameters of the macroeconomic models which aid monetary-policy making. These elasticities are essential for tax revenue forecasts based on macroeconomic predictions and for the cyclical adjustment of public budget balances. Moreover, the calculation of tax multipliers also crucially depends on the estimated values of tax elasticities (Mertens and Ravn, 2014). Despite their importance, tax revenue elasticities are often not estimated but only calibrated, especially for emerging and transition economies. Either the calibration is based on the ratio of the marginal to the average tax rate, or, for some tax categories, the elasticity is assumed to equal one.

The output elasticities of tax revenue for the Albanian fiscal sector have already been calculated by Mançellari (2011), using an application of the Divisia Index based on Choudhry (1979) for the period 1998Q1-2009Q4. The Ministry

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of Finance and Economy of the Republic of Albania (2018) and Gazidede (2013) estimate the tax revenue elasticity not with respect to the output, but with respect to the output gap, in order to estimate the cyclically-adjusted budget balance to analyse and monitor the fiscal position of Albania. In addition to these publications, this article contributes to literature by estimating the output elasticity of tax revenue through the disaggregated approach as suggested by OECD using the latest available data for the Albanian economy (1998Q1-2018Q2), estimating also the output elasticities for the main tax components such as: Value Added Tax, direct taxes on individuals and corporations, Excise Taxes, Customs duties and Social security taxes.

As the main purpose of estimating output elasticity of fiscal revenue in this article is to use it for the identification of fiscal policy shocks within a Structural VAR framework, this article focuses just on the contemporaneous relationship between the indicators, i.e. the effect of economic activity on public finances only in the period of the economic shock, leaving apart the dynamic nature of the relationships in question. The approach used here builds on the assumption of a proportional and static relationship between tax revenue and the corresponding tax base, and focuses on estimating how economic output influences individual tax bases.

2. DATA AND METHODOLOGY

The dataset used for the calculation of output elasticity of tax revenue includes quarterly time series on the components of net tax revenues and their respective tax bases, and real Gross Domestic Product (GDP, where 2010=100), covering the period 1998Q1 to 2018Q2, which amounts in total to 82 observations. "All the indicators are expressed in real terms by using CPI as a common deflator." This article makes use of quarterly data, because the annual time series available for Albania are too short to allow for any meaningful regression analysis. The use of quarterly data brings additional problems, because tax revenue components, tax bases and real GDP display a strong seasonal pattern, therefore all the series are adjusted seasonally using the TRAMO/SEATS method.

Using the publicly accessible database of the Ministry of Finance, the fiscal revenues used in the SVAR are defined as in Perotti (2002):

Net Tax Revenues = Fiscal Revenues – Transfers = VAT revenues + Direct taxes on individuals + Direct taxes on corporations + Excise Taxes + Customs duties + Social security taxes - Government transfers, where the later represent transfers to households and subsidies to firms.

Quarterly data on GDP are published only for the period 2009Q1-2018Q2, while before they are available only annually. Therefore for the period 1998-2008, they are interpolated into quarterly data following the methodology described in Dushku (2008).

In line with Blanchard and Perotti (2002) and Giorno et al. (1995), in this article we adopt the OECD methodology for calculating the output elasticity, which uses a two-stage approach and identifies separately: i) the elasticity of fiscal revenues with respect to their base, ii) the elasticity of bases with respect to the output.

The individual elasticities are proxied by the coefficients obtained from regressing each of the revenue components (r_i) on the macroeconomic base (B_i) (equation (1a)) and the later (B_i) on the output y (equation (1b)) over the whole sample, where all the variables are transformed in natural logarithms. The equations (1a) and (1b) are estimated using Ordinary Least Squares (OLS) method and a correction approach of the standard errors developed by Newey and West is applied to account for serial correlation and heteroscedasticity. The terms u_t and v_t represent the errors for each of the linear regression equations, respectively.

$$\ln(r_i) = \alpha_0 + \alpha_{B_i}^{r_i} * \ln(B_i) + u_t \quad (1a)$$

$$\ln(B_i) = \alpha_1 + \alpha_y^{B_i} * \ln(y) + v_t \quad (1b)$$

The exogenous elasticities of a budgetary item with respect to output $\alpha_y^{r_i}$ are obtained as product of the elasticity of the budgetary item to its macroeconomic base $\alpha_{B_i}^{r_i}$ and the elasticity of this base with respect to output $\alpha_y^{B_i}$. If the elasticity of a budgetary item is constructed as an average value of two or more sub-components' elasticities, then their respective shares in the budgetary item's volume are used as weights. The output elasticity of total net tax revenue α_y^r is estimated as a weighted average of output elasticities of different revenue components, where the weights are assigned according to their share on the total tax revenue $\frac{T_i}{T}$. To sum up, the net tax elasticity to output is calculated through the formula (2):

$$\alpha_y^r = \sum_{i=1}^n \alpha_{B_i}^{r_i} * \alpha_y^{B_i} * \frac{T_i}{T} \quad (2)$$

Table 1 and 2 give a summary of the estimated exogenous elasticities and the proxies used for the tax bases of the revenue components, respectively. For details on the respective "macrobase" (macroeconomic base) see for instance Bouthevillain et al. (2001). Note that elasticity of government transfers multiplied by their relative weight in the fiscal revenue indicator is subtracted from the overall output elasticity of fiscal revenues, according to the definition of net tax revenue used in this article.

