ON THE BUOYANCY OF TOTAL BUDGET REVENUES IN MOLDOVA: ECONOMETRIC ESTIMATES AND REVENUE FORECASTS

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SUMMARY

An economy's total budget revenue is a key variable for the efficient design and conduct of economic policy and for maintaining fiscal and debt sustainability. Following a brief analysis of the notion of the buoyancy of total budget revenues and its estimation, the paper estimates the buoyancy of total revenues in the Moldovan economy using quarterly data on total budget revenues and Gross Domestic Product for the period from the first quarter of 2016 to the fourth quarter of 2025, thereby providing updated country-specific evidence based on high-frequency data. The empirical work reported in the paper suggests that the buoyancy of total budget revenues in Moldova's economy is close to 1.06. The paper then forecasts the medium-term evolution of total budget revenues using quarterly Gross Domestic Product forecasts from an estimated time series model. The total revenue forecasts are lower than the Ministry of Finance's latest forecasts. The paper suggests regularly updating the buoyancy estimate and revenue forecasts for both monitoring and forecasting purposes.

Keywords: *buoyancy, total budget revenues, Moldova*

INTRODUCTION

The evolution of total budget revenues is a key variable for the efficient design of economic policy and the maintenance of fiscal and debt sustainability. The goal of this paper is to estimate the buoyancy of total budget revenues in Moldova and to generate medium-term forecasts of total budget revenues.

The paper is organised as follows: Section 2 briefly analyses the notion of buoyancy and its estimation. Section 3 presents the data used for empirical work and the econometric estimate of the buoyancy of total budget revenues in Moldova. Section 4 presents quarterly forecasts of nominal Gross Domestic Product (GDP) and total budget revenues from the first quarter of 2026 through the fourth quarter of 2028. Section 5 concludes. The paper's statistical annex reproduces the data used for empirical work.

A NOTE ON THE NOTION OF BUOYANCY AND ITS ESTIMATION

The buoyancy of a tax, B, is defined by the ratio of the percentage change of the revenues generated over the percentage change of the tax's base according to the equation:

$$B = (\text{percentage change of revenues}) / (\text{percentage change of the tax base}) \quad (1)$$

In equation (1), the base is frequently the country's GDP, though other bases may be more appropriate depending upon the particular tax under consideration. Thus, for example, for the cases of VAT and import tariffs, more appropriate bases are consumption and imports, respectively.

For the buoyancy of total budget revenues, the appropriate base is the GDP. The buoyancy of total budget revenues indicates how much economic growth would increase total budget revenues over time: thus, a buoyancy estimate greater (less) than one implies that revenues are likely to grow faster (slower) than GDP growth.

Buoyancy is a policy-relevant indicator for macroeconomic management and forecasting. Recent studies have further refined empirical approaches to estimating tax buoyancy and its implications for fiscal policy analysis (Khan, 2024; Raouf, 2026), underscoring the importance of robust econometric techniques. It is notable that buoyancy includes the effects of discretionary policy measures, such as changes in tax rates and brackets, modifications to the tax base definition, and changes in tax administration and enforcement. In contrast, the elasticity measures the responsiveness of revenues to changes in the tax base while holding policy constant. It thus captures the automatic response of revenues to economic growth, abstracting from any discretionary policy changes. In other words, the elasticity is defined as the ratio of the percentage change in revenues over the percentage change of the tax's base under the condition that there is no change in the tax system over the period. By disentangling the effect of changes induced by tax policy through time the elasticity of a tax provides an indication of the automatic response of the tax under consideration to changes in macroeconomic conditions.

A simple methodology to estimate the buoyancy over a period, which we will not utilise in this paper, is to use equation (1) to estimate the annual buoyancies and estimate the buoyancy as the average of the annual estimates over the period.

