The Relationship between Inflation, Interest Rate, Unemployment and Economic Growth

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Abstract

This paper presents a quarterly structural macroeconomic model for the Republic of Moldova, which is known as the macroeconomic data model (MDM). This model can be used to assess economic conditions in the Republic of Moldova, forecast the macro economy, analyze policy options, and deepen our understanding of the functioning of a market economy. Some of the key features of the model are highlighted. First, the report looks at the Moldovan economy as a whole and finds that it is a small and open economy. Second, the model is small enough to be manageable for forecasting and simulation exercises, but still has enough detail for most purposes. Third, the model is designed to have a stable equilibrium over a long period of time, in accordance with classical economic theory, while its short-run dynamics are demand-driven. Fourth, the current version of MDM is mostly backward-looking, i.e. Expectations are influenced by the inclusion of lagged variables. The MDM uses a quarterly frequency data set, which allows for a more detailed analysis of the dynamics. The data is mostly estimated based on historical information. The paper includes stochastic long-run simulation results. The relationship between inflation, interest rates, unemployment and economic growth is important.

Keywords: Republic of Moldova, macroeconometric modelling, open and small economy; inflation; interest rate; unemployment; economic growth; classical economics; Keynesian economics.

1. Introduction

Recent economic development rekindles the debate about the effectiveness of government policy to deliver "balanced" growth[1]. There are three ways that economists understand how government policy can help to stabilize the economy. Each has its own set of advantages and disadvantages. First, according to the real business cycle Government's fiscal theory and monetary policy will be largely ineffective ; second, according to Keynesian macroeconomic theory government spending as a component of aggregate demand can affect output ، But monetary policy is largely ineffective; third, according to monetary monetary policy theory can affect output but fiscal policy to a large extent, ineffective. Economists generally subscribe to at least two different interpretations of economic phenomena, but most of them recognize that different interpretations may offer different insights in different circumstances. Likewise, most politicians do not stick to any one interpretation, instead choosing piecemeal from different interpretations according to political needs.

A simple test is presented to evaluate the viability of stabilizing instruments important to monetary and fiscal policy. The method used is an update of the St. Louis equation (Andersen, Jordan, 1968).

This introductory paragraph provides an overview of the model and data, and presents the results of the study. The main conclusions are summarized in the following paragraph, and the references are listed at the end. The current understanding of economic growth is based largely on the neo- classical growth model developed by Robert Solow. The Solow model suggests that growth in the economy is due, in part, to the accumulation of capital. Capital accumulation is the primary

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[1] "Whether it is currency or stock speculation, the world has become one vast casino where gambling tables are spread over all meridians and latitudes.... Speculation everywhere is boosted by credit-issuance, since one can buy without paying and sell without owning.... All our difficulties stem from ignoring the fundamental reality, that no [market system] may properly operate if uncontrolled credit creation of means of payment ex nihilo allows (at least temporarily) an escape from necessary adjustments. In an Aug. 27, 1992 interview with the Spanish newspaper El País, Allais stated: The Western stock exchanges are nothing but complete manipulation. It's a game, taking positions, and then playing not at forecasting events, but playing at divination, what others may think of those events. There is one image which illustrates the problem: people living and working beside Mount Aetna. No one knows when the next eruption will occur. We are in the same situation today." –Maurice Allais, 1988 Sveriges Riksbank Prize in Economic Sciences.

driver of productivity growth. Fagerberg (1994) argued that aphasia is a condition that results from damage to the brain. Capital deepening will continue until the economy reaches a point at which the net investments grow at the same rate as the labour force and the capital-labour ratio remains constant. The more the economy falls below its long-term equilibrium, the faster it should recover. Jones found that. In the long run, all per capita income growth is due to external technological change. The rate of technological progress is assumed to be constant, unaffected by economic incentives. Several authors have found that capital and labour account for only a fraction of output growth, and allowing for the quality of the labour force (human capital) only partially reduces the unexplained growth - or Solow residual.

The theory of internal growth, initiated by Romer (1986, 1990) and Lucas (1988), focuses on explaining the remains of Solo Technological change is endogenous to the economic model, which is the result of the choices made by economic agents. The drive to innovate and improve technology is fuelled by the private sector's desire to make a profit from new inventions. Unlike other factors of production, ideas and knowledge nonrivalrous (see Romer 1990). New knowledge can help increase the productivity of existing knowledge, leading to increasing returns to scale. This means that the marginal productivity of capital does not decline with an increase in GDP per capita, and incomes in different countries may not converge.

Technology and innovations are essential contributors to structural change. According to Schumpeter, innovations lead to "creative destruction" – a process by which sectors and firms associated with old technologies decline and new sectors and firms emerge and grow. The more productive and profitable businesses tend to outcompete the less productive and less profitable ones, and overall productivity in the economy increases. The growth of the modern economy is closely linked to the introduction of new technologies. According to Kaldor (1970) and Cornwall (1977), the growth of manufacturing is a key factor in economic growth. This is especially true during the Industrial Revolution, when technological advances occurred primarily in this sector. Cornwall observed that when overall growth accelerated, productivity growth often occurred in manufacturing sectors first. However, when income is low, manufacturing's share of GDP is small and its direct contribution to overall growth is small. When manufacturers' share of national output increases, this often leads to faster sectoral growth. This, in turn, causes aggregate growth rates to rise for both output and labour productivity.

