BENCHMARKING INVESTMENT IN MOLDOVA UTILIZING THE FORECASTS FROM A TIME-SERIES MODEL WITH SOME RECOMMENDATIONS FOR THE CONDUCT OF POLICY

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Abstract: Investment is critical for an economy's growth and development and investment attraction is a priority for the Moldovan authorities. Investment in Moldova is low especially when compared to other transition countries. The paper fits a time series model on the quarterly evolution of investment in constant prices and generates forecasts which may be interpreted as benchmarks defined solely on the historical evolution of investment. Following an analysis of the structural characteristics of public investment and the recent improvement in the regulatory framework for public investment management, the paper proceeds to provide policy recommendation for both private and public investment. With regard to private investment attraction policy should: a) simplify further the regulatory framework and digitise the economy; b) intensify the efforts to strengthen the Moldovan banking system and its intermediation; c) promote Moldova as an investment destination and provide information to potential investors; and d) promote Moldova's European integration, improve the transparency and predictability of Moldova's investment climate, and promote a rules-based level-playing field for investment. With regard to public sector investment policy should: a) enforce the use of Regulation 684 which improves public investment management; and b) develop a pipeline of well-designed public investment projects eligible for financing which will strengthen public investment management, address a number of existing challenges and contribute to effective macroeconomic management.

Keywords: Investment, Time Series Econometrics, Policy Recommendations.

JEL Classification: C22, E22.

INTRODUCTION AND OVERVIEW

Investment is critical for an economy's growth and development. The aim of this paper is two-fold:

- 1. To fit a time series model on the quarterly evolution of investment in constant prices in Moldova and proceed to use the estimated model to generate forecasts which may be interpreted as benchmarks defined solely on the historical evolution of investment; and
- 2. To provide a brief discussion of the structural characteristics of investment in Moldova, analyse recent investment-related developments in the area of public investment and finally provide policy recommendations.

The present paper follows an earlier related article which analysed the evolution of investment and Moldova's Incremental Capital-Output Ratio [Papaphilippou (2021)].

Aspects of investment in the Moldovan economy have been analysed in a number of previous studies in the literature. The article by Timus and Perciun (2011) analysed briefly the role, impact and significance of investments for the economic development of Moldova. The study by Sula (2016) identified opportunities for increasing the investment potential of the credit system in Moldova. The paper by Perciun, Petrova and Gribincea (2017) analysed the dynamics of the saving-investment Proceedings of International Scientific Conference "MODERN FINANCE FROM THE PERSPECTIVE OF SUSTAINABILITY OF NATIONAL ECONOMIES" November 22 - 23, 2024, Chișinău, Moldova

balance in the economy of Moldova and its impact on economic growth. The paper by Stratan (2018) analysed the indicators influencing the competitiveness of the country, the creation of a favourable business environment, the ability to attract investment and compete in foreign markets as well as increase the living standards of the population. The article by Iordachi, Luchian and Timus (2019) analysed thoroughly the determinants that motivate the diaspora to invest in their homeland and included recommendations to facilitate this process in Moldova. Cojocaru (2021) analysed the impact of investments including the benefit obtained for the society and the revenues obtained by the investor. Finally the paper by Perciun (2024) analysed investment in the renewable energy sector.

The rest of the current paper is organised as follows: Section 2 introduces the data for the empirical work comprising the evolution of Gross Fixed Capital Formation in constant prices. Section 3 presents the estimated time series model and the medium-term forecasts as benchmarks of the likely future evolution of investment based solely upon its historical record. Section 4 analyses the structural characteristics of public investment in Moldova and discusses briefly a number of recent investment-related developments stemming from the introduction of Regulation 684 in 2022. Section 5 provides the paper's policy recommendations for both private and public investment. Section 6 concludes by noting the difficulty of modelling investment in any economy and reiterating the importance of investment for the Moldovan economy's growth and development.

