# MODELING THE DYNAMIC EQUILIBRIUM UNDER THE POLICY OF ADJUSTING THE INTEREST RATE AND TAYLOR'S RULE OF NATIONAL BANK OF MOLDOVA (NBM)

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**Abstract**

*This article describe an IS-LM model in historical Timbergen persepctive. Each graphs tries to answer the main questions regarding the monetary policiry rule in the Republic of Moldova in the last three decades. The main model doesnt include Balance of PAyment and it should be consider a lack in perspecive of assymetric shoks and information assymetry. Also, the model doesn't responde if a Taylor rule is Pareto optimal for actual path of decision-making. In addition it should be consider that the model is partily a time-manner since of Rational Expectations equation is a not a constraint rather to be an inflation targeting, submodel as in the traiectory of the author's research goal. At the end, it could be relevant to describe the model framework in a New Keynesian approach.*

*The two past a long time of COVID-19 suggestions determined the capitalist showcase economies of the world through repetitive periods of energetic patterns. At the begin of the show decade the development rate of genuine GDP per capita turned negative in all of the three biggest Eastern European Economies: Russia, Ukraine and Romania. We concludes that that various disarrays distinguishing with the course of action of techniques utilized by Money related Arrangement in a particular space of ponder money related factors and parameters can reexamine expected time-arrangement and/or instability in terms of demonstrate blunders.*

**Keywords:** *IS-LM model; dynamic general equilibrium (DGE); Monetary Policy, Policy Design and Consistency; discrete regression; prices; econometric methods*

**JEL Classification: C13; E44; E41; E21**

## 1. Introduction

Economic activity today depends crucially on expected economic conditions tomorrow. The other branch of macroeconomic policy besides monetary policy is fiscal policy. From the perspective of macroeconomics, fiscal policy is concerned with the overall levels and broad composition of taxes and government spending and their effects on the aggregate economy. Many important issues in the macroeconomics of fiscal policy involve its short-run impact on the economy and its potential role in stabilization policy. There is considerable agreement that because of the political barriers to timely and sound fiscal policy actions, it is usually best to leave stabilization to monetary policy. But when the shocks hitting the economy are sufficiently long-lasting and, especially, when monetary policy is constrained by the zero lower bound, there is clearly a case for using fiscal policy. As a result, the financial and macroeconomic crisis that began in 2019 led to widespread fiscal actions for stabilization. For example, almost every major advanced country enacted discretionary fiscal stimulus in 2020 and 2021.

The crisis also led to renewed interest among economists in the use of fiscal policy for stabilization. Many questions that are important to monetary policy carry over to fiscal policy as a tool for stabilization. For example, the issue of whether there are substantial benefits to stabilization policy and the possibility that the importance of inflation expectations makes optimal stabilization policy dynamically inconsistent are just as relevant to fiscal policy as to monetary policy. One critical aspect of stabilization policy where fiscal policy clearly must be studied separately from monetary policy is the effects of policy. There has been an explosion of work in this area in recent years, much of it motivated by the financial and macroeconomic crisis. Some of it focuses on aggregate evidence, some examines regional evidence, and some

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considers individual-level evidence. The general consensus is that fiscal policy works in the expected direction: reductions in taxes and increases in government spending raise output in the short run. Moreover, for the most part the magnitudes of the estimated effects are substantial. However, once one turns to narrower questions, such as whether there are important differences in the effects of different types of fiscal policy actions (for example, spending versus taxes or one type of spending versus another), or whether the effects depend strongly on the state of the economy, there is much more uncertainty and room for further research. Another major set of issues in the macroeconomics of fiscal policy concern the overall features of the tax system and their long-run impact on the economy. Examples of important questions here include the long-run effects of the level of taxes on the level or growth rate of aggregate output, and whether the overall composition of taxes among those on labor income, capital income, and consumption has important effects on output and welfare. Because the range of subjects that fall under the macroeconomics of fiscal policy is so broad, and because many of the issues related to fiscal policy as a tool for stabilization are so closely related to ones involving monetary policy, this chapter does not try to be comprehensive. Instead, it takes a narrower focus, largely concentrating on the sources of deficits that is, of the difference between the government's overall spending and its overall revenues. The model's basic idea is that because taxes distort individuals' choices and since those distortions rise more than proportionally with the tax rate, steady moderate tax rates are preferable to alternating periods of high and low tax rates. As we will see, this theory provides an appealing explanation for such phenomena as governments' reliance on deficits to finance wars.

The tax-smoothing model is normatively appealing, but from a positive perspective it has a major limitation: it does not appear to be consistent with large persistent deficits or with the pursuit of fiscal policies that are unlikely to be sustainable. Yet these appear to be common. For example, the U.S. federal government has run large budget deficits almost without interruption since the early 1980s. Furthermore, in the absence of major policy changes, increases in social security and health care spending are likely to lead to exploding levels of the deficit and the stock of debt within a few decades. Many other advanced countries have run persistently large budget deficits in recent decades and face similar long-term budgetary challenges. And in many developing countries, large, persistent deficits have led to hyperinflation, default, or a debt crisis.

This apparent deficit bias is a major reason that economists are particularly interested in the sources of deficits. Much of the analysis is therefore devoted to possible reasons that there could be a systematic tendency for the political process to produce excessive deficits.

**2. Literature Review**

Understanding the costs of inflation is a significant challenge. In many models, steady inflation just adds an equal amount to the growth rate of all prices and wages and to nominal interest rates on all assets. As a result, it has few easily identifiable costs.

The cost of inflation that is easiest to identify arises from the fact that, since the nominal return on high-powered money is fixed at zero, higher inflation causes people to exert more effort to reduce their holdings of high-powered money. For example, they make smaller and more frequent conversions of interest-bearing assets into currency. Since high-powered money is essentially costless to produce, these efforts have no social benefit, and so they represent a cost of inflation. They could be eliminated if inflation were chosen so that the nominal interest rate and hence the opportunity cost of holding money was zero. Since real interest rates are typically modestly positive, this requires slight deflation.5

A second readily identifiable cost of inflation comes from the fact that individual prices are not adjusted continuously. As a result, even steady inflation causes variations in relative prices as different firms adjust their prices at different times. These relative-price variations

have no counterpart in social costs and benefits, and so cause misallocations. Likewise, the resources that firms devote to changing their prices to keep up with inflation represent costs of inflation. Under natural assumptions about the distribution of relative-price shocks, spurious movements in relative prices and the resources devoted to price adjustment are minimized with zero inflation. The last cost of inflation that can be identified easily is that it distorts the tax system (see, for example, Feldstein, 1997). In most countries, income from capital gains and interest, and deductions for interest expenses and depreciation, are computed in nominal terms. As a result, inflation can have large effects on incentives for investment and saving. In the United States, the net effect of inflation through these various channels is to raise the effective tax rate on capital income substantially. In addition, inflation can significantly alter the relative attractiveness of different kinds of investment.

For example, since the services from owner-occupied housing are generally not taxed and the income generated by ordinary business capital is, even without inflation the tax system encourages investment in owner-occupied housing relative to business capital. The fact that mortgage interest payments are deductible from income causes inflation to exacerbate this distortion.

Unfortunately, none of these costs can explain the strong aversion to inflation among policymakers and the public. The shoe-leather costs associated with more frequent conversions of interest-bearing assets into high-powered money are surely small for almost all inflation rates observed in practice.

Even if the price level is doubling each month, money is losing value only at a rate of a few percent per day. Thus even in this case individuals will not incur extreme costs to reduce their money holdings. Similarly, because the costs of price adjustment and indexation are almost certainly small, both the costs of adjusting prices to keep up with inflation and the direct distortions caused by inflation-induced relative price variability are likely to be small. Moreover, Nakamura, Steinsson, Sun, and Villar (2017) find that relative-price variability that is unrelated to fundamentals appears to have been no larger in the late 1970s, when inflation was close to 10 percent, than it was in the decades after the Volcker disinflation brought inflation down to much lower levels. These results suggest that this potential cost of inflation is not important over the relevant range. Finally, although the costs of inflation through tax distortions may be large, these costs are quite specific and can be overcome through indexation of the tax system. Yet the dislike of inflation seems much deeper.

Economists have therefore devoted considerable effort to investigating whether inflation might have important costs through less straightforward channels. Those costs could arise from steady, anticipated inflation, or from a link between the level of inflation and its variability.