A widely-used method to estimate the buoyancy of revenues, which we will use in this paper, is to use time-series data to regress the logarithm of revenues on the logarithm of GDP. In the log-linear equation (2) below:

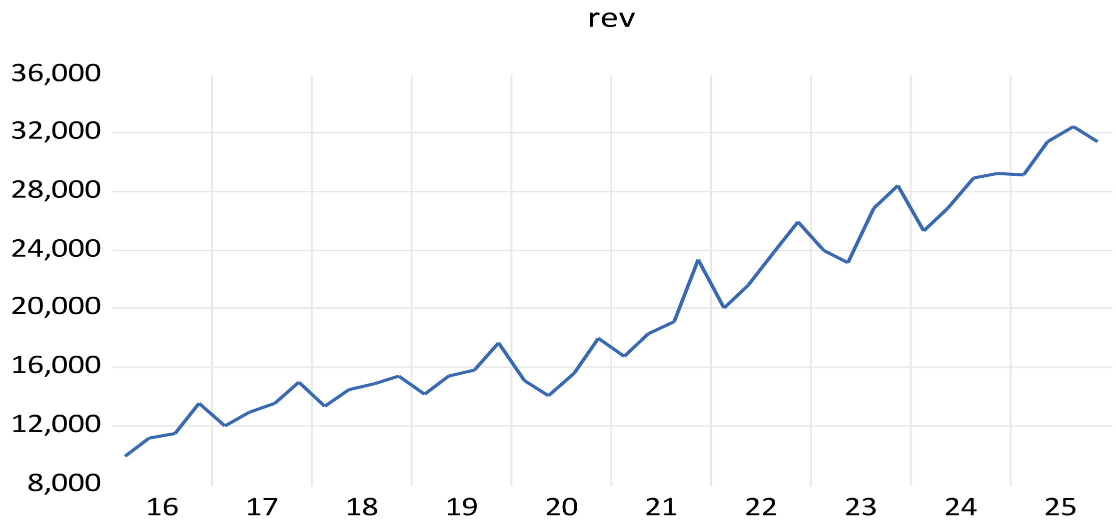
$$\log \text{Revenues}_t = a + b \log \text{GDP}_t + e_t \quad (2)$$

- The parameters a and e represent the constant term and the error term of the equation to be estimated through the use of time series data; while
- The econometric estimate of parameter b in equation (2) provides an estimate of the buoyancy of revenues.

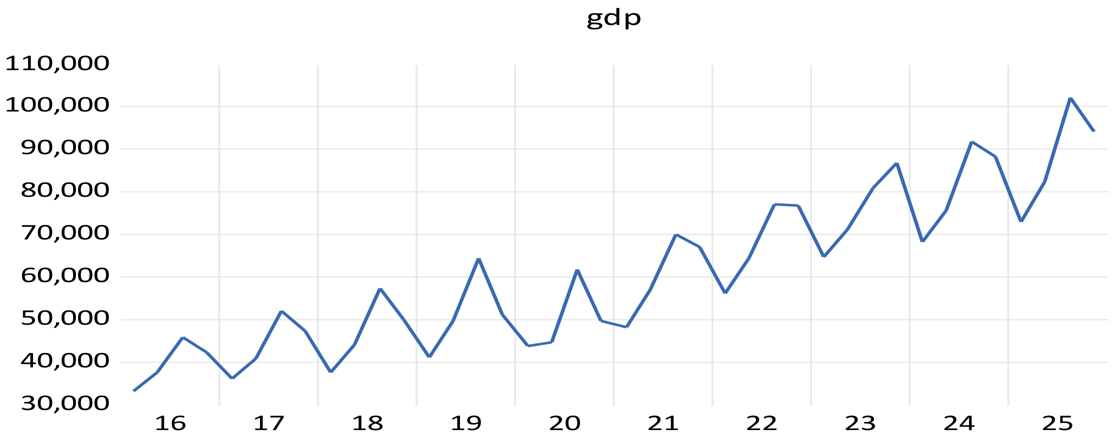
A number of studies in the literature have provided evidence of the international experience on tax buoyancy. The recent IMF working paper by Cornevin, Corrales and Angel (2023) provided an empirical overview of tax buoyancy in 185 countries over the period 1990 to 2020 and indicated that long-run buoyancy of taxes typically hovers around unity. The paper by Dudine and Jalles (2017) estimated both short- and long-run buoyancies for 107 countries over the period 1980 to 2014 and reported that long-run buoyancy is not significantly different from 1 overall, while short-run buoyancy tends to exceed 1 in emerging markets and low-income countries. The study by Gupta, Jalles and Liu (2022) estimated buoyancy for 44 Sub-Saharan African countries over the period 1980 to 2017 and indicated that long-term buoyancy often equals or slightly exceeds 1 for most countries, while short-term buoyancy was lower in states with weaker institutions. Finally, a World Bank country study utilising data from 2000 to 2017 reported that the buoyancy of total revenue in Moldova was 1.12 (World Bank, 2019).