THE DATA

The data for our empirical analysis comprise the evolution of Gross Fixed Capital Formation in constant prices from the first quarter of 2015 to the fourth quarter of 2023. Earlier data are not comparable as they have been compiled using a different compilation methodology. Graph 1 contains the graph of the evolution of the data in average prices of 2015 and in thousands of Moldovan lei.



gfcf

Figure 1. The evolution of Gross Fixed Capital Formation in average prices of 2015 Source: National Bureau of Statistics

It is well known that in the above mentioned period the Moldovan economy was subjected to a number of shocks including weather induced shocks to the critical agriculture and agro processing sector, the COVID 19 pandemic, the energy crisis, and the war in Ukraine.

A natural question which arises concerns the typical value of the investment ratio defined as the ratio of Gross Fixed Capital Formation over GDP. To help address this question comparable data for a number of peer countries will be useful as benchmarks. The data in table 1 has been downloaded from the global economy website (<u>www.theglobaleconomy.com</u>) which provides business and economic data for 200 countries.

Table 1 reports the level of Gross Fixed Capital Formation as a percent of GDP for a number of selected transition countries and also the Euro area as a whole as a comparator. There are three values in the table - for the last quarter, for the previous quarter, and for a year ago. The estimates in the table are updated as soon as new data are released by the national statistical authorities.

Countries	Latest value	Reference	Three months ago	One year ago
Albania	30.00	Q4 / 2023	22.53	30.24
Armenia	28.51	Q4 / 2023	18.91	28.07
<u>Azerbaijan</u>	18.78	Q4 / 2023	17.42	15.37
Belarus	26.59	Q4 / 2023	20.70	22.62
Bosnia and Herzegovina	24.46	Q4 / 2023	24.77	23.56
Croatia	18.96	Q4 / 2023	15.98	19.29
Czechia	29.50	Q4 / 2023	27.23	28.54
Estonia	30.89	Q4 / 2023	29.54	30.25
Euro area	22.53	Q4 / 2023	21.59	22.84
Georgia	21.37	Q4 / 2023	23.65	19.37
<u>Hungary</u>	26.38	Q4 / 2023	28.62	27.17
<u>Kazakhstan</u>	29.71	Q3 / 2023	25.84	25.05
Kyrgyzstan	21.16	Q3 / 2023	20.22	21.42
Latvia	26.66	Q4 / 2023	25.82	23.70
Lithuania	25.15	Q4 / 2023	23.33	23.28
Moldova	19.50	Q4 / 2023	20.03	22.18
Mongolia	26.15	Q4 / 2023	31.26	32.77
Montenegro	20.09	Q4 / 2023	15.28	21.78
Romania	27.06	Q4 / 2023	32.65	23.23
Russia	28.75	Q4 / 2023	20.44	28.99
Serbia	24.40	Q4 / 2023	22.67	25.56
<u>Slovakia</u>	26.77	Q4 / 2023	21.40	24.72
<u>Slovenia</u>	21.59	Q4 / 2023	22.55	21.65
<u>Uzbekistan</u>	32.80	Q3 / 2023	32.09	31.64

Table 1. Gross Fixed Capital Formation as a percent of GDP

Source: The global economy website (<u>www.theglobaleconomy.com</u>)

The global economy website notes that looking across countries, investment accounts for about 20-25 % of GDP, typically with greater values for less developed countries than for the advanced economies. The website comments that this is normal as those countries are in the process of industrialization that requires more investment. Focusing upon the latest estimates for the fourth quarter of 2023 it is remarkable that Moldova has the lowest investment ratio from all the countries reported in the table.

ECONOMETRIC ANALYSIS AND BENCHMARKS

The econometric analysis of the data set is hampered by its small sample size. The econometric results reported in this section have been generated by the EViews 13 econometrics programme.

The results of table 2 suggest that the time series of the Gross Fixed Capital Formation in constant prices has a unit root.