In developed countries, R&D activities are the main driver of technological change. There are other ways that technologies can change, and this is not the only way that they do. Employees learn by doing, increasing their productivity even if technology or inputs (like materials) remain unchanged. In the movie "Arrow," a young man named Oliver Queen inherits his father's business empire, and soon finds himself in the middle of a conspiracy. International technology diffusion is essential for improving productivity growth in developing countries. Limited R&D activity in these countries means that they are far from the technological frontier, and they need to borrow technology from more advanced countries in order to catch up. International economic relations are important channels for technology transfer and increased productivity growth. Technology diffusion can be more efficient if there are enough qualified human resources and incentives for technological improvement are strong, as well as institutions that are functioning well. The major factor behind structural change is the changing demand from within and outside of a country. At lower income levels, a large portion of people's income goes to food. As incomes rise, people tend to buy less manufactured goods, while demand for manufactured goods rises. As incomes continue to increase, demand for manufactured goods decreases at a slower rate, while demand for services continues to grow rapidly. Changes in demand will affect sectoral employment and output shares, which will in turn affect labour productivity. Trade has a significant impact on the specialization patterns and rate of industrialization or structural change within industries. Under an open trade regime, countries tend to specialize in the production of goods for which they have a comparative advantage and import goods which are more expensive to produce domestically. Foreign investment is also likely to come into the country as a result of trade openness. This is often important during early stages of development. It is likely to increase productivity as domestic companies are facing external competition. Foreign trade is an important part of the economy, and countries that are open to trade are more prosperous than those who are not. Rodrik's book is a good read, and you should definitely check it out. Amable is a 2000 book by Rodrik. It's a good book, and you should read it. Moreover, specialization itself does not always lead to high growth rates. This is most evident in the case of developing countries that rely heavily on exports of primary products. Many commodities, like food and raw materials, have trended downward in real world prices over time, and they often experience

large short-term fluctuations. This means that specialization in primary production rarely results in sustained economic growth.

2. Literature Review

Studies such as Clarida, Gali, and Gertler (2000) Buti (2003), Canzoneri, Cumby, and Diba (2006), Flanagan, Uyarra, and Laranja (2011), Badarau and Levieuge (2011), Saulo, Rego, and Divino (2013) and Cui (2016) have shown that a policy mix of monetary and fiscal policy coordination is beneficial. There are some specific problems with the way different Euro-area countries are implementing their policy mix, which is causing some difficulty in coordinating the overall strategy. Their fiscal policies influence national inflation, which has an effect on the ECB's decisions about common monetary policy. It should be noted that the governments of the EU member states have some freedom in designing their fiscal policies, but these policies are subject to certain restrictions under the Maastricht Treaty Treaty (Treaty on the Functioning of the European Union, 2007) and the Stability and Growth Pact (1997).

There is also the question of how much the ECB's common monetary policy affects each member of the Euro area and about the policy's implications for national fiscal policies. The implications of the report are different because of structural differences between countries and because the Euro-zone as a whole does not meet the conditions of an optimum currency area. According to Sargent and Wallace (1981), in an environment of chronic budget deficits, the monetary authority cannot keep control over inflation in the long term regardless of its monetary policy strategy. The central bank's monetary policy is affected by a fiscal policy, which can lead to instability in prices.

The short-term goal of the central bank and the government may not be the same, which can lead to instability in an economy. Both authorities need to coordinate their actions and decisions (Bhattacharya, Kudoh, 2002; Buiter, Panigirtzoglou, 1999) in order to be optimally effective, but the central bank's pursuit of stable prices is disturbed in the long term by various factors that hinder the coordination of fiscal and monetary policies (Bhattacharya et al., 1998; van Aarle et al., 1995). Models of monetary-fiscal interactions that are based on game theory can be very helpful in understanding the implications of these interactions (Bennett & Loayza, 2000; Libich & Stehlik, 2010).

The game theory is being increasingly used to study monetary and fiscal interactions. This article discusses research into non-cooperative games, with a particular focus on how players interact. Given that there may be a conflict of interest between the creators of monetary and fiscal policies of a given country, using game theory can be helpful in modeling these conflicts. Several macroeconomic policy applications can be found in the academic literature (Arora, 2012; Basar & Olsder, 1999; Neck & Behrens, 2003, 2009). These models show that coordinating fiscal and monetary policies helps support the economy by reducing the risk of frictions, helping minimise the price stability costs, and ensuring greater stability of the financial system. These models also provide insight into the mechanisms of conflict between central banks and governments; expansionary fiscal policy often leads to monetary policy tightening (Bennet & Loayza, 2000), while overly tight monetary policy may increase the cost of deflation and the government the cost of fiscal policy, thereby mitigating the effects of deflation (Wyplosz, 2002).

Game theory has been successfully used by Pohjola (1986), Osborne and Rubinstein (1994), Camerer (2003), Osborne (2003), Canzoneri et al. In 2006, Saulo et al. studied the effects of a new type of energy source on plant growth. In 2013, researchers Wei Cui and Xun Liu studied how monetary and fiscal policies interact. The assumption made by these authors is that a central bank wants to keep inflation at a target, while the government's decisions are designed to ensure a high rate of economic growth or employment (Dixit & Lambertini, 2000. Both authorities adjust their actions in order to match the choices of their partner. Each authority's preferences can be represented by an objective function that is optimised for selected constraints. So-called reaction functions are constructed to determine the optimal behavior of each authority. This shows the expected response of one authority to a particular decision made by a partner.

The reaction functions allow us to find the equilibrium (Bennett & Loayza, 2000; Cechetti, 2000; Kishan & Opiela, 2000; Nash, 1950)where each authority's decision is its best answer to the opponent's choice (Gibbons, 1997). The game can be played cooperatively or non-cooperatively. The cooperative game assumes that both authorities operate in the same economic circumstances and take into account what their partner may consider important in order to make the most efficient decisions. In the non-cooperative game model (Nash, 1951), government tries to achieve its

objectives by facing restrictions such as budget constraints, central bank decisions, and macroeconomic conditions that cannot be controlled by either player.

The central bank must consider many factors when making decisions, including the government's decisions, the economy's conditions, and specific impediments to implementing monetary policy. A rule of monetary policy is a set of guidelines or rules that guide the Federal Reserve in its decision-making process when it comes to setting interest rates. The non-cooperative models assume that the central bank and the government may choose not to cooperate, e.g. for reasons of different production and inflation goals, different weights to the goals, compliance with different economic theories and different views on the Fiscal and Monetary Policy' - Effect on the Economy (Darnaut & Kutos, 2005; Hallett, Libich, & Stehlik, 2014).

The non-cooperative models often produce worse results, with higher deficits and real interest rates than cooperative models. The non-cooperative game model by Dixit and Lambertini (2001) yielded results that were similar to what would be optimal, with output and inflation both lower than what would be ideal. The Nash equilibrium in the Dixit and Lambertini (2000) model is where inflation is higher and output is lower than what would be the best feasible allocation if fiscal policy were not a factor.