In the case of steady inflation, there are three leading candidates for large costs of inflation. The first involves the inflation-induced relative-price variability described above. Okun (1975) and Carlton (1982) argue informally that although this variability has only small effects in relatively Walrasian markets, it can significantly disrupt markets where buyers and sellers form long-term relationships. For example, it can make it harder for potential customers to decide whether to enter a long-term relationship, or for the parties to a long-term relationship to check the fairness of the price they are trading at by comparing it with other prices. Formal models suggest that inflation can have complicated effects on market structure, long-term relationships, and efficiency (for example, Bénabou, 1992, and Tommasi, 1994). This literature has not reached any consensus about the effects of inflation, but it does suggest some ways that inflation may have substantial costs.

Second, individuals and firms may have trouble accounting for inflation (Modigliani and Cohn, 1979; Hall, 1984). Ten percent annual inflation causes the price level to rise by a factor of 45 in 40 years; even 3 percent inflation causes it to triple over that period. As a result, inflation can cause households and firms, which typically do their financial planning in

nominal terms, to make large errors in saving for their retirement, in assessing the real burdens of mortgages, or in making long-term investments.

Third, steady inflation may be costly not because of any real effects, but simply because people dislike it. People relate to their economic environment in terms of dollar values. They may therefore find large changes in dollar prices and wages disturbing even if the changes have no consequences for their real incomes. In Okun's (1975) analogy, a switch to a policy of reducing the length of the mile by a fixed amount each year might have few effects on real decisions, but might nonetheless cause considerable unhappiness. And indeed, Shiller (1997) reports survey evidence suggesting that people intensely dislike inflation for reasons other than the economic effects catalogued above. Since the ultimate goal of policy is presumably the public's well-being, such effects of inflation represent genuine costs.6

The other possible sources of large costs of inflation stem from its potential impact on inflation variability. Inflation is more variable and less predictable when it is higher (for example, Ball and Cecchetti, 1990). One way this association could arise is through an effect of inflation on policy. When inflation is low, there is a consensus that it should be kept low, and so inflation is steady and predictable. When inflation is moderate or high, however, there is disagreement about the importance of reducing it; indeed, the costs of slightly greater inflation may appear small. As a result, inflation is variable and difficult to predict.

If this argument is correct, the relationship between the mean and the variance of inflation represents a true effect of the mean on the variance. This implies three potentially important additional costs of inflation. First, since many assets are denominated in nominal terms, unanticipated changes in inflation redistribute wealth. Thus greater inflation variability increases uncertainty and lowers welfare. Second, with debts denominated in nominal terms, increased uncertainty about inflation may make firms and individuals reluctant to undertake investment projects, especially long-term ones.7 And finally, highly variable inflation (or even high average inflation alone) can also discourage long-term investment because firms and individuals view it as a

symptom of a government that is functioning badly, and that may therefore resort to confiscatory taxation or other policies that are highly detrimental to capital-holders.

Empirically, there is a negative association between inflation and investment, and between inflation and growth (for example, Bruno and Easterly, 1998). But we know little about whether these relationships are causal, and it is not difficult to think of reasons that the associations might not represent true effects of inflation. As a result, this evidence is of limited value in determining the costs of inflation.

This analysis suggests that stabilization policy has only modest potential benefits. If this is right, episodes like Great Depression and the financial crisis that began in 2007 are counterbalanced by periods of above-normal output with roughly offsetting welfare benefits. Thus, while we surely would have preferred a smoother path of output, the overall costs of departing from that path are small. Although this analysis identifies conditions under which the potential benefits of stabilization policy are small, these conditions are almost certainly not the most relevant ones in practice. There are four main reasons for concern three whose importance is uncertain, and a fourth that appears crucial.

The first two issues involve asymmetries in the welfare effects of recessions and booms. First, individuals might be much more risk-averse than Lucas's calculation assumes. Recall from Section 8.5 that stocks earn much higher average returns than bonds. One candidate explanation is that individuals dislike risk so much that they require a substantial premium to accept the moderate risk of holding stocks (for example, Campbell and Cochrane, 1999). If this is right, the welfare costs of the variability associated with short-run fluctuations could be large.

Second, stabilization policy might have substantial benefits not by stabilizing consumption, but by stabilizing hours of work. Hours are much more cyclically variable than

consumption; and if labor supply is relatively inelastic, utility may be much more sharply curved in hours than in consumption.

Ball and D. Romer (1990) find that as a result, it is possible that the cost of fluctuations through variability of hours is substantial. Intuitively, the utility benefit of the additional leisure during periods of below-normal output may not nearly offset the utility cost of the reduced consumption, whereas the disutility from the additional hours during booms may nearly offset the benefit of the higher consumption.

The third issue has to do with investment and the path of the economy's flexible-price level of output. A common informal view is that macroeconomic stability promotes investment of all types, from conventional physical-capital investment to research and development. If so, stabilization policy could raise income substantially over the long run.9

Finally, and critically, our earlier analysis hinges on the assumption that inflation dynamics are reasonably well captured by the Lucas supply curve, (12.10), or the accelerationist Phillips curve (12.11) (or some combination of the two). But this assumption may be very far off. Theoretically, we have seen numerous models of price-setting and inflation, many of which differ greatly from (12.10) and (12.11). Empirically, periods of below-normal periods of above-normal output. For example, in the Great Depression, inflation returned to positive levels long before output returned to normal. And in

the Great Recession, inflation fell little. Thus in both cases, the behavior of inflation did not leave policymakers in a position to pursue offsetting periods of vastly above-normal output with low inflation.

These arguments suggest there is probably an important role for stabilization policy after all. If successful stabilization policy can prevent a Great Depression or a Great Recession with little cost in terms of lower utility or lower output at other times, its benefits are clearly very large.

**3. Assumptions (backgound and settings)**

Let to introduce a short history and decision making at National Bank of Moldova (BNM).

The leadership of the NBM, by Leonid Talmaci between 1991-2009, was apostrophized by three major events that changed the economy of the Republic of Moldova, namely:

- Introduction of the Moldovan Leu, in November 1993, when he launched the national currency of the Republic of Moldova;
- The financial crisis in Russia 1998;
- The introduction of the single European currency at continental level in 1999.

**3.1 Currency board times (2002-2021)**

One solution to the problem of lack of transparency and commitment to the exchange-rate target is the adoption of a currency board, in which the domestic currency is backed 100% by a foreign currency (say, dollars or the euro) and in which the note-issuing authority, whether the central bank or the government, establishes a fixed exchange rate to this foreign currency and stands ready to exchange domestic currency for the foreign currency at this rate whenever the public requests it. A currency board is just a variant of a fixed exchange- rate target in which the commitment to the fixed exchange rate is especially strong because the conduct of monetary policy is in effect put on autopilot, and taken completely out of the hands of the central bank and the government. In contrast, the typical fixed or pegged exchange-rate regime does allow the monetary authorities some discretion in their conduct of monetary policy because they can still adjust interest rates or print money.

A currency board arrangement thus has important advantages over a monetary policy strategy that just uses an exchange-rate target. First, the money supply can expand only when foreign currency is exchanged for domestic currency at the central bank. Thus the increased amount of domestic currency is matched by an equal increase in foreign exchange reserves.

The central bank no longer has the ability to print money and thereby cause inflation. Second, the currency board involves a stronger commitment by the central bank to the fixed exchange rate and may therefore be effective in bringing down inflation quickly and in decreasing the likelihood of a successful speculative attack against the currency.

Although they solve the transparency and commitment problems inherent in an exchange-rate target regime, currency boards suffer from some of the same shortcomings: the loss of an independent monetary policy and increased exposure of the economy to shocks from the anchor country, and the loss of the central bank's ability to create money and act as a lender of last resort. Other means must therefore be used to cope with potential banking crises. Also, if there is a speculative attack on a currency board, the exchange of the domestic currency for foreign currency leads to a sharp contraction of the money supply, which can be highly damaging to the economy.

Currency boards have been established in the territory of Hong Kong (1983) and countries such as Argentina (1991), Estonia (1992), Lithuania (1994), Bulgaria (1997) and Bosnia (1998). Argentina's currency board, which operated from 1991 to 2002 and required the central bank to exchange US dollars for new pesos at a fixed exchange rate of 1 to 1, is one of the most interesting. For more on this subject, see the box 'Argentina's currency board'.

*Euro Area and Argentina's currency board*

Argentina has had a long history of monetary instability, with inflation rates fluctuating dramatically and sometimes surging to beyond 1,000% per year. To end this cycle of inflationary surges, Argentina decided to adopt a currency board in April 1991. The Argentine currency board worked as follows. Under Argentina's convertibility law, the peso/dollar exchange rate was fixed at one to one, and a member of the public could go to the Argentine central bank and exchange a peso for a dollar, or vice versa, at any time.