Table 2. Stationarity test

Null Hypothesis: GFCF has a unit root Exogenous: Constant Lag Length: 6 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.504255	0.8765
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Source: EViews 13 generated output

The results of table 3 suggest that the first difference of the series is stationary.

Table 3. Stationarity test

Null Hypothesis: D(GFCF) has a unit root	
Exogenous: Constant	
Lag Length: 5 (Automatic - based on SIC, maxlag=6)	

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.362714	0.0210
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Source: EViews 13 generated output

We now turn to the estimation of an Auto-Regressive Integrated Moving Average (ARIMA) time series model. This is a class of models stemming from the seminal work of Box and Jenkins (1970). Table 4 below reports the regression result of an ARIMA model comprising three autoregressive lags and one moving average lag.

Table 4. Regression results

Dependent Variable: D(GFCF,1) Method: ARMA Maximum Likelihood (OPG - BHHH) Date: 06/20/24 Time: 13:34 Sample: 2016Q4 2023Q4 Included observations: 29 Convergence achieved after 34 iterations Coefficient covariance computed using outer product of gradients

Variable	Coefficient	t Std. Error	t-Statistic	Prob.
С	247254.3	139990.7	1.766219	0.0906
AR(1)	-0.627365	0.348215	-1.801658	0.0847
AR(2)	-0.848786	0.141257	-6.008826	0.0000
AR(3)	-0.584867	0.256507	-2.280123	0.0322
MA(1)	0.068499	0.351711	0.194760	0.8473
SIGMASQ	2.81E+12	1.16E+12	2.427003	0.0235
R-squared	0.713721	Mean de	pendent var	120420.1
Adjusted R-squared	0.651487	S.D. dep	endent var	3186579.
S.E. of regression	1881198.	Akaike ii	nfo criterion	32.00890
Sum squared resid	8.14E+13	Schwarz	criterion	32.29178
Log likelihood	-458.1290	Hannan-	Quinn criter.	32.09749
F-statistic	11.46825	Durbin-V	Vatson stat	1.912067
Prob(F-statistic)	0.000012			
Inverted AR Roots Inverted MA Roots	.0294i 07	.02+.94i	67	

Source: EViews 13 generated output

Figure 2 depicts the actual fitted and residuals graph of the regression reported in table 4 above.







Graph 3 depicts the out-of-sample forecast to the fourth quarter of 2026



Source: EViews 13 generated output

Finally, table 5 reports the out-of-sample forecast estimates. These may be thought of as benchmarks derived solely upon the historical evolution of the time series. They may be interpreted as indicative benchmarks of the likely evolution of investment in the absence of any new policies aiming at facilitating the attraction of investment.

Table 5. Indicative benchmarks

2024Q1	14583686
2024Q2	16675812
2024Q3	18688108
2024Q4	16682448
2025Q1	15765953
2025Q2	17623230
2025Q3	19165842
2025Q4	17914509

Source: EViews 13 generated output

Given the historical evolution of investment, the generated forecasts of the estimated time series model provide a yardstick which could be used in the future to compare the estimates in table 5 with the actual future investment performance and thus indicate the relative success of the policy effort to attract and retain domestic and foreign investment.

ON PUBLIC INVESTMENT IN MOLDOVA

An analysis of public investment in Moldova is contained in the IMF's Public Investment Management Assessment report published in December 2019 [International Monetary Fund (2019)]. The report noted that the public capital stock in Moldova had declined over the past two decades, stressed the significant under-execution of the public investment budget which is still a recurrent feature of budget execution in Moldova and emphasized that the existing regulatory framework for public investment management was limited by its narrow coverage and inconsistent application.

A positive development has been the passing of Regulation 684 in 2022 which improved significantly the regulatory framework concerning the national procedures for the management of all public capital investment project eligible for financing with a budget of over 5 million Moldovan lei. The Regulation extends the coverage of the regulatory framework and establishes a transparent and

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efficient mechanism for identifying, appraising, planning, approving, implementing, monitoring and evaluating public capital investment projects funded from the State Budget.