DATA AND ECONOMETRIC ESTIMATES

The following two graphs depict the evolution of total revenues and nominal GDP from the first quarter of 2016 to the fourth quarter of 2025, in millions of Moldovan lei (MDL). The estimates of the fourth quarter of 2025 are preliminary.



Source: *Ministry of Finance @2026. https://mf.gov.md/en*



Source: *National Bureau of Statistics of the Republic of Moldova*

It is notable that standard stationarity tests indicate that both total revenues and nominal GDP, as well as the logarithms of these variables, are not stationary. And it is well-known that regressing nonstationary variables may result in spurious regressions.

The econometric estimates of the log-linear model will indicate whether the buoyancy of total revenues in Moldova is less than or greater than one. The econometric estimates of the log-linear model are reported below:

Table 1.
Regression results of the log-linear model

Dependent Variable: LOG(REV)				
Method: Least Squares				
Sample: 2016Q1 2025Q4				
Included observations: 40				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.757421	0.685835	-2.562454	0.0145
LOG(GDP)	1.056753	0.062501	16.90778	0.0000
R-squared	0.882670		Mean dependent var	9.834330
Adjusted R-squared	0.879582		S.D. dependent var	0.336466
S.E. of regression	0.116758		Akaike info criterion	-1.408723
Sum squared resid	0.518031		Schwarz criterion	-1.324279
Log likelihood	30.17447		Hannan-Quinn criter.	-1.378191
F-statistic	285.8730		Durbin-Watson stat	1.922725
Prob(F-statistic)	0.000000			

Source: developed by the author

The econometric estimation suggests that the buoyancy of total revenues in Moldova is close to 1.06. This is greater than one but less that the 1.12 estimate reported in the World Bank study discussed above (World Bank, 2019).

FORECASTS

The estimated log-linear econometric model may be used to generate forecasts of revenues subject to a projected path of the future nominal GDP evolution.

As there are no official quarterly forecasts of nominal GDP these may be generated by the forecasts of an estimated Auto-Regressive Integrated Moving Average (ARIMA) model fitted on the historical evolution of nominal GDP.

The stationarity test reported below indicates that the quarterly time series of nominal GDP is not stationary.

Table 2.
Stationarity test of the nominal GDP series

Null Hypothesis: GDP has a unit root			
Exogenous: Constant			
Lag Length: 3 (Automatic - based on SIC, maxlag=8)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.320258	0.9982
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	
*MacKinnon (1996) one-sided p-values.			

Source: developed by the author

In contrast the next table indicates that first difference of the quarterly time series of nominal GDP is stationary.

Table 3.
Stationarity test of the first difference of the nominal GDP series

Null Hypothesis: D(GDP) has a unit root			
Exogenous: Constant			
Lag Length: 3 (Automatic - based on SIC, maxlag=8)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.383025	0.0187
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	
*MacKinnon (1996) one-sided p-values.			

Source: developed by the author

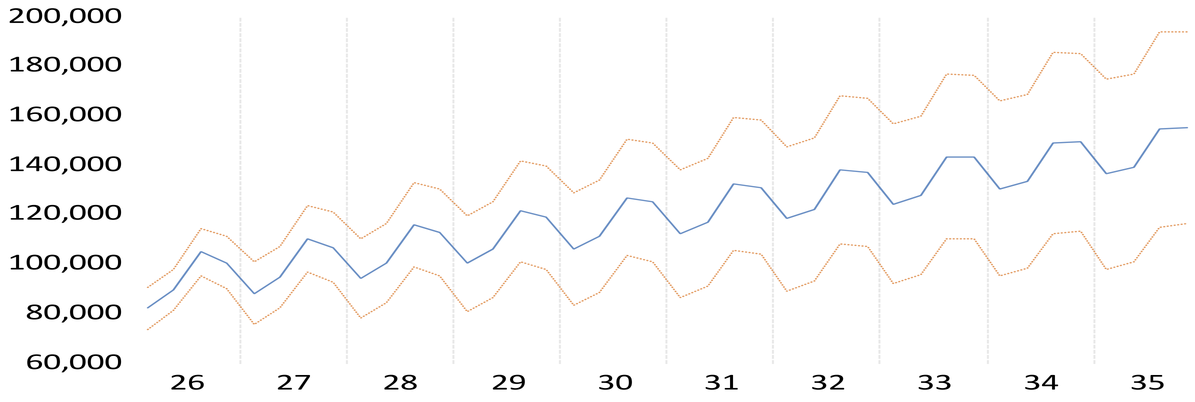
EViews's automatic ARIMA selection, with the Akaike information criterion as the criterion choice, suggests the following (2,1,3) ARIMA model fitted on the historical evolution of nominal GDP as the preferred model.