The early years of Argentina's currency board looked stunningly successful. Inflation, which had been running at an 800% annual rate in 1990, fell to less than 5% by the end of 1994, and economic growth was rapid, averaging almost 8% per year from 1991 to 1994. In the aftermath of the Mexican peso crisis, however, concern about the health of the Argentine economy resulted in the public pulling money out of the banks (deposits fell by 18%) and exchanging pesos for dollars, thus causing a contraction of the Argentine money supply. The result was a sharp drop in Argentine economic activity, with real GDP shrinking by more than 5% in 1995 and the unemployment rate jumping above 15%. Only in 1996 did the economy begin to recover.

Because the central bank of Argentina had no control over monetary policy under the currency board system, it was relatively helpless to counteract the contractionary monetary policy stemming from the public's behaviour. Furthermore, because the currency board did not allow the central bank to create pesos and lend them to the banks, it had very little capability to act as a lender of last resort. With help from international agencies, such as the IMF, the World Bank and the Inter-American Development Bank, which lent Argentina more than $5 billion in 1995 to help shore up its banking system, the currency board survived.

However, in 1998 Argentina entered another recession, which was both severe and very long- lasting. By the end of 2001, unemployment reached nearly 20%, a level comparable to that experienced in the United States during the Great Depression of the 1930s. The result has been civil unrest and the fall of the elected government, as well as a major banking crisis and a default on nearly $150 billion of government debt. Because the central bank of Argentina had no control over monetary policy under the currency board system, it was unable to use monetary policy to expand the economy and get out of its recession. Furthermore, because the currency board did not allow the central bank to create pesos and lend them to banks, it had very little capability to act as a lender of last resort. In January 2002, the currency board finally collapsed

and the peso depreciated by more than 70%. The result was the full-scale financial crisis described in Chapter 9, with inflation shooting up and an extremely severe depression. Clearly, the Argentine public is not as enamoured of its currency board as it once was.

### 3.2 Dollarization times (1994-2004)

Another solution to the problems created by a lack of transparency and commitment to the exchange-rate target is dollarization, the adoption of a sound currency, like the US dollar, as a country's money. Indeed, dollarization is just another variant of a fixed exchange-rate target with an even stronger commitment mechanism than a currency board provides. As we have seen in Argentina, a currency board can be abandoned, allowing a change in the value of the currency, but a change of value is impossible with dollarization. A dollar bill is always worth one dollar, whether it is held in the United States or outside of it.

Dollarization has been advocated as a monetary policy strategy for emerging market countries. Panama has been dollarized since its independence in 1904. Dollarization was discussed actively by Argentine officials in the aftermath of the devaluation of the Brazilian real in January 1999 and was adopted by Ecuador in 2000 and El Salvador in 2001. Dollarization's key advantage is that it completely avoids the possibility of a speculative attack on the domestic currency (because there is none). (Such an attack is still a danger even under a currency board arrangement.)

Dollarization is subject to the usual disadvantages of an exchange-rate target (the loss of an independent monetary policy, increased exposure of the economy to shocks from the anchor country, and the inability of the central bank to create money and act as a lender of last resort). Dollarization has one additional disadvantage not characteristic of currency boards or other exchange-rate target regimes. Because a country adopting dollarization no longer has its own currency, it loses the revenue that a government receives by issuing money, which is called seignorage. Because governments (or their central banks) do not have to pay interest on their currency, they earn revenue (seignorage) by using this currency to purchase income-earning assets such as bonds. If an emerging market country dollarizes and gives up its currency, it needs to make up this loss of revenue somewhere, which is not always easy for a poor country.

## 4. The Model

The particular model we consider is the canonical three-equation Optimal Keynesian model of Clarida, Galí, and Gertler (2000). The price-adjustment condition is the modern Keynesian Phillips curve. This treatment of price adjustment has two primary qualities. The primary is its solid microeconomic establishments: it comes specifically from an presumption of occasional inflation of ostensible costs. The other is its comparative effortlessness: inflation depends as it were on anticipated future inflation and current output, with no part for past inflation or for more complicated flow. The aggregate-demand condition of the model is the new Keynesian IS curve. The ultimate condition portrays financial approach. So distant, since our goal has been to shed light on the essential suggestions of various presumptions concerning price adjustment, we have considered as it were basic ways of the money supply (or total request).

To construct a model that's more valuable for analyzing real macroeconomic fluctuations, however, we have to be expect that the central bank takes after a run the model for the interest rate. In specific, in keeping with the **forward-looking character** of the modern Keynesian Phillips curve and the optimal Keynesian IS curve, we accept the central bank takes after a **forward-looking** interest-rate run the model, altering the interest rate in reaction to changes in anticipated future inflation and output. The other fixing of the model is its fluctuations: it incorporates serially connected unsettling disturbances to all three

conditions. This permits us to analyze unsettling disturbances to private total request, price-setting behavior, and money related approach. At long last, for comfort, all the conditions are direct and the consistent terms are set to zero. Hence the factors ought to be deciphered as flights from their steady-state or slant values. The three core equations are:

$$y_t = E_t[y_{t+1}] - \frac{1}{\theta} r_t + u_t^{IS}, \theta > 0 \quad (1)$$

$$\pi_t = \beta[\pi_{t+1}] + ky_t + u_t^{\pi}, 0 < \beta < 1, k > 0 \quad (2)$$

$$r_t = \varphi_\pi E_t[\pi_{t+1}] + \varphi_y E_t[y_{t+1}] + u_t^{MP}, \varphi_\pi > 0, \varphi_y \geq 0 \quad (3)$$

Equation (1) is the new Keynesian IS curve, (2) is the new Keynesian Phillips curve, and (3) is the forward-looking interest-rate rule. The shocks follow independent AR-1 processes:

$$u_t^{IS} = \rho_{IS} u_{t-1}^{IS} + e_t^{IS}, \ -1 < \rho_{IS} < 1, \quad (4)$$

$$u_t^{\pi} = \rho_\pi u_{t-1}^{\pi} + e_t^{\pi}, \ -1 < \rho_\pi < 1, \quad (5)$$

$$u_t^{MP} = \rho_{MP} u_{t-1}^{MP} + e_t^{MP}, \ -1 < \rho_{MP} < 1, \quad (6)$$

where $e^{IS}, e_t^{\pi}$ and $e_t^{MP}$ are white-noise disturbances that are uncorrelated with one another.

The model is clearly greatly stylized. To provide few examples, all behavior is forward-looking; the elements of inflation and total request are exceptionally straightforward; and the modern Keynesian Phillips curve is accepted to depict inflation flow in spite of its destitute observational execution. In any case, since its center fixings are so straightforward and have such appealing microeconomic establishments, the model could be a key reference point in present day models of variances. The model and variations of it are as often as possible utilized, and it has been adjusted and expanded in numerous ways. The nearness of the forward-looking components infers that for a few parameter values, the model has sunspot solutions. The to begin with step in fathoming the model is to specific output and inflation in terms of their anticipated future values and the disturbances. Applying straightforward algebra to (1) (2) gives us

$$y_t = -\frac{\varphi_\pi}{\theta} E_t[\pi_{t+1}] + (1 - \frac{\varphi_y}{\theta}) E_t[y_{t+1}] + u_t^{IS} - \frac{1}{\theta} u_t^{MP}, \quad (7)$$

$$\pi_t = -(\beta - \frac{\varphi_\pi k}{\theta} E_t[\pi_{t+1}] + (1 - \frac{\varphi_y}{\theta}) kE_t[y_{t+1}] + ku_t^{IS} + u_t^{\pi} - \frac{k}{\theta} u_t^{MP}, \quad (8)$$

An critical and educator extraordinary case of the model happens when there's no serial relationship within the unsettling disturbances (so $\rho_{IS} = \rho_\pi = \rho_{MP} = 0$ . In this case, since of the absence of any backward-looking components and any data about long-term values of the unsettling disturbances, there's no drive causing operators to anticipate the economy to depart from its steady state within the future. That is, the fundamental solution has $E_t[y_{t+1}]$ and $E_t[\pi_{t+1}]$ always equal to zero. To see this, note that with $E_t[y_{t+1}] = E_t[\pi_{t+1}] = 0$, equations (3), (7), and (8) simplify to

$$y_t = u_t^{IS} - \frac{1}{\theta} u_t^{MP}, \quad (9)$$

$$\pi_t = ku_t^{IS} + u_t^{\pi} - \frac{k}{\theta} u_t^{MP}, \quad (10)$$

$$r_t = u_t^{MP}. \quad (11)$$

In case (9) (11) depict the behavior of output, inflation, and the real interest rate, at that point, since we are considering the case where the u's are white noise, the desires of future output and inflation are continuously zero. (9) (11) hence speak to the elemental arrangement to the model in this case. These expressions appear the impacts of the different fluctuations. A contractionary monetary-policy shock raises the real interest rate and brings down output and inflation. A positive shock to private aggregate demand raises output and inflation and has no effect on the real interest rate. And an unfavorable inflation shock raises inflation but has no other impacts. These comes about are to a great extent routine. The IS shock falls flat to influence the real interest rate since financial arrangement is forward-looking, and so does not react to the increases in current output and inflation. The truth that money related arrangement is forward-looking is additionally the reason the inflation shock does not spill over to the other factors. The key message of this case of the model, be that as it may, is that the model, just like the standard real-business-cycle model, has no inside engendering components. Serial relationship in output, inflation, and the real interest rate can come as it were from serial relationship within the driving forms.