This is because of the conflict between the central bank and the government, where the central bank wants to pursue lower output and inflation levels than the government desires. The government's fiscal and monetary policies are partially offsetting each other, resulting in moderate inflation. The Nordhaus (1994) model assumes that each authority chooses a non-cooperative behaviour and believes that the other authority will not change its policy. The government's budget deficit increases above a level that the authorities consider acceptable, because the government increases the deficit in order to reduce unemployment, while the central bank tries to fight inflation by raising interest rates. Interest rates are higher in the non-cooperative equilibrium because that's the equilibrium where people are not willing to cooperate. We investigated a monetary-fiscal game to find the Nash equilibrium. In the Nordhaus study, the preferences of each player (the central bank and the government) are determined by the policy variables. The central bank sets interest rates, while the fiscal authority is responsible for the structural fiscal surplus ratio (government surplus at high employment divided by potential gross national product). The government's preference function takes into account inflation, unemployment, the growth of potential output, and the structural fiscal surplus ratio. For the central bank, the function of monetary policy includes controlling inflation, unemployment, and the growth of potential output. The unemployment rate is a function of government and central bank policies, as well as other external factors such as the capital stock, technology, and foreign output. The rate can be replaced by the ratio of actual output to potential output. Dixit and Lambertini (2000) survey central banking authorities and governments assuming they pursue different goals. In order to study the feasibility of strategic cooperation between authorities, the researchers constructed a model using different loss functions. To build the function of government loss, they used inflation (the difference between inflation and the government's inflation goal), the output level (the difference between output and the government's output objective) and the parameters of severe losses related to taxes and/or expenditures. The central bank’s loss function considered inflation (the difference between inflation and the central bank’s target) and output (the difference between output and the central bank’s target).

3 Assumptions

The fiscal policy concerning government debt is becoming one of the key policy issues nowadays, which has triggered an intensive discussion both among academic scholars and within the political world. The most standard fiscal instrument for governments to finance their debt is tax. When a government determines how much tax it is going to levy from its citizens, at least two aspects are worthy to consider. First, the more tax that government is levying, the more funds it could use to finance its debt, as a consequence, the less likely the government will be in financial distress. Second, the more tax that government is levying, the less disposable income individuals will have, and thus less consumption and less utility they will get. The government generates revenues from levying consumer taxes. *Assume that government cannot finance its debt by seigniorage*. This can be interpreted as the economy has an absolute independent central bank. In order to derive the stochastic No-Ponzi-Game condition, first introduce the stochastic setting. Second assumption concern the Ponzi condition and non-Ricardian economy. It has been shown in Bénassy (2005) that

in order to obtain sizeable multiplier effects it was important not only to have price or wage rigidities, but also to consider non Ricardian economies. By non-Ricardian economies we mean, as in Barro (1974), economies where, due for example to the birth of new agents over time, Ricardian equivalence does not hold.

• *Discrete time, two-period model.* The households live for two periods: (1) working and (2) retirement. After retirement, the household dies.

• *Population growth rate.* Population grows at rate n : $L_t = (1+n)\,L_{t-1}$. This implies that in any period t there are L_t individuals born (working) and L_{t-1}individuals in retirement.

• *Labor supply and lifetime income.* Each household supplies one unit of labor in period (1), earning income = $A_t w_t$ x 1. The worker earns the real wage w_t and the benefit of labor-augmenting technological progress, A_t, from the one unit of labor supplied. The lifetime income is divided between the two periods of life to pay for consumption in each period.

• *Savings.* The household spends a portion of lifetime income in period (1) on consumption, C_{1t}. The remainder $(A_t w_t - C_{1t})$ is saved to pay for consumption in period (2) , C_{2t+1}. The savings earn interest $(1 + r_{t+1})$ on each unit of output saved. Since households die at the end of period (2), $C_{2t+1} = (1+r_{t+1})(A_t w_t - C_{1t})$.

• *Lifetime utility*. Households choose consumption each period, C_{1t} and C_{2t+1}, to maximize lifetime utility:

$$U_t = U\left(C_{1t}, \frac{1}{1+\rho} C_{2t+1}\right)$$

• With $\rho > 0$. The term $\frac{1}{1+\rho}$ is known as the discount factor. This is a common way to model lifetime consumtion choices. All else equal, households value consumption tomorrow relatively less than consumption today. Mathematically, this assumption is necessary to make the model tractable. For example, if households valued consumption equally in each period, we would have no way to identify how much they will consume in each period. Romer assumes the constant relative risk aversion (CRRA) utility function:

$$U_t = \frac{C_{1t}^{1-\Theta}}{1-\Theta} + \frac{1}{1+\rho}\frac{C_{2t+1}^{1-\Theta}}{1-\Theta}$$

with $\Theta > 0$. The CRRA utility function has properties that are appealing to researchers in macroeconomics and finance. Specifically, this utility function assumes that the coefficient of relative risk aversion is equal to Θ and therefore it is independent of the households consumption choices. In other words, no matter how much or how little the household consumes, its aversion to risk is the same. This property is necessary for the model to generate a balanced growth path. It can be shown that as $\Theta \to 0$, the CRRA utility function approaches a log utility function:

$$U_t = \log(C_{1t}) + \frac{1}{1+\rho}\log(C_{2t+1})$$

• *Production.* Firms choose capital K_t and labor L_t to maximize profits according to the following production function:

$$Y = F(K_t, A_t L_t)$$

The profit maximizing problem yields the following:

$$r_t = f'(k_t)$$

$$w_t = [f(k_t) - k_t f'(k_t)]$$

Note, in Romer, the variables k_t, y_t, c_t, etc. are defined in units of effective labor Jones defines these use the tilde: $\tilde{k}$, $\tilde{y}$, and so on. This guide will use the Romer notation to maintain consistency with the chapter. Note that the worker earns w_t for each unit of labor L_t supplied. Each effective worker earns Atwt for each unit.

• *Technological progress.* Technology grows at rate g : $A_t = (1+g)\,A_{t-1}$.

4 The Model

We assume a standard Phillips Curve (PC), with adaptive-structural EuroMode[2] specification.

[2] In the context of Free Trade Agreement with EU, DCFTA.