Table 1 Exogenous sub-elasticities with respect to real GDP and share of tax item in total taxes.

	Elasticity of budgetary item to tax base	Elasticity of Tax base to real GDP	Elasticity of budgetary item to real GDP	Avg. Weight (Share in tax revenues)
	$\alpha_{B_i}^{r_i}$	$\alpha_y^{B_i}$	$\alpha_y^{r_i}$	$\frac{T_i}{T}$
VAT	1,443	0,913	1,317	0,455
Profit tax			2,250	0,096
Excise	1,780	0,913	1,625	0,131
Personal Income Tax	1,910	0,541	1,034	0,083
Custom duties	1,012	1,318	1,334	0,075
Social Security Tax	0,863	0,541	0,467	0,218
Health Tax	1,445	0,541	0,782	0,025
Transfers (unemployment and economic assistance)			0,800	0,082

Note: All coefficients are significant at least at the 5% level.

Source: Author's computation.

Table 2 Proxies for tax bases.

Tax category	Tax Base Proxy
Value Added Tax	Private Consumption
Profit Tax	Corporate Profits
Personal Income Tax	Wages
Excise	Private Consumption
Custom Duties	Imports
Health and Insurance	Wages

Source: INSTAT, Ministry of Finance and author's calculations.

Source: Author's computation.

The series of private consumption, used as a proxy for the tax base of Value Added Tax (VAT), is published by INSTAT on an annual basis before 2009, therefore for the period 1998Q1-2008Q4, it has been interpolated to quarterly frequency following the methodology described in Vika, Abazaj (2013). The series of corporate profits is published annually by INSTAT only for the period 2013-2017. As this is a very short series, it has not been extended before this period with specific extrapolation techniques, as the error margin in such cases could be very high. For simplicity, we have assumed unit elasticity of tax proceeds with respect to tax base for the period till 2013, meaning that an increase in corporate profits is followed by the same rise in the profit tax revenues. This could be reasonable as before that year Albania was under flat tax regime of 10%, and theoretically, the elasticity of proportional taxes with respect to their tax base is unity. For the rest of the period (2013-2017), annual elasticities of profit tax revenues to corporate profits and the corporate profits to real GDP are calculated according to data availability. The elasticity of profit tax revenues to GDP for the whole period is obtained as a weighted average of the two elasticities in each of the sub-periods, where the weights are assigned according to the length of the sub-periods relative to the whole sample. The series of nominal wages per employee is published by INSTAT in annual terms since 2000. The quarterly data are interpolated into quarterly frequency for the period 2000-2002 using the wages of the public sector,

while starting from 2003 they are interpolated in line with the wage index from the Survey of Economic Enterprises conducted by the National Institute of Statistics (INSTAT). The series of total wages is obtained by multiplying the nominal wage per employee with the number of employees, when the later is obtained from the INSTAT web page publication "Labor Forces Balance". The data on imports of goods and services are taken from Bank of Albania.

Following the methodology explained above, the quarterly output elasticity of net tax revenues for Albanian data results to be 1.3, meaning that a 1% increase in economic output (measured by real GDP) generates a 1.3% increase in tax revenues. Compared to the results obtained for Albania by Mançellari (2011), this value is 0.14 percentage points lower, however due to different methodological approaches and different time series, the presented fiscal elasticities may not be directly comparable. If it is compared to the results obtained by studies covering other countries, the output elasticity of fiscal revenue in Albania matches the tax elasticity in the Ukrainian case (Mitra, Poghosyan, 2015), it is higher than that in the Croatian case (Gnip, 2012) and in the German case shown in Perotti (2002), but it is lower than that in the US economy.

3. FEW CLOSING REMARKS

This article aims at estimating the exogenous elasticity of fiscal revenues with respect to economic output in Albania through the OECD disaggregated approach using the latest available data for the Albanian economy during 1998-2018. The calculated elasticity results to be 1.3, meaning that on average a 1% increase in economic output (measured by real GDP) generates a 1.3% increase in tax revenues, *ceteris paribus*. The results are in line with previous studies on this topic for Albania and for other countries too.

The herein analysis focuses only on the contemporaneous relation between the economic output and tax revenue components, as this way it serves to the fiscal Structural VAR approach for which this analysis is intended. However, it would be very interesting and helpful taking into account the dynamic nature of these relationships in the future through a vector error correction model, as suggested mostly in the empirical literature (see for instance Koester and Priesmeier (2012), Havránek et al. (2015), Výškrabka (2017)), which allows the estimation of the short-term and long-term fiscal elasticities, as well as the investigation of the adjustment process between the two.

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