A direct way to illuminate the model within the common case is to utilize the strategy of undetermined coefficients. Given the model's direct structure and nonappearance of backward-looking behavior, it is sensible to figure that the endogenous factors are straight capacities of the unsettling disturbances.

**5. Taylor Rule and Saint Louis Equation (IS – LM on short time)**

To analyze the trade-off between the output gap and the inflation rate volatility, we used a backward-looking model. The data used in the empirical analysis are quarterly and were obtained from the National Institute of Statistics (from 2000: 1 to 2020: 4 for Republic of Moldova). We will analyze the various models of dynamic price adjustment in a com- mon framework. The framework draws heavily on the model of exogenous nominal rigidity and the model of inflation targeting . Time is discrete. Each period, imperfectly competitive firms produce output using labor as their only input. As in, the production function is one-for-one; thus aggregate output and aggregate labor input are equal. The model omits government purchases and international trade, aggregate consumption and aggregate output are equal. Households maximize utility, taking the paths of the real wage and the real interest rate as given. Firms, which are owned by the households, maximize the present discounted value of their profits, subject to constraints on their price-setting (which vary across the models we will consider). Finally, a central bank determines the path of the real interest rate through its conduct of monetary policy.

Besides, as we are going see within the another two examples, the same variables that can cause financial unsettling disturbances to have critical real impacts have imperative results for the impacts of other unsettling disturbances. This discourse recommends that a basic test of pure real-business-cycle models is whether money related unsettling disturbances have significant real impacts. Somewhat for this reason, an gigantic sum of inquire about has been committed to attempting to decide the impacts of financial changes. Since our objective is to test whether money related changes have real impacts, a apparently self-evident put to begin is to fair relapse output on money. Such relapses have a long history. One of the most punctual and most clear was carried out by Leonall Andersen and Jerry Jordan of the Government Save Bank of St. Louis (Andersen and Jordan, 1968).

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.[1]

The results are:

$$\Delta lnY_t = C + \Delta lnm_t + \Delta lnm_{t-1} + \Delta lnm_{t-2} + \Delta lnm_{t-3} + \Delta lnm_{t-4} - t \quad (12)$$

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 (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 endeavors 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.

Models with sticky costs foresee that in case the NBM does not increase the money supply completely in reaction to these unsettling disturbances, there will be a negative relationship between money and output. A positive money demand shock, for case, will increment the money stock but increment the interest rate and decrease output. And indeed on the off chance that the NBM accommodates the shifts, the fact that they are so huge may cause a number of perceptions to have a unbalanced impact on the results. As a result of the money request shifts, the assessed relationship between money and output is touchy to such things as the test period and the degree of money. For example, if equation (12) is estimating utilizing M1 in place of M2, or in case it is assessed over a somewhat different test period, the comes about alter impressively. Since of these challenges, regressions like (12) are of little value in determination the impacts of money related changes on output.

Based on the Granger causality test, we opted for one of the two equations, which

Even if both models describe the mechanism for adjusting monetary policy with the medium-term economic growth policy of the Republic of Moldova. We mention that the first equation is closer to Taylor's original rule elaborated by Taylor in his work.[1]

[1] 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.

**Univariate model (Taylor's rule). Represent the following equation:**

$$i_t = \pi_t + r_t^* + a_\pi(\pi_t - \pi_t^*) + a_y(y_t - \bar{y_t}) \quad (13)$$

where, $i_t -$ base rate; $\pi_t -$ inflation rate; $\pi_t^* -$ the target inflation rate; $r_t^*$- the real base equilibrium rate; $y_t$- the natural logarithm of real GDP; $\bar{y_t}$- the natural logarithm of potential GDP. In this equation, the parameters $a_\pi$ *and* $a_y$must be positive.

**6. The natural rate level of output (IS-LM model in the long-run)**

So far in our *ISLM* analysis, we have been assuming that the price level is fixed so that nominal values and real values are the same. This is a reasonable assumption for the short run, but in the long run the price level does change. To see what happens in the *ISLM* model in the long run, we make use of the concept of the **natural rate level of output** (denoted by $Y_n$), which is the rate of output at which the price level has no tendency to rise or fall. When output is above the natural rate level, the booming economy will cause prices to rise; when output is below the natural rate level, the slack in the economy will cause prices to fall.

Because we now want to examine what happens when the price level changes, we can no longer assume that real and nominal values are the same. The spending variables that affect the *IS* curve (consumer expenditure, investment spending, government spending and net exports) describe the demand for goods and services and are *in real terms*; they describe the physical quantities of goods that people want to buy. Because these quantities do not change when the price level changes, a change in the price level has no effect on the *IS* curve, which describes the combinations of the interest rate and aggregate output *in real terms* that satisfy goods market equilibrium.

Figure 1 shows what happens in the *ISLM* model when output rises above the natural rate level, which is marked by a vertical line at $Y_n$. Suppose that initially the *IS* and *LM* curves intersect at point 1, where output $Y = Y_n$. Panel (a) examines what happens to output and interest rates when there is a rise in the money supply. The rise in the money supply causes the *LM* curve to shift to $LM_2$, and the equilibrium moves to point 2 (the intersection of $IS_1$ and $LM_2$), where the interest rate falls to $i_2$ and output rises to $Y_2$. However, as we can see in panel (a), the level of output at $Y_2$ is greater than the natural rate level $Y_n$, and so the price level begins to rise.

In contrast to the *IS* curve, which is unaffected by a rise in the price level, the *LM* curve is affected by the price level rise because the liquidity preference theory states that the demand for money *in real terms* depends on real income and interest rates. This makes sense because money is valued in terms of what it can buy. However, the money supply the media reports in euros is not the money supply in real terms; it is a nominal quantity. As the price level rises, the quantity of money *in real terms* falls, and the effect on the *LM* curve is identical to a fall in the nominal money supply with the price level fixed. The lower value of the real money supply creates an excess demand for money, causing the interest rate to rise at any given level of aggregate output, and the *LM* curve shifts back to the left. As long as the level of output exceeds the natural rate level, the price level will continue to rise, shifting the *LM* curve to the left, until finally output is back at the natural rate level $Y_n$. This occurs

1 **Taylor, John B. 1993.** ‘‘Discretion versus Policy Rules in Practice.’’ *Carnegie-Rochester Conference Series on Public Policy* 39 (December): 195 214.