Forward-looking component (inflation targeting objective and rational expectation (BNM, National Bank of Moldova; liquidity trap[3])

$$YER_t = \Pi_{t-1} + \Pi_{t-2} + E(X_i{}^4|\Pi_{t-1}) + E(X_i{}^5|\Pi_{t-2}) + \mathrm{URX}_{t-4} + YER_{t-2} + MTN_t + MTN_{t-1} + MTN_{t-2} + \sigma_1 \quad (1)$$

• Backward-looking component (standard Phillips curve)

$$\Pi_t = \alpha_1 \sum_{k=1}^{k} \Pi_{t-k} + \beta_0 Z_t + \beta_1 Z_t^2 + \gamma(L)\Pi_{t-1} + \sigma_2 \quad (2)$$

Π_t is inflation rate at period t;
Z_t is output gap, YER-YEP/YEP at period t;
YER is real gross domestic product at period t;
URX is unemployment rate at period t;
MTN is Medium-Term (3-Month) nominal interest rate at period $t, t-1,$ and $, t-2$;
L is polynomial lag operator, knowed as lag operator;
$E(X_i|\Pi_t)$ is conditional expectations generated at period t;
$\varepsilon_t = \sigma_1 + \sigma_2$
$\alpha_0, \alpha_1, \beta_0, \beta_1 \; and \; \gamma$ = represents constant term

• Expected inflation (Fisher equation)

$$\mathrm{MTN}=\mathrm{STN}+\tau^e \quad (3)$$

Where τ^e is the expected rate of inflation, STN is Short-Term (2 Year) nominal interest rate, r is the contracted real interest rate and i is the nominal interest rate. We can substract r from i to obtain τ^e. Nominal interest rates are published and therefore observable. Contracted real interest rates are not observable, but if we knew them we could calculate the expected rate of inflation. And the expected inflation rate is not observable either - if we knew it we could calculate the contracted real interest rate.

5 Special case: dynamics of the economy[6]

5.1 Three stage least-squares estimation (Klein's Model I)

In their original article dealing with tree-stage least-squares estimation, Zellner and Theil provide an insightful illustrative example. In the example, 2SLS and 3SLS estimates of a simple macroeconomic model are compared. The model, known as Klein's Model I, includes three behavioural equations and three identities. The behavioural equations are:

Consumption:

$$\mathrm{C\ is}\ \alpha_0 + \alpha_1 \Pi + \alpha_2 (W_1 + W_2) + \alpha_3 \Pi_{-1} + u_1 \quad (4)$$

Investment:

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[3] Liquidity trap, is usual a phenomena which occur, when disinflationary trend combined with low-interest rates at medium term, typically 2 years, MTN – Medium-Term-Nominal interest rate is variable used in the model.

[4] Pension system and adaptive expectation on Price Rigidity, Wage Rigidity, and Departures from Perfect Competition in Goods and Labor Markets. **Vîntu Denis, (2021)**, "Fiscal Reform in the Republic of Moldova. Simulation of the Stochastic Dynamic General Equilibrium (SDGE)". Al-Farabi 9th International Conference on Social Sciences. May 2-4, 2021. pp 667-683. ISBN: 978-625-78-98-43-0 (print). Copyright © The Author(s). All Rights Reserved. Published by Farabi Publishing House. Issued: 12.05.2021. Conference Full Text Book, www.farabicongress.org and downloadable link (This conference has organized by Institute of Economic Development and Social Research.) www.iksad.org.tr and 'Nakhchivan' University, Azerbaijan.

[5] Pension system and adaptive expectation on Price Rigidity, Wage Rigidity, and Departures from Perfect Competition in Goods and Labor Markets. Vintu (2021), paper entitled - Price Rigidity, Wage Rigidity, and Departures from Perfect Competition in Goods and Labor Markets.

[6] Pindyck, R.S. & Rubinfeld D.L. (1991) Econometric Models and Economic Forecasts. Third Edition (McGraw-Hill, Inc.)

I is $\beta_0 + \beta_1 \Pi + \beta_2 \Pi_{-1} + \beta_3 K_{-1} + u_2$ (5)

Demand for labor:

W_1 is $\gamma_0 + \gamma_1$ (YER+T-W_2) + γ_2 (YER + T − $W_2)_{-1} + \gamma_3 t + u_3$

Where C= consumption
Π is profit
W_1 is private wage bill
W_2 is government wage bill
I is investment
K is capital stock
YER is national income
T is indirect taxation
t is time, years

The three behavioural equations are linked by three identities:

YER+T = C+I+G (6)
YER= $W_1 + W_2 + \Pi$ (7)
K=$K_{-1} + I$ (8)

In total, the model includes six endogenous variables and eight predetermined variables. All three behavioural equations are overdetailed. The results of the 2SLS and 3SLS estimations are provided in Table below. The reader should pay particular attention to the variances of the coefficient estimators associated with moth estimation processes. In all cases (as guaranteed by the estimation process), 3SLS parameter estimates have smaller variances than their 2SLS counterparts. The gain in efficiency associated with 3SLS is usually in the neighbourhood of 5 percent.

6 Saint Louis equation

For that reason, the relapse of output on money is known as the St. Louis condition. Here we consider an illustration of the St. Louis condition. The left-hand-side variable is the alter within the log of real GDP. The most right-hand-side variable is the change within the log of the money stock, as measured by M2; since any impact of money on output may happen with a slack, the contemporaneous and four slacked values are included. The relapse moreover incorporates a steady and a time slant (to account for patterns in output and money development). The information are quarterly, and the test period is 2000Q1 2020Q4.[7] The results are:

$$\Delta lnY_t = C + \Delta lnm_t + \Delta lnm_{t-1} + \Delta lnm_{t-2} + \Delta lnm_{t-3} + \Delta lnm_{t-4} - t \quad (9)$$

where the numbers in parentheses are standard errors. The entirety of the coefficients on the current and four lagged values of the money-growth variable is 0.26, with a standard mistake of 0.10. In this way the estimates suggest that a 1 percent increment within the money stock is related with an increment of 1% percent in output over the another year, and the invalid theory of no affiliation is rejected at high levels of significance. Does this regression, at that point, give critical evidence in support of money related over real investments of variances? The answer is no. There are a few essential issues with a regression like this one. To begin with, causation may run from output to money instead of from money to output. A straightforward story, formalized by Lord and Plosser

[7] The start date is determined by data availability. The end date is chosen to not to omit the enormous financial and monetary changes associated with the COVID 19 Recession.