Table 4.
Regression results of the (2,1,3) model

Dependent Variable: D(GDP,1)				
Method: ARMA Maximum Likelihood (OPG - BHHH)				
Sample: 2017Q3 2025Q4				
Included observations: 34				
C	1445.954	345.4707	4.185460	0.0003
AR(1)	0.018716	0.035922	0.521037	0.6066
AR(2)	-0.996748	0.008999	-110.7560	0.0000
MA(1)	-0.662098	1.031532	-0.641859	0.5264
MA(2)	1.097350	7.739318	0.141789	0.8883
MA(3)	-0.417443	3.084448	-0.135338	0.8933
SIGMASQ	10800736	78549941	0.137502	0.8917
R-squared	0.904074		Mean dependent var	1573.324
Adjusted R-squared	0.882757		S.D. dependent var	10770.64
S.E. of regression	3687.943		Akaike info criterion	19.73931
Sum squared resid	3.67E+08		Schwarz criterion	20.05357
Log likelihood	-328.5684		Hannan-Quinn criter.	19.84648
F-statistic	42.41128		Durbin-Watson stat	2.117584
Prob(F-statistic)	0.000000			

Source: developed by the author

The graph of the out-of-sample forecast of nominal GDP on the basis of the above (2,1,3) ARIMA model is as follows:



Source: developed by the author

We reproduce below the point estimates of the quarterly nominal GDP forecast generated by the (2,1,3) ARIMA model from the first quarter of 2026 to the fourth quarter of 2028.

2026Q1	82282.92
2026Q2	89649.92
2026Q3	104961.1
2026Q4	100764.8
2027Q1	88284.99
2027Q2	95094.23
2027Q3	110521.0
2027Q4	106882.8
2028Q1	94298.22
2028Q2	100549.2
2028Q3	116070.0
2028Q4	112990.0

The table below compares the annual GDP estimates of the (2,1,3) model to the annual GDP estimates in the latest macroeconomic forecast of the Ministry of Economic Development and Digitalisation (MoEDD) published in December 2025.

Table 5.
Comparison of the GDP forecasts

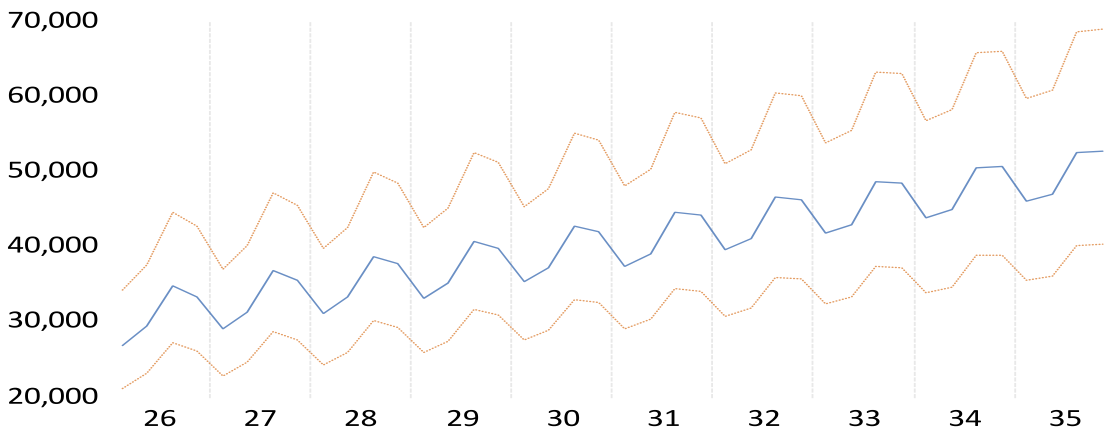
	(2,1,3) model	MoEDD
2026	377658.7	377200
2027	400783	406900
2028	423907.4	440200

Source: developed by the author.