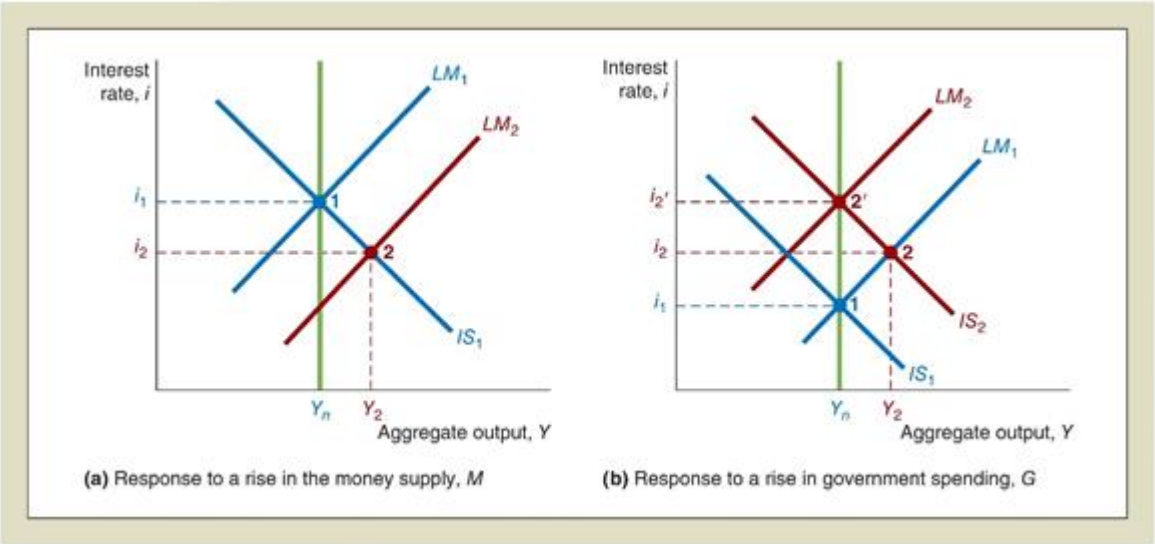


**Figure 1 *ISLM* model in the long run**

In panel (a), a rise in the money supply causes the *LM* curve to shift rightward to *LM2*, and the equilibrium moves to point 2, where the interest rate falls to *i*2 and output rises to *Y*2. Because output at *Y*2 is above the natural rate level *Yn*, the price level rises, the real money supply falls, and the *LM* curve shifts back to *LM*1; the economy has returned to the original equilibrium at point 1. In panel (b), an increase in government spending shifts the *IS* curve to the right to *IS2*, and the economy moves to point 2, at which the interest rate has risen to *i*2 and output has risen to *Y*2. Because output at *Y*2 is above the natural rate level *Yn*, the price level begins to rise, real money balances *M/P* begin to fall, and the *LM* curve shifts to the left to *LM2*. The long-run equilibrium at point 2 has an even higher interest rate at *i*2, and output has returned to *Yn*.

When the *LM* curve has returned to $LM_1$, where real money balances *M/P* have returned to the original level and the economy has returned to the original equilibrium at point 1. The result of the expansion in the money supply in the long run is that the economy has the same level of output and interest rates.

The fact that the increase in the money supply has left output and interest rates unchanged in the long run is referred to as **long-run monetary neutrality**. The only result of the increase in the money supply is a higher price level, which has increased proportionally to the increase in the money supply so that real money balances *M/P* are unchanged.

Panel (b) looks at what happens to output and interest rates when there is expansionary fiscal policy such as an increase in government spending. As we saw earlier, the increase in government spending shifts the *IS* curve to the right to $IS_2$, and in the short run the economy moves to point 2 (the intersection of $IS_2$ and $LM_1$), where the interest rate has risen to $i_2$ and output has risen to $Y_2$. Because output at $Y_2$ is above the natural rate level $Y_n$, the price level begins to rise, real money balances *M/P* begin to fall, and the *LM* curve shifts to the left.

Only when the *LM* curve has shifted to $LM_2$ and the equilibrium is at point 2, where output is again at the natural rate level $Y_n$, does the price level stop rising and the LM curve come to rest. The resulting long-run equilibrium at point 2′ has an even higher interest rate at i2 and output has not risen from Yn. Indeed, what has occurred in the long run is complete crowding out: the rise in the price level, which has shifted the LM curve to LM2, has caused the interest rate to rise to i2, causing investment and net exports to fall enough to offset the increased government spending completely. What we have discovered is that even though

complete crowding out does not occur in the short run in the ISLM model (unless the LM curve is vertical), it does occur in the long run. Our conclusion from examining what happens in the ISLM model from an expansionary monetary or fiscal policy is that although monetary and fiscal policy can affect output in the short run, neither affects output in the long run. Clearly, an important issue in deciding on the effectiveness of monetary and fiscal policy to raise output is how soon the long run occurs. This is a topic that we explore in the next chapter.

**IS-LM model and the aggregate demand curve**

We now examine further what happens in the *ISLM* model when the price level changes. When we conduct the *ISLM* analysis with a changing price level, we find that as the price level falls, the level of aggregate output rises. Thus we obtain a relationship between the price level and quantity of aggregate output for which the goods market and the market for money are in equilibrium, called the **aggregate demand curve**. This aggregate demand curve is a central element in the aggregate supply and demand analysis of Chapter 22, which allows us to explain changes not only in aggregate output but also in the price level.

**Deriving the aggregate demand curve**

Now that you understand how a change in the price level affects the LM curve, we can analyse what happens in the ISLM diagram when the price level changes. This exercise is carried out in Figure 2. Panel (a) contains an ISLM diagram for a given value of the nominal money supply. Let us first consider a price level of P1. The LM curve at this price level is LM (P1), and its intersection with the IS curve is at point 1, where output is Y1. The equilibrium output level Y1 that occurs when the price level is $P_1$ is also plotted in panel (b) as point 1. If the price level rises to $P_2$, then *in real terms* the money supply has fallen. The effect on the *LM* curve is identical to a decline in the nominal money supply when the price level is fixed: The *LM* curve will shift leftward to *LM* ($P_2$). The new equilibrium level of output has fallen to $Y_2$, because planned investment and net exports fall when the interest rate rises. Point 2 in panel (b) plots this level of output for price level $P_2$. A further increase in the price level to $P_3$ causes a further

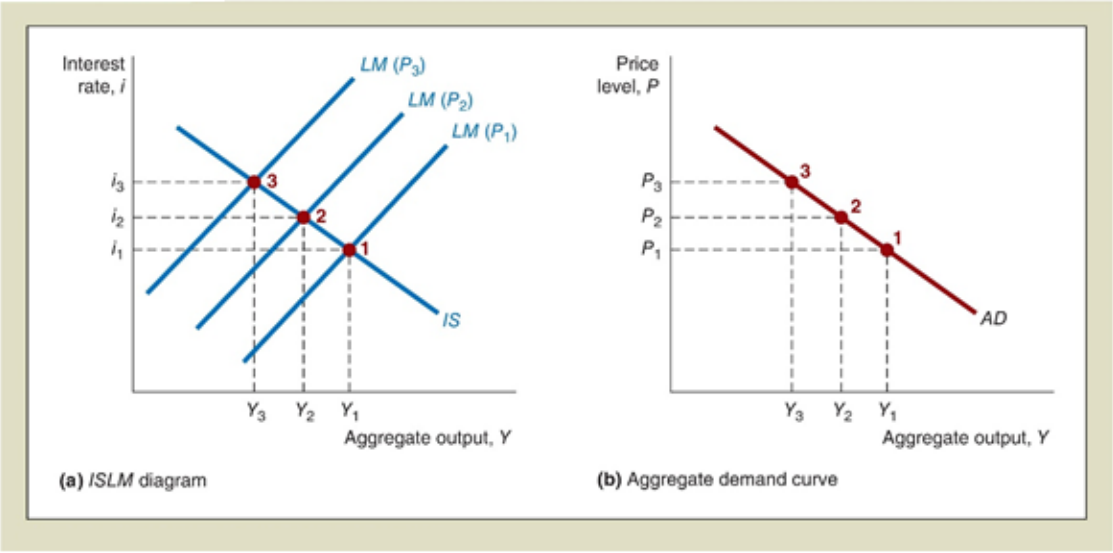


**Figure 2. Deriving the aggregate demand curve**

*Expansionary fiscal policy, a rise in net exports, or more optimistic consumers and firms shift the IS curve to the ISLM diagram in panel (a) shows that with a given nominal money supply as the price level rises from P1 to P2 to P3, the LM curve shifts to the left, and equilibrium output falls. The combinations of the price level and equilibrium output from panel (a) are then plotted in panel (b), and the line connecting them is the aggregate demand curve AD.*

Decline in the real money supply, leading to a further increase in the interest rate and a further decline in planned investment and net exports, and output declines to $Y_3$. Point 3 in panel (b) plots this level of output for price level $P_3$.

The line that connects the three points in panel (b) is the aggregate demand curve *AD*, and it indicates the level of aggregate output consistent with equilibrium in the goods market and the market for money at any given price level. This aggregate demand curve has the usual downward slope, because a higher price level reduces the money supply in real terms, raises interest rates and lowers the equilibrium level of aggregate output.

**Factors that cause the aggregate demand curve to shift**

*ISLM* analysis demonstrates how the equilibrium level of aggregate output changes for a given price level. A change in any factor (except a change in the price level) that causes the *IS* or *LM* curve to shift causes the aggregate demand curve to shift. To see how this works, let's first look at what happens to the aggregate demand curve when the *IS* curve shifts.