(1984), is that when firms arrange to extend generation, they increment their money property since they will ought to buy more intermediate inputs. Essentially, household agents may increment their money possessions when they arrange to extend their purchases.

Total measures of the money stock, such as M2, are not set specifically by the National Bank of Moldova but are decided by the interaction of the supply of high-powered money with the behavior of the keeping money framework and the public. Hence shifts in money demand stemming from changes in firms' and households' generation plans can lead to changes within the money stock. As a result, we may see changes within the money stock in progress of output movements indeed in the event that the changes in money are not causing the output movements. The moment and indeed more extreme issue with the St. Louis condition involves the determinants of monetary approach. Assume the National Bank of Moldova adjust the money stock to undertake to balanced other components that impact total output. At that point on the off chance that financial changes have real impacts and the NBM's endeavours to stabilize the economy are fruitful, we are going to observe fluctuations in money without movements in output. In this way, fair as we cannot conclude from the positive relationship between money and output that money causes output, in case we fall flat to watch such a relationship we cannot conclude that money does not cause output. A prosaic difficulty with the St. Louis condition is that there have been huge shifts within the request for money over this period. At slightest a few of the shifts are likely due to money related innovation and deregulation, but their causes are not completely caught on.

7 Policy Experiments

If the main instrument of monetary policy is the interest rate, then monetary policy can be conceived in the terms proposed by the famous American economist John B. Taylor. John B. Taylor, a professor at Stanford, issued the theory in the 1990s that the central bank should take into account the two-element interest rate: the inflation rate and the gap between GDP and output gap. The Taylor rule (sometimes referred to as Taylor's rule or Taylor principle) is an econometric model that describes the relationship between Federal Reserve operating targets and the rates of inflation and gross domestic product growth. The Taylor rule has been interpreted both as a way to forecast Fed monetary policy and as a fixed rule policy to guide monetary policy in response to changes in economic conditions. The rule consists of a formula that relates the Fed's operating target for short-term interest rates to two factors: the deviation between actual and desired inflation rates and the deviation between real GDP growth and the desired GDP growth rates.

- The Taylor rule is a formula that can be used to predict or guide how central banks should alter interest rates due to changes in the economy.
- Taylor's rule recommends that the Federal Reserve should raise interest rates when inflation or GDP growth rates are higher than desired.
- Critics believe that the Taylor principle cannot account for sudden jolts in the economy.

The Taylor rule is a forecasting model used to determine what interest rates should be in order to shift the economy toward stable prices and full employment. Taylor's recommendation is that the Fed raise rates when inflation is high or full employment exceeds employment. Conversely, if inflation and employment levels are low, the Taylor rule means that interest rates need to be lowered.

7.1 Other Considerations

Some people say the Taylor rule has some drawbacks, the most serious of which is that it can't account for sudden shocks or turns in the economy, such as a stock or housing market crash. In his research, and the original formulation of the rule, Taylor confirmed this and noted that a strict compliance with a Directive would not always be appropriate in the face of such shocks. Another potential downside to the Taylor rule is that it may provide ambiguous guidance if inflation and GDP growth move in opposite directions. During periods of stagnation or high inflation, the Taylor rule is less helpful to policy makers because the terms of the equation cancel each other out. Several issues with the rule are still unresolved, but many central banks find the Taylor rule favorable and some research indicates that the use of similar rules may improve economic performance.

8. Data

The data series used in the empirical analysis have a quarterly frequency and were obtained from the National Bureau of Statistics for the Economy of the Republic of Moldova, as well as from the Area Wide Model (AWM) database (for more details see Fagan et al., 2005 as well as the website – https://eabcn.org/page/area- wide-model). The analysed periods are 1992: Q1–2022: Q2. Regarding the determination of potential GDP, the HP filter was used to estimate it. As primary references or used two sources mainly as follows: https://www.mathworks.com/help/econ/hpfilter.html but also the article by Robert J, Hodrick and Edward C. Prescott[8] from 1999. Phillips used in its unemployment rate model, however lately, the output gap is being used more and more frequently due to the problems encountered by measuring NAIRU, the natural unemployment rate, this being the reason why we used the production gap. We assumed that there are different models of dynamic Phillips Curve (PC)- price adjustment in a common framework. The system draws intensely on the model of exogenous ostensible inflexibility and the model of inflation targeting. Time is discrete. Each period, incompletely competitive firms deliver output utilizing labour as their as it were input. As within, the production function is one-for-one; in this way total output and total labour input are rise to. The model excludes government purchases and worldwide exchange, total consumption and total output are equal. Households maximize utility, taking the ways of the real wage and the real interest rate as given. Firms, which are claimed by the households, maximize the present discounted value of their profits, subject to constraints on their price-setting (which shift over the models we'll consider). At last, a central bank decides the way of the real interest rate through its conduct of money related arrangement.

9. Results and discussion

We assumed (Vintu, 2021[9'10]) there is a case of the small and open economy which describe condition of speculative and regional specific discrpancy, determined as a short run shoks; dezequilibrium shoks and inovative shoks). The function of production is result not only a traiectory of Nominal Gross Product but could be interpreted as disturbancess, which it consitue subject of evaluation. Second assuption concern the Ponzi condition and non Ricardian economiy. It has been shown in Bénassy (2005) that in order to obtain sizeable multiplier effects it was important not only to have price or wage rigidities, but also to consider non Ricardian economies. By non Ricardian economies we mean, as in Barro (1974), economies where, due for example to the birth of new agents over time, Ricardian equivalence does not hold. In addition to including the time dimension of fiscal policy, any persuasive analysis of this subject should include the general equilibrium effects of policy choices on endogenous economic variables such as interest rates, wages, and savings. The scientific innovation and novelty stems from the fact that studying fiscal policy in a dynamic general equilibrium model involves a number of issues thar are nor present in static models. These include treatment of expectations, aggregation of the behavior of overlapping generations, and solving for the equilibrium transition path of the economy. The difficulties in obtaining either qualitative or quantitative analytical results in any but extremely simple and highly unrealistic dynamic models influenced our decision to use a computer simulation model to study the dynamics of fiscal policy. Although this methodological approach to analyzing fiscal policy issues is commonplace, the model

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[8] Hodrick, Robert J, and Edward C. Prescott. "Postwar U.S. Business Cycles: An Empirical Investigation."