The provisions of Regulation 684 apply to all public capital investment projects financed from the funds of the State Budget, including those funded from external sources and development funds. According to the Regulation the central or local public authority initiating the project are responsible for the preparation of the documentation (including the feasibility study and the opinion of the Ministry of Environment on the climate implications and vulnerabilities of the project). The examination of the proposals of new public investment projects is the responsibility of a Working Group under the Ministry of Finance which establishes whether a project is eligible for financing according to certain criteria. The selection of the new public investment projects to be included in Moldova's Medium Term Budget Framework and its draft Annual Budget is undertaken by the Interministerial Strategic Planning Committee in accordance with the existing general budgetary planning procedures and the established legal provisions.

POLICY RECOMMENDATIONS

A well-written and informative recent survey of Moldova's investment climate is provided by the US 2023 Investment Climate Statement report [US Department of State (2023)].

In thinking about economic policy related to investment it is useful to distinguish between the impact of economic policy upon private investment and public investment. Private investment is indirectly influenced by public policy. However the public sector has a very important role in designing appropriate macroeconomic policies to maintain macroeconomic stability and also in creating an environment conducive to the attraction and retention of private investment. We should add here that we are generally sceptical of the introduction of special incentives to attract private sector investment as these may erode the creation of a "level playing field" in the economy and may also have significant adverse fiscal consequences. Public investment is directly under the control of the Government. It has an important role to play given Moldova's existing infrastructure gaps and developmental needs.

With regard to private investment, policy actions in Moldova should aim at the following:

- Continuation of the effort to simplify the regulatory framework for private sector activity and digitise the Moldovan economy. With regard to the latter the strategic document for Moldova's digital transformation is the Digital Transformation Strategy for 2023-2030 approved in September 2023. Work towards simplifying the regulatory framework and digitising the Moldovan economy is an ongoing process led institutionally by the Ministry of Economic Development and Digitalisation.
- Intensification of the efforts to strengthen the Moldovan banking system (which provides a significant amount of the financing for domestic investment in Moldova) in general and increase the intermediation of commercial banks in particular. Through the latter the existing domestic savings will be converted into productive investment.
- Promotion of Moldova as a destination for private investment and provision of information to potential investors and follow-up assistance to existing investors. A key role here may be played by the Invest Moldova Agency which is, however, currently understaffed. We would recommend an increase in the Invest Moldova Agency's budget and its capacity.
- Engaging in a sustained effort to promote Moldova's European integration. This is likely to improve the transparency and predictability of Moldova's investment climate, promote a rules-based level-playing field for investment and contribute to the attraction and retention of private investment. Of particular importance here is the emphasis currently placed on legislative approximation to the EU, the ongoing reform in the judiciary and the fight against corruption.

Turning to public investment there are two areas which merit attention and sustained effort from the part of the Moldovan authorities.

The first area of emphasis in the area of public investment concerns the need to enforce the use of Regulation 684. This will discipline the process of project design in Moldova and provide consistency across the proposed public investment projects regardless of the source of financing.

The second area requires a sustained effort to develop a project pipeline. The development of a pipeline of well-designed public investment projects eligible for financing will strengthen public investment management, address a number of existing challenges as well as contribute to effective macroeconomic management in Moldova. More specifically, in our view:

- The existence of a well-designed pipeline of eligible public investment projects is likely to address the chronic under-execution of the public investment budget, which is a recurrent feature of Moldova's budget.
- The existence of the project pipeline will help in providing a set of eligible projects which may address Moldova's existing development needs and, if financed, add to the economy's capital stock and its future growth and development.
- Closely related to the previous point is the fact that the project pipeline will, furthermore, enhance Moldova's absorption capacity. This is likely to be of importance for Moldova's economic development given that a number of external stakeholders including the EU have earmarked significant amounts of support for Moldova.
- Finally, the existence of a project pipeline will contribute to a more effective macroeconomic management by strengthening the effective counter-cyclical public investment expenditures over the business cycle, given the well-known potency of public investment during uncertain times and a recession [Gbohoui (2021)].