**Shifts in the IS curve**

Five factors cause the *IS* curve to shift: changes in autonomous consumer spending, changes in investment spending related to business confidence, changes in government spending, changes in taxes and autonomous changes in net exports. How changes in these factors lead to a shift in the aggregate demand curve is examined in Figure 3

Suppose that initially the aggregate demand curve is at $AD_1$ and there is a rise in, for example, government spending. The *ISLM* diagram in panel (b) shows what then happens to equilibrium output, holding the price level constant at $P_A$. Initially, equilibrium output is at $Y_A$ at the intersection of $IS_1$ and $LM_1$. The rise in government spending (holding the price level constant at $P_A$) shifts the *IS* curve to the right and raises equilibrium output to $Y_{A'}$. In

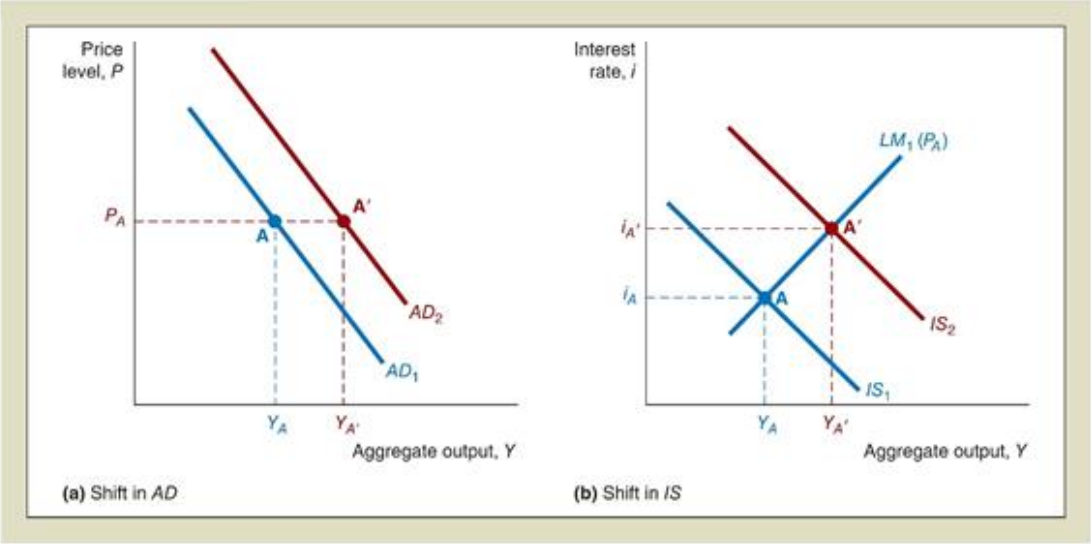


**Figure 3 Shift in the aggregate demand curve caused by a shift in the IS curve.**

*Expansionary fiscal policy, a rise in net exports, or more optimistic consumers and firms shift the IS curve to the right in panel (b), and at a price level of PA, equilibrium output rises from YA to YA_.This change in equilibrium output is shown as a movement from point A to point A in panel (a); hence the aggregate demand curve shifts to the right, from AD1 to AD2.*

Panel (a), this rise in equilibrium output is shown as a movement from point A to point A′, and the aggregate demand curve shifts to the right (to $AD_2$).

The conclusion from Figure  is that ***any factor that shifts the IS curve shifts the aggregate demand curve in the same direction***. Therefore, 'animal spirits' that encourage a rise in autonomous consumer spending or planned investment spending, a rise in government spending, a fall in taxes or an autonomous rise in net exports – all of which shift the *IS* curve to the right – will also shift the aggregate demand curve to the right. Conversely, a fall in autonomous consumer spending, a fall in planned investment spending, a fall in government spending, a rise in taxes or a fall in net exports will cause the aggregate demand curve to shift to the left.

**Shifts in the LM curve**

Shifts in the *LM* curve are caused by either an autonomous change in money demand (not caused by a change in *P*, *Y* or *i*) or a change in the money supply. Figure 4 shows how either of these changes leads to a shift in the aggregate demand curve. Again, we are initially at the $AD_1$ aggregate demand curve, and we look at what happens to the level of equilibrium output when the price level is held constant at $P_A$. A rise in the money supply shifts the *LM* curve to the right and raises equilibrium output to $Y_A$'. This rise in equilibrium output is shown as a movement from point A to point *A′* in panel (a), and the aggregate demand curve shifts to the right.

Our conclusion from Figure 4 is similar to that of Figure 3: ***holding the price level constant, any factor that shifts the LM curve shifts the aggregate demand curve in the same direction***. Therefore, a decline in money demand as well as an increase in the money supply, both of which shift the *LM* curve to the right, also shift the aggregate demand curve to the right. The aggregate demand curve will shift to the left, however, if the money supply declines or money demand rises.

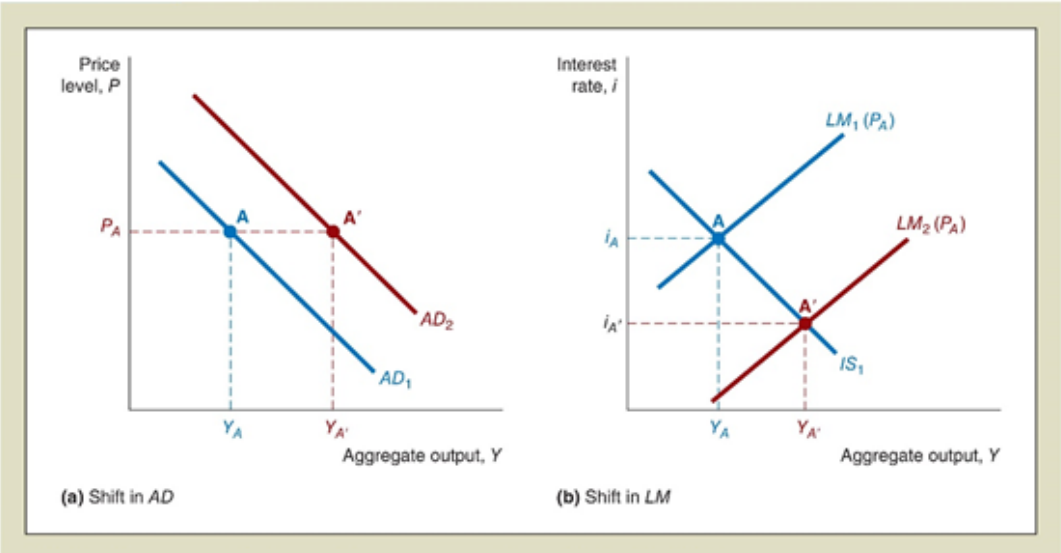


**Figure 4  Shift in the aggregate demand curve caused by a shift in the LM curve**

A rise in the money supply or a fall in money demand shifts the *LM* curve to the right in panel (b), and at a price level of *PA*, equilibrium output rises from *YA* to *YA_*. This change in equilibrium output is shown as a movement from point A to point A in panel (a); hence the aggregate demand curve shifts to the right, from *AD1* to *AD2*.

**7. Government Policy in perspective of EURO accession: ERM II and streighforwarding the free trade (times)**

A monetary union is formed when two or more countries abandon their own national currencies for a common currency managed by a common central bank. These countries fix their exchange rates irrevocably and irreversibly towards the common currency. Because of its irrevocability and irreversibility, a monetary union is often viewed as the most extreme variant of exchange-rate targeting. A monetary union differs from dollarization in that dollarized countries like Ecuador and Panama, for example, do not have any influence on the Fed's monetary policy decisions. On the other hand, countries participating in a monetary union take part in monetary decision processes and share governance. Moreover, union members also share the revenues that come from printing money.

There are several existing monetary unions around the world. Probably, the most well known is the Economic and Monetary Union (EMU). Formed on 1 January 1999, the EMU currently (as of 2012) comprises 17 European countries which irrevocably and irreversibly fixed the values of their national currency against the euro, created the European Central Bank (ECB) which conducts monetary policy for the entire euro area. Other examples of monetary unions include the West African Economic and Monetary Union (WAEMU), which engulfs eight West African nations that use the West African CFA franc as their common currency, and the Economic and Monetary Community of Central Africa, which comprises six Central African nations and uses the Central African CFA franc as their legal tender. There are monetary unions yet to be formed: the Gulf Cooperation Council (established in May 1981) aims at full economic and monetary union (see box below).

But why would a certain group of independent countries decide to give up their currencies? More specifically, what are the benefits and the costs of a monetary union?