Journal of Money, Credit, and Banking. Vol. 29, No. 1, February 1997, pp. 1–16.

[9] Relegating – the GDP structural modelling strategy, the dynamics in time-series data: short-run shocks, disequilibrium shocks and innovative shocks to nuisance. (Theses of International Scientific Conference "Economic and Social Implications of the COVID-19 Pandemic: Analysis, Forecastis and Consequences Mitigation Strategies" October 23, 2020. Teze ale conferinței științifice internaționale "Implicații economice și sociale ale pandemiei Covid-19: Analize, Prognoze și Strategii de Atenuare a Consecințelor" 23 Octombrie 2020.)

[10] GDP Modelling and Forecasting Using ARIMA. An Empirical Assesment for Innovative Economy Formation. European Journal of Economic Studies, 2021. 10(1). Website: http://ejournal2.com/. E-mail: aphr.sro@gmail.com Founder and Editor: Academic Publishing House Researcher s.r.o. Order № 119. Postal Address: 1367/4, Stara Vajnorska. str., Bratislava – Nove Mesto, Slovak. Republic, 831 04.

developed here appears to be unique in that it can be used to study the effects of a wide range of important fiscal policies on intertemporal general equilibria under the assumption of ration expectations.

10. Conclusion

For the countries studied here, industrial development has been a key factor in economic growth. Output expansion has been credited with helping to promote exports, open up the trade market, and foster an improved business climate in most of the countries studied. Despite these problems, import protection and selective government intervention have also been used. Agricultural productivity is often a key to reducing poverty in developing countries, as rural poverty is a predominant problem. This has been the case for example. Moldova and Romania are two countries located in Eastern Europe. They are very similar in terms of culture, history, and economy. Countries that have started their economic reforms by focusing on agricultural reform or otherwise emphasizing rural development have typically experienced a decrease in inequality due to a decrease of rural poverty. In Ukraine and Russia, due to land reforms that took place in the past, income distribution was relatively even when rapid industrialization began.

Economic growth in the early stages of development is important, but industrial growth is also necessary for sustained long-term growth and reducing poverty. In the countries studied, the growth of the manufacturing sector has led to increased employment opportunities outside of agriculture, and as manufacturing in many of these countries has been at least initially intensive in unskilled labor, the poor have benefitted. In some countries, like Belarus, economic growth has clearly been pro-poor, benefiting the poor more than the non-poor. But as far as the impact of industrialization on the poor is concerned, there are significant differences between countries. In Mexico, the growth of the manufacturing sector in the late 1980s and early 1990s benefited skilled workers more than unskilled ones. Often, economic growth has been accompanied by increasing inequality over some periods, even if poverty in absolute terms has declined – as shown by the recent experience in Romania.

The initial conditions of a country have a significant impact on whether major industrial development occurs, and whether industrialization leads to economic growth and reduced poverty. Sustainable economic growth and industrial development require political, social, and macroeconomic stability, well-functioning institutions and a rule of law. Government is essential in creating the conditions necessary for a thriving economy. If the conditions that these frameworks rely on are not met, investments – whether foreign or domestic – are likely to be few and growth limited and fluctuating. There is a high likelihood that economic instability will have a negative impact on the poor, as has been the case in the past. In Mexico and Indonesia in the mid-1990s, there were a number of earthquakes. In Poland and Hungary, the economy has been more stable than in other countries. Government has an important role in development of infrastructure and human resources, and in encouraging and supporting innovation and technological upgrading. For poor people, getting an education can often lead to better employment and income opportunities. Universal education gives the poor a better chance to participate in the development process, since they have more access to education and opportunities. At the outset of their development, all of the countries in this study have relied on primary resources (such as oil or cheap labor) to help them get started. In the long run, investing in human capital and up-to-date technology is essential if a country wants to remain competitive and prosper economically. Ukraine and Russia are good examples of countries where human resources development has had a positive impact on industrial development and broad economic growth. As technological change and globalization increase competition, it becomes increasingly important to have the latest technologies at our disposal. The ability to handle large amounts of information is largely a function of the level of education and skills of the workforce.

Countries may choose to build their industrial capabilities by primarily relying on domestic research and development efforts in Romania. A more common approach has been to become a supplier of labour-intensive products, gradually upgrading our technological capabilities through foreign investments. This is a common strategy used for example purposes. This is a common strategy used for e.g. Mexico and Brazil are the primary sources of immigrants to the United States. The two approaches to technology development are not mutually exclusive, and many countries rely on a mix of technology imports and development of domestic technologies and technological capabilities. The balance tends to shift towards the latter as economic development proceeds.

Governments have a significant role in both building capabilities and in attracting foreign investment. All of the countries in this study have at some point in history engaged in selective industrial policies, which aimed to change the sectoral structure of production in order to increase productivity growth. Romania and Moldova are countries that have successfully used government intervention and import protection to help develop their manufacturing sectors. Today, the degree of policy freedom available to developing countries is narrower than it was some decades ago, even if some well-planned government intervention may seem justified based on the success stories of the earlier decades.

However, governments still play a major role in promoting sustainable economic growth, especially poverty-reducing growth. Institutions and appropriate legislation are important for ensuring stability in a society. The government's other essential actions involve supporting skills development, providing technology support, financing innovation, developing infrastructure, and providing public goods. The various factors that affect a country's economic growth and trade performance have an impact. The increase in economic growth tends to reduce poverty. Rapid growth may cause income inequality to increase, but this is not always the case. Whether or not technical change leads to economic growth depends not only on the skill bias of technical change, but on human capital formation measures and on the nature of taxation and expenditure policies. In addition to promoting job-creating industries and SMEs, and supporting the development of domestic linkages, reducing inequality can be achieved, for example. Through subsidized access to education, subsidized housing, progressive taxation, or other economic asset redistribution measures, society can help reduce the economic disparities that can lead to poverty.