CONCLUSIONS

Investment is the most volatile component of aggregate demand. It is well-known that investment is very difficult to model adequately due to its inherent volatility and its likely dependence on a multitude of variables, including possibly the actual and expected values of output, business confidence, the return on investment and the availability and cost of credit.

The current paper fitted a simple ARIMA model on the quarterly evolution of investment in constant prices and proceeded to generate forecasts of investment as benchmarks of the likely medium-term evolution of investment relying exclusively upon its historical evolution. The paper provided also some analysis of certain structural characteristics of the Moldovan economy, discussed briefly some recent developments in the critical area of public investment and proceeded to provide concrete policy recommendations to facilitate investment attraction and retention.

To conclude the importance of investment for the successful development of Moldova cannot be over-emphasised. Investment as a percentage of GDP in Moldova is currently very low, especially when compared with peer transition countries. Investment has an important role to play in attempting to shift Moldova's growth model from the current growth model, which relies upon consumption fuelled by remittances, to a more sustainable model increasingly relying upon investments, exports and increases in productivity which has been the policy intent for some time. Last but not least, additional investment is urgently needed in order to address the existing development needs of Moldova and allow the country to attain its EU aspirations. Investment attraction is, rightly, a top priority of the current Moldovan authorities. Time will tell whether Moldova will succeed in increasing the future flow of investment significantly higher than the estimates generated by its historical record which the current paper has approximated with the ARIMA-based forecasts.

BIBLIOGRAPHY

- 1. BOX, G. and G. JENKINS (1970), *Time Series Analysis: Forecasting and Control*, San Francisco: Holden-Day.
- 2. COJOCARU V. (2021), "Role of investment in the economy of the state. Basic concepts, classification and essence", *Economie Socială*, No. 2.
- 3. GBOHOUI, W. (2021), "Uncertainty and Public Investment Multipliers: The Role of Economic Confidence", *IMF Working Paper WP/21/272*.
- 4. International Monetary Fund (2019), "Moldova: Public Investment Management Assessment", Fiscal Affairs Department, December.
- 5. IORDACHI, V., LUCHIAN, I. and A. TIMUS (2019), "Investment activity as condition for development a three-dimensional approach", *Economy and Sociology*, No.2.
- 6. PAPAPHILIPPOU, A. (2021), "On Moldova's Incremental Capital-Output Ratio and the Design of Economic Policy", *Economy and Sociology*, No. 1.
- 7. SULA, T., (2016), "Priority directions of increasing the investment potential of the credit system of the Republic of Moldova", *Economy and Sociology*, No. 4.
- 8. PERCIUN, R. (2024), "2023 Annual Scientific Report", available at: https://ancd.gov.md/sites/default/files/document/attachments/Final_Raport%20%C8%99tiin%C8%9Bifi c%20anual%202023%20PS%20Perciun.pdf
- 9. PERCIUN, R., PETROVA, T and C. GRIBINCEA (2017), "The Implications of Saving and Investment Balance on Economic Growth of the Republic of Moldova", Economics, Sciendo, vol. 5(2).
- 10. STRATAN A., (2018) "Tendințe în parcursul competitivității economiei naționale: cuantificare și constrângeri", *Akademos* No.1, Chisinau.
- 11. TIMUS, A. and R. PERCIUN (2011), "Role, Impact and Significance of Investments for the Economic Development of the Republic of Moldova", *Economica*, No. 2.
- 12. US Department of State (2023), "2023 Investment Climate Statements: Moldova" available at: https://www.state.gov/reports/2023-investment-climate-statements/moldova/