**Benefits of monetary union**

The benefits of a monetary union are mostly microeconomic in nature. They include: increased price transparency, reduced transaction costs and reduced exchange rate uncertainty. First, sharing one currency increases price transparency. If consumers see prices in the same unit of account, they are better able to compare them. This increases competition among sellers and thus leads to efficiency gains. To see an example, suppose you live in Austria and want to buy a mountain bike for your next adventure in the Scottish Highlands. You start searching the Internet for possible bikes to buy, and find your preferred model both from an Austrian bike shop for €600 and from a German portal in Munich, but for €400. Because a bicycle can be transported relatively easily and cheaply, you will probably buy the bike in Munich. A monetary union, by easing price comparison, reduces price differentials through higher competition.

Second, a monetary union reduces foreign transaction costs, related to commission charges or margins between the buy and the sell exchange rates charged by banks and currency exchanges. For instance, the European Commission has estimated that the gains of eliminating foreign transaction costs may arrive at 0.3-0.5% of EU GDP each year. Third, with a common currency, the uncertainty associated with future exchange rate movements is eliminated. Of course, exchange rate uncertainty can be reduced through hedging (protecting oneself against future exchange rate movements). But hedging costs money. Both the elimination of the exchange rate risk and the reduction of transaction costs stimulate trade

among the members of a monetary union. For instance, recent empirical studies estimate that EMU boosted eurozone trade by something between 5% and 20%.

Besides these traditional microeconomic benefits, a single currency has also the main macroeconomic advantage of anchoring inflation expectations and reducing inflation uncertainty. If the newly created common central bank is credibly committed to the goal of price stability, the monetary union will help anchor inflationary expectations to low levels also in those countries of the union which in the past had a weak anti-inflationary reputation. Therefore these countries may benefit to a great extent from joining a monetary union. A clear example in this respect is given by Italy, which since joining the EMU has been able to bring down inflation to a considerable extent.

Finally, the creation of a common central bank with a strong anti-inflation reputation may have the additional benefit of making the new common currency increasingly used as reserve currency in international financial transactions. This will stimulate activity for domestic financial markets, creating enhanced investment opportunities for bank and non-bank businesses in the monetary union. In this respect, with the creation of the euro in 1999, many commentators have argued that the supremacy of the US dollar as reserve currency may be subject to a serious challenge (see the Closer look box: 'The euro's challenge to the dollar').

Let us now move to the costs of a monetary union.

**Costs of monetary union**

The costs of a monetary union, as in the other forms of exchange-rate targeting, derive from the loss of an independent monetary policy to deal with domestic considerations. In particular, union members are no longer able to influence the exchange rate of their currency, and are unable to set their own short-term interest rates or determine the amount of money supply in their country. But how costly is it to lose the monetary instruments to deal with domestic considerations in a monetary union? The answer to this question is at the heart of the theory of Optimal Currency Area (OCA), pioneered by Robert Mundell, the 1999 Nobel Prize winner and economics professor at Columbia University in New York. On the basis of this theory, a geographical region constitutes an optimal currency area when the use of a common currency leads to no loss of welfare related to the loss of the monetary policy instruments. In particular, two main criteria can be identified. First, the optimality of a currency area depends on how important asymmetric shocks in the monetary union really are. Second, if asymmetric shocks are present, the question is whether or not there are adjustment mechanisms that help the economy return to equilibrium. Let us address these two aspects in turn.

An asymmetric shock is a shock that hits only one of the countries in the monetary union. Because a country-specific shock may have a small impact on the economic conditions of the union as a whole, it cannot be addressed by the common central bank. Therefore, the effects of an asymmetric shock have to be dealt with by the country itself. Because of the absence of exchange rate adjustments, dealing with such shocks can be costly. If asymmetric shocks are large and frequent, the cost of losing monetary policy as a tool to manage the economy may be high.

To see an example, let us consider the case in which two countries A, and B, form a monetary union. Therefore, countries A and B share the same currency, which is managed by the new common central bank. Now, let us suppose that countries A and B are hit by an asymmetric demand shock, because for instance there has been a shift of demand from the products of country A to the products of country B. As a result, in country A output declines and unemployment rises, whereas in country B output grows and unemployment falls. Both countries are now in disequilibrium, and need adjustment.

If the two countries had not been in a monetary union and had chosen a flexible exchange rate regime, the adjustment mechanism would have been the following. The central bank of country A would have lowered its interest rate to stimulate aggregate demand, whereas country B would have followed the opposite policy. The resulting depreciation of the currency of country A relative to the currency of country B would have further stimulated the aggregate demand of country A, and reduced that of country B, leading to a return to equilibrium in both countries. On the other hand, if both countries are part of a monetary union, the interest rate and exchange rate instruments cannot be used to address domestic conditions. This simple example shows that one condition for a currency area to be optimal is the absence of asymmetric shocks.13 But are there other adjustment mechanisms that would help the two countries in a monetary union to return to equilibrium?

Alternative adjustment mechanisms helping to restore equilibrium is through wage flexibility and labour mobility. If wages in the two countries are flexible, due to high unemployment in country B workers will reduce their wage claims, making the products of country B cheaper and more competitive. In country A, on the other hand, the excess demand for labour will lead to increased wages and production prices, making products in country A more expensive and less competitive. As a consequence, equilibrium will be restored. Another mechanism that can help restore equilibrium requires labour mobility. If people from country A (where there is excess supply of labour) are ready to move to country B (where there is excess demand for labour), then equilibrium is restored without changes in the wage and price level in the two countries. Wage flexibility and labour mobility are the two key adjustment mechanisms of the original OCA theory. Therefore, the second condition for a currency area to be optimal is the presence of sufficient flexibility of the labour market. Another adjustment mechanism which may help restore equilibrium works through fiscal policy. Suppose that in the monetary union there exists a centralized fiscal authority that can levy taxes and make transfers (e.g. pensions and unemployment benefits) to residents of countries A and B. Under these circumstances, a potential adjustment mechanism may work through automatic transfers from country B to country A. The higher tax revenues deriving from the rise in output of country B, can be for instance automatically transferred to country A in the form of higher unemployment benefits. With such a system of redistribution in place, the problems of the adjustment mechanisms are reduced. If the centralization of the budget is non-existent, national fiscal authorities of countries A and B can still deal with the effects of asymmetric shocks individually. An example of centralized fiscal authority in a monetary union is given by the US, whereas the model of decentralized fiscal authorities is in place in the euro area.

Now that we know the main criteria to judge how optimal a monetary union is, we are ready to tackle two important questions which have kept many economists, policymakers and commentators rather busy over the last few years. That is, is the euro area an optimal currency area? Will the euro area expand in the future? In the next two boxes we will address these two questions in turn.

**The Euro's challenge to the dollar**

With the creation of the Economic and Monetary Union and the euro in 1999, the US dollar is facing a challenge to its position as the key reserve currency in international financial transactions. Adoption of the euro increases integration of Europe's financial markets, which could rival those in the United States. The resulting increase

in the use of euros in financial markets will make it more likely that international transactions are carried out in the euro. The economic clout of the euro area rivals that of the United States: both have a similar share of world GDP (around 20%) and world exports (around 15%). If the European Central Bank can make sure that inflation remains low so that the euro becomes a sound currency, this should bode well for the euro.

However, for the euro to eat into the dollar's position as a reserve currency, the euro area must function as a cohesive political entity that can exert its influence on the world stage. There are serious doubts on this score, however, with the 'no' votes on the European constitution by France and the Netherlands in 2005 and particularly with the lack of political consensus shown by European leaders to deal with euro debt crisis. Most analysts think it will be a long time before the euro drives out the dollar in international financial transactions.

**IS the euro area an optimal currency area?**

When evaluating how optimal a currency area is, the presence of adjustment mechanisms to absorb asymmetric shocks hitting the countries in the monetary union is of crucial importance. First, however, we need to see how often such shocks occur. Some early evidence in the 1990s showed that in the pre-EMU period economic shocks hitting the European countries were uncorrelated, and

the business cycles not fully synchronized. The general conclusion from this empirical literature was that a monetary union of all EU members was not optimal. But is it correct to judge the optimality of a currency area before the adoption of the common currency? By joining a monetary union, countries intensify their trade relationships which leads to more business cycle synchronization. Work carried out by two American economists, Jeffrey Frankel and Andy Rose, seems to support this view. They find that the more countries trade with each other, the more correlated their business cycles are. Similar results are also found in more recent empirical studies. This tells us that a currency area may not be optimal ex ante, but it may become so ex post.