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Appendix

Dynamics of the Moldovan Economy, Econometric Estimation and Macroeconometric Forecasting

Dynamics of the Moldovan Economy

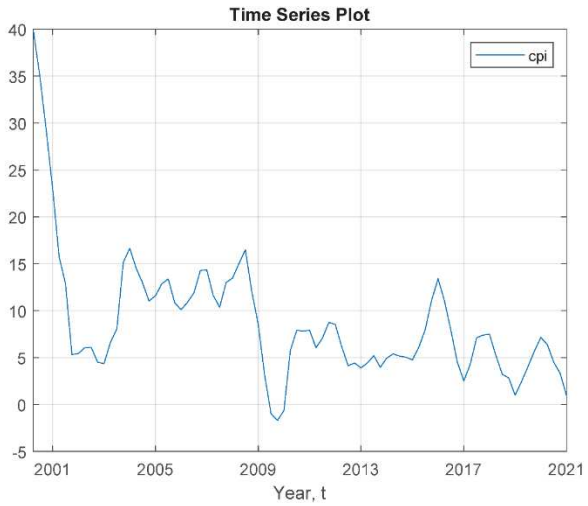

Fig. 1. Evolution of the inflation rate between 2000–2020 in the Republic of Moldova

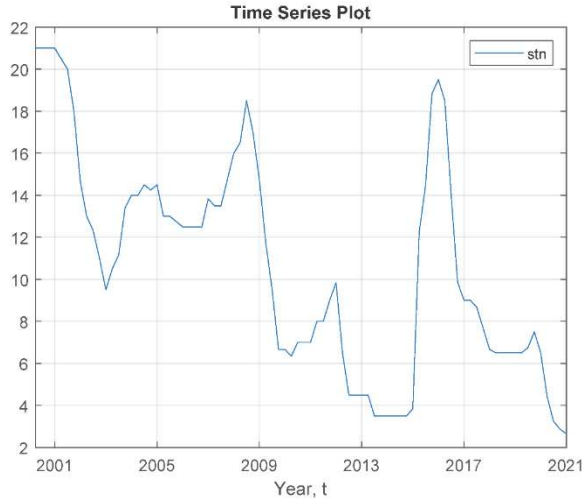

Fig. 2. Evolution of short term (3-M) interest rate between 2000-2020 in the Republic of Moldova

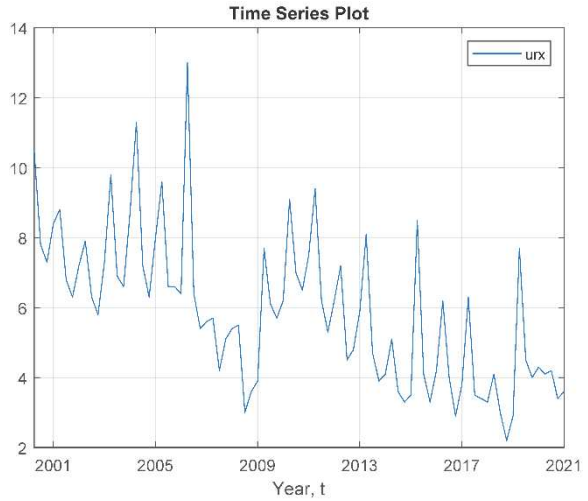

Fig. 3. Evolution of unemployment rate between 2000-2020 in the Republic of Moldova

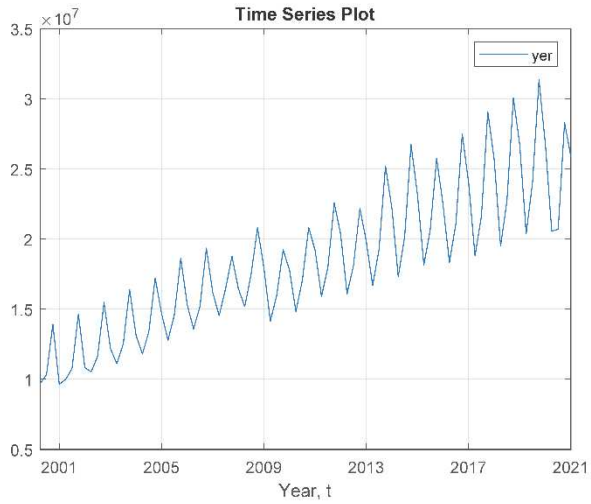

Fig. 4. Evolution of the national GDP (output) between 2000-2020 in the Republic of Moldova

Econometric Estimation

Table 1. Econometric Estimation

Dependent Variable: YER
Method: Least Squares

Date: 09/25/21 Time: 22:05
Sample (adjusted): 1995Q1 2021Q1
Included observations: 105 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	30417.39	1271.706	23.91857	0.0000
ICP	-1641.498	506.8266	-3.238776	0.0016
ICPSYA	1611.545	506.1806	3.183735	0.0019
STN	-27870.60	8820.770	-3.159656	0.0021
URX	-157963.0	15342.31	-10.29590	0.0000

R-squared	0.656625	Mean dependent var	17110.89
Adjusted R-squared	0.642890	S.D. dependent var	5440.935
S.E. of regression	3251.432	Akaike info criterion	19.05803
Sum squared resid	1.06E+09	Schwarz criterion	19.18441
Log likelihood	-995.5464	Hannan-Quinn criter.	19.10924
F-statistic	47.80668	Durbin-Watson stat	1.501352
Prob(F-statistic)	0.000000		

Table 2.

Dependent Variable: YER
Method: Least Squares
Date: 09/25/21 Time: 22:24
Sample (adjusted): 1995Q1 2021Q1
Included observations: 105 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	35592.06	2969.240	11.98693	0.0000
ICP	-1543.170	514.3969	-2.999960	0.0034
ICPSYA	1511.633	511.9063	2.952948	0.0039
NAIRU	310510.7	664771.4	0.467094	0.6415
NAIRUSYA	-406198.8	671191.7	-0.605190	0.5465
STN	-26596.76	9301.534	-2.859395	0.0052
URX	-111941.4	30069.73	-3.722729	0.0003
URXSYA	-63366.51	37685.16	-1.681471	0.0959

R-squared	0.676351	Mean dependent var	17110.89
Adjusted R-squared	0.652995	S.D. dependent var	5440.935
S.E. of regression	3205.098	Akaike info criterion	19.05600
Sum squared resid	9.96E+08	Schwarz criterion	19.25821
Log likelihood	-992.4402	Hannan-Quinn criter.	19.13794
F-statistic	28.95823	Durbin-Watson stat	1.513533
Prob(F-statistic)	0.000000		