It is notable that the GDP forecasts for 2026 and 2027 are almost identical. It is worth noting that the ARIMA model's forecasts become increasingly unreliable the further into the future the forecast horizon extends.

We now turn to using the quarterly forecasts of nominal GDP generated by the (2,1,3) ARIMA model and the econometric estimates of the log-linear model to produce quarterly forecasts of total budget revenues.

We reproduce below the graph of the out-of-sample forecast of revenues generated by the log-linear model of revenues.



Source: developed by the author

The point estimates of the forecasted evolution of total budget revenues from the first quarter of 2026 to the fourth quarter of 2028 are as follows:

2026Q1	26979.12
2026Q2	29538.03
2026Q3	34893.64
2026Q4	33421.12
2027Q1	29062.99
2027Q2	31436.84
2027Q3	36849.79
2027Q4	35569.11
2028Q1	31158.82
2028Q2	33345.57
2028Q3	38807.67
2028Q4	37720.25

The table below compares the annual estimates of our forecasted total budget revenues based on the log-linear model to the latest forecast of the Ministry of Finance.

Table 6.
Comparison of the total budget revenue forecasts

	Log-linear model	Ministry of Finance
2026	124831.9	133456.7
2027	132918.7	143652.6
2028	141032.3	155405.5

Source: developed by the author

The forecasts derived from the log-linear model are more pessimistic than the forecasts of the Ministry of Finance.

CONCLUSION

The empirical work reported in the paper suggests that the buoyancy of total budget revenues in the Moldovan economy is close to 1.06. This finding is broadly consistent with international evidence and provides updated country-specific estimates based on recent quarterly data. It is notable that, in order finalise the forecasts of total budget revenues, the forecasters need to incorporate their professional judgement on the likely evolution of Moldova's macroeconomic indicators over the forecast's horizon and their impact on the budget, and also take into account the likely effect of any policy-induced changes in tax rates, the revenues base, the tax administration and compliance.

The analysis also suggests that model-based forecasts may differ from official projections, underscoring the importance of using alternative empirical approaches to complement institutional forecasting frameworks.

A natural area for further work is the regular updating of econometric estimates and forecasts over time for both monitoring and forecasting purposes.

ACKNOWLEDGEMENTS

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STATISTICAL ANNEX

	GDP	Revenues		GDP	Revenues
2016Q1	33231.00	9925.0	2021Q1	48074.13	16698.8
2016Q2	37566.00	11103.0	2021Q2	56985.19	18234.4
2016Q3	45882.00	11443.1	2021Q3	70075.43	19143.6
2016Q4	42331.00	13482.8	2021Q4	66943.00	23296.2
2017Q1	36079.00	11993.2	2022Q1	56266.49	20075.9
2017Q2	40660.00	12916.0	2022Q2	64326.29	21627.4
2017Q3	51932.00	13516.3	2022Q3	77178.51	23865.2
2017Q4	47336.00	14953.9	2022Q4	76717.00	25936.9
2018Q1	37609.00	13291.6	2023Q1	64745.84	23968.2
2018Q2	44166.00	14495.6	2023Q2	71244.05	23095.4
2018Q3	57370.00	14858.6	2023Q3	80841.49	26810.8
2018Q4	49917.00	15350.1	2023Q4	86723.00	28424.8
2019Q1	41185.00	14128.3	2024Q1	68170.99	25346.4
2019Q2	49704.00	15338.9	2024Q2	75606.22	26832.5
2019Q3	64323.00	15811.4	2024Q3	91796.95	28925.9
2019Q4	51044.00	17670.6	2024Q4	88242.66	29233.7
2020Q1	43685.33	15029.6	2025Q1	72980.01	29151.5
2020Q2	44629.49	14008.1	2025Q2	82312.89	31380.0
2020Q3	61719.25	15597.6	2025Q3	102054.6	32397.9
2020Q4	49699.00	18014.7	2025Q4	94153.00	31450.7

Source: National Bureau of Statistics and Ministry of Finance

Note: The data are in millions of MDL. The estimates for the fourth quarter of 2025 are preliminary