The enhanced trade integration and increased business cycle convergence do not imply the absence of asymmetric shocks in EMU. Therefore the question whether adjustment mechanisms are available remains relevant. In terms of flexibility of labour markets, European countries show a relatively poor record. First, European wages are very inflexible, mainly due to labour unions that are relatively much stronger in European countries than in other industrialized countries. Second, the degree of labour mobility across European countries is much lower than within US regions. But why are Europeans so immobile? When considering moving to another country, people consider not only economic incentives (availability of jobs, higher wages, career opportunities in general, social benefits, etc.), but also weigh factors such as cultural differences, language barriers, traditions, and family and friends left behind.

Apparently for Europeans the prospect of better labour

market conditions does not weigh enough against the disadvantages of leaving their country of residence. This will probably change in the future as a result of economic and political integration, but this process is working rather slowly.

If the labour market is not flexible enough, is the adjustment mechanism working through fiscal policy operative in Europe? Currently, the EU centralized budget accounts for a mere 1% of the EU GDP. Thus no significant centralized redistribution system is in place

in Europe. This is in clear contrast with the US, where it is estimated that between 20% and 30% of the effects of asymmetric shocks are compensated by transfers

of the federal government. Moreover, euro members cannot make full use of national fiscal policy. In fact, in order to ensure fiscal discipline of member states, in 1997 European leaders introduced the Stability and Growth Pact (SGP), which imposes constraints on the national fiscal policies of EU countries. More specifically, according to the SGP the budget deficit/GDP ratio should not exceed 3% and government debt/GDP ratio should stay below 60%. As such, the SGP limits the ability to use fiscal policy as a stabilizing tool.

To sum up, we have seen that as for the occurrence of asymmetric shocks and business cycle convergence, the EMU countries are showing gradual improvement. However, on the

basis of the labour and fiscal adjustment mechanisms, the EMU is far from being an OCA. So, why did European leaders introduce the euro? Commentators such as Barry Eichengreen and Martin Feldstein argue that the euro was introduced for political reasons, and view the EMU as the outcome of a bargain between Germany striving for more political integration and

France trying to acquire a say in monetary policy. Other economists, like Charles Wyplosz, give more credit to the economic arguments behind EMU and point to the 'impossible trilogy', the simultaneous existence of free capital mobility, monetary independence and a fixed exchange rate. With full capital mobility, the European countries had no other choice than to move to a union. The alternatives would have been continued German monetary hegemony or a float with long and disruptive swings in the nominal exchange rates.

**Will the euro area expand in the future?**

As of 2012, 17 of the 27 European Union (EU) member countries were part of the EMU, whereas 10 EU countries had not adopted the euro. The latter are three of the old EU countries (Denmark, Sweden and the UK) and seven of the new EU member states (Bulgaria, the Czech Republic, Hungary, Latvia, Lithuania, Poland and Romania). Will these countries join the euro area in the future? Before answering this question, we need to discuss the convergence criteria of the Maastricht Treaty, which was signed in December 1991 and is the foundation stone of the process towards monetary unification in Europe.

According to the Maastricht Treaty, in order for an EU member to join the eurozone it has to fulfil four main convergence criteria, all of which stress macroeconomic convergence between countries before accession to the eurozone. The first criterion determines that the inflation rate in the acceding country should not exceed the average of the three lowest inflation rates in the EU plus 1.5%. The second criterion states that the long-term interest rate should not be more than 2% higher than the average observed in these three low-inflation countries. According to the budgetary criterion, the budget deficit/GDP ratio should not exceed 3% (if it does, it should be declining continuously and substantially to approach the desired level) and government debt/ GDP ratio should stay below 60% (if it is not currently under this threshold it should have a declining trend and approach the threshold level at a swift enough rate). Finally, the fourth criterion ensures exchange rate stability. In particular, would-be members of the eurozone should join the ERM system and spend at least two years without devaluation prior to joining. The rationale behind the convergence criteria is ensuring macroeconomic convergence with the eurozone members. All the convergence criteria (through different mechanisms) have the goal of avoiding inflation differentials in the eurozone. This is necessary because traditionally low-inflation countries (e.g. Germany) agreed to the adoption of the euro if they received some guarantee that with the new currency, the euro, they will be able to keep low inflation in their economies.

Whereas the seven countries that entered the EU in or after 2004 will have to introduce the euro once they have fulfilled the convergence criteria, the three old EU members (Denmark, Sweden and the UK) decided not to join the EMU. Despite satisfying the convergence criteria, Denmark was given the right to condition its entry on the result of a referendum. Sweden, by refusing to enter ERM, did not join as the exchange-rate criterion was not fulfilled. Finally, the UK obtained an 'opt-out' clause, which gives it the right to decide whether to join or not at its discretion. But will the UK join the euro at some point in the future?

In 1997 the Blair government expressed its will to enter the eurozone conditional on five economic tests being passed. The five economic tests, some of which closely resemble the criteria of an OCA, are as follows. (1) Are business cycles and economic structures compatible so that we and others could live with euro interest rates on a permanent basis? (2)

If problems emerge, is there sufficient flexibility to deal with them? (3) Would joining EMU create better conditions for firms making long-term decisions to invest in Britain? (4) What impact would entry into EMU have on the financial services industry? (5) In summary, will joining EMU promote higher growth, stability and a lasting increase in jobs? The outcome of the evaluation in 1997 was that the UK had not yet passed the first test. In 2003 the Treasury repeated the analysis and reached the same conclusion. In particular, it was concluded that the timing of the UK business cycle was significantly different from that of the rest of the EU. By 2003 significant progress on convergence had been made and business cycles were more convergent with those of the euro area. But the presence of significant structural differences, in particular between the housing market in the UK and in the rest of Europe, led to the conclusion that the UK was not fit to join the euro. Although the establishment of the five economic tests shows that economic arguments are important, as we have seen in the previous Application, adopting the euro is also (if not mostly) a political decision. Many British leaders have regarded the adoption of the euro as a certain loss of political sovereignty. This seems to be the view of the new Liberal–Conservative government, which ruled out entry to the euro at least till the next election.

Over the last few years, due to the dramatic developments of the euro sovereign debt crisis (see Chapter 9) public and political support towards entry has weakened. In fact, as of early 2012, the question is not whether and when the euro area will expand, but it is rather if the EMU will contract or even break up.

For instance, the quick deterioration of the Greek fiscal position opened the possibility of Greece exiting the eurozone.

**Financial crisez 2015 and IS-LM model under Drăguțanu governorship (2009-2016)**

Since World War II, government policymakers have tried to promote high employment without causing inflation. If the economy experiences a recession such as the one that began with the recent financial crisis, policymakers have two principal sets of tools that they can use to affect aggregate economic activity: monetary policy, the control of interest rates or the money supply, and fiscal policy, the control of government spending and taxes.

The ISLM model can help policymakers predict what will happen to aggregate output and interest rates if they decide to increase the money supply or increase government spending. In this way, ISLM analysis enables us to answer some important questions about the usefulness and effectiveness of monetary and fiscal policy in influencing economic activity. But which is better? When is monetary policy more effective than fiscal policy at controlling the level of aggregate output, and when is it less effective? Will fiscal policy be more effective if it is conducted by changing government spending rather than changing taxes? Should the monetary authorities conduct monetary policy by manipulating the money supply or interest rates? In this chapter, we use the ISLM model to help answer these questions and to learn how the model generates the aggregate demand curve featured prominently in the aggregate demand and supply framework (examined in Chapter 22), which is used to understand changes not only in aggregate output but also in the price level. Our analysis will show why economists focus so much attention on topics such as the stability of the demand for money function and whether the demand for money is strongly influenced by interest rates.

First, however, let's examine the ISLM model in more detail to see how the IS and LM curves developed in Chapter 20 shift and the implications of these shifts. (We continue to assume that the price level is fixed so.

## 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 2000: 1–2021: 1. 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[1] 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. Conclusions and Discussions

For many, the jury is out on the Taylor rule as it comes with several drawbacks, the most serious being it cannot account for sudden shocks or turns in the economy, such as a stock or housing market crash. In his research and original formulation of the rule, Taylor acknowledged this and pointed out that rigid adherence to a policy rule would not always be appropriate in the face of such shocks. Another shortcoming of the Taylor rule is that it can offer ambiguous advice if inflation and GDP growth move in opposite directions. During periods of stagnant economic growth and high inflation, such as stagflation, the Taylor rule provides little guidance to policy makers, since the terms of the equation then tend to cancel each other out. While several issues with the rule are, as yet, unresolved, many central banks find the Taylor rule a favorable practice and some research indicates that the use of similar rules may improve economic performance.

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[1] 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.

[2] *art. 13 para. (1) of the Code on Science and Innovation of the Republic of Moldova, no. 259/2004 (Official Monitor of the Republic of Moldova, 2018, nr.58-66, art.131)*

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