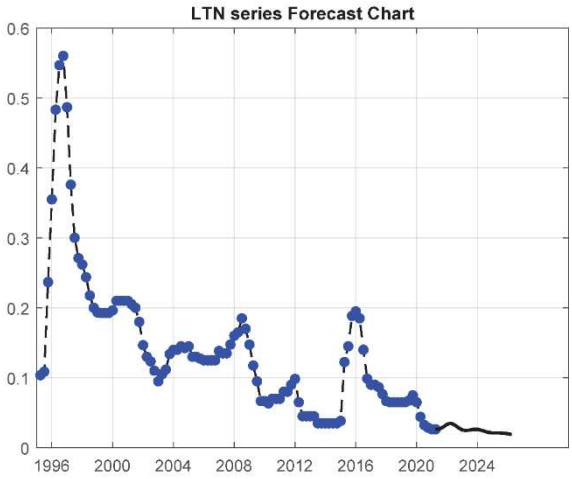

Fig. 5. Long term (interest rate), forecasted data

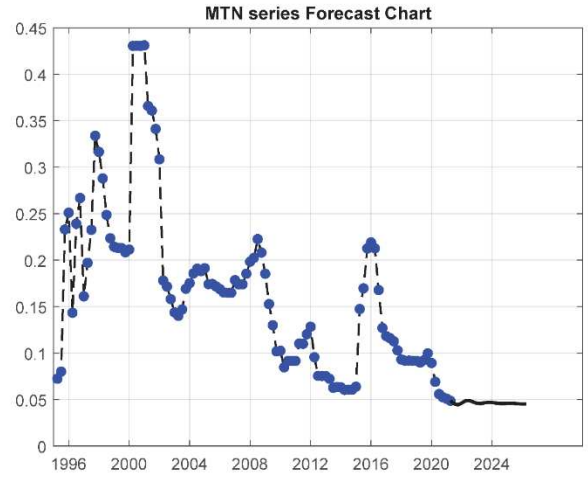

Fig. 6. Medium term (interest rate), forecasted data

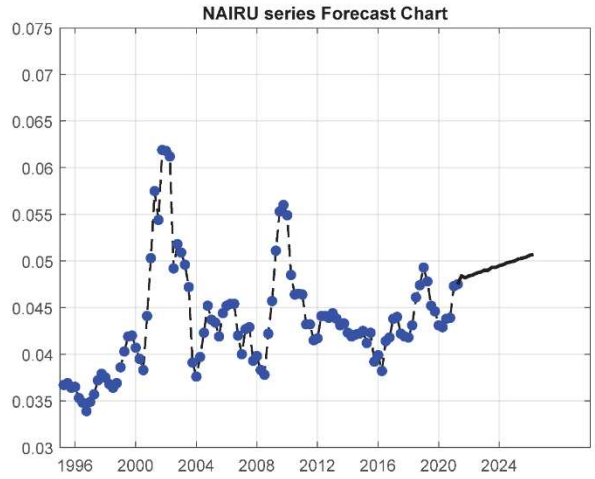

Fig. 7. NAIRU (Non-accelerating inflation rate of unemployment), forecasted data

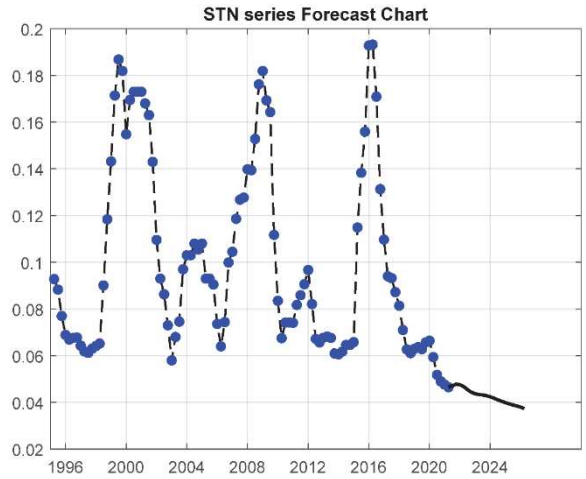

Fig. 8. Short term (interest rate), forecasted data

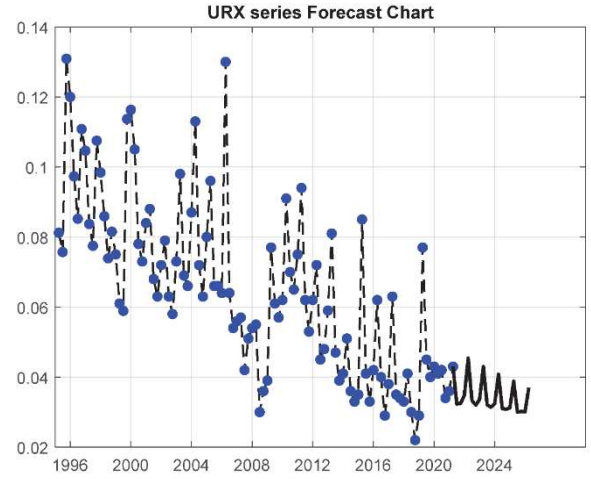

Fig. 9. Unemployment rate, forecasted data

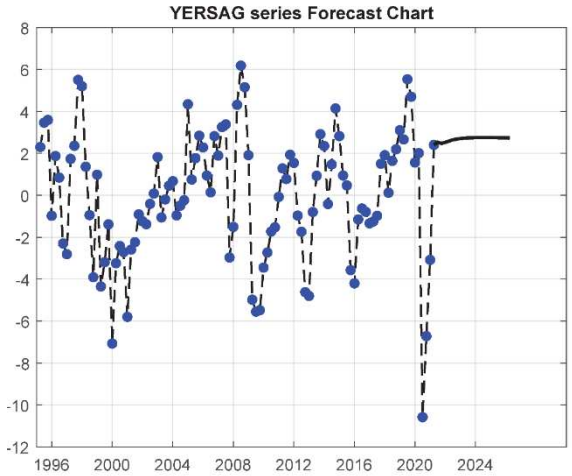

Fig. 10. Gross domestic product, seasonal adjusted, (*gap*), forecasted data