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SYSTEM DYNAMIC MODEL OF BACKWARD-LOOKING MONETARY POLICY DECISIONS

In developed countries, the primary objective of monetary policy is to achieve and maintain price stability in the country. Stabilization policy means how policymakers should use their tools to influence the behavior of inflation and output. Stabilization policy often begin from an assumption that their goal should be to keep inflation low and stable and to minimize departures of output.

The goals of stabilization policy should be models that give accurate statements about how the policy should be conducted, so here we consider a model where private behavior is backward- looking.

In our model, economy is described by two equations, one characterizing aggregate demand and the other characterizing aggregate supply. The first equation is the representation of the traditional curve IS. The second equation is the representation of Phillips curve. The following two equation describe the behavior of the two driving processes- shocks to the IS curve and to the flexible- price level of output. Also we assume that ε_t^{IS} and ε_t^Y are independent white- noise process. The final equation suggests that there may be a constant gap between the Walrasian and flexible- price levels of output.

The model is described by such system of equations:

$$y_t = -\beta r_{t-1} + u_t^{IS}, \beta > 0 \quad (1)$$

$$\pi_t = \pi_{t-1} + \alpha(y_{t-1} - y_{t-1}^n), \alpha > 0 \quad (2)$$

$$u_t^{IS} = \rho_{IS} u_{t-1}^{IS} + \varepsilon_t^{IS}, -1 < \rho_{IS} < 1 \quad (3)$$

$$y_t^n = \rho_Y y_{t-1}^n - \varepsilon_t^Y, 0 < \rho_Y < 1 \quad (4)$$

$$y_t^* - y_t^n = \Delta, \quad \Delta \geq 0 \quad (5)$$

where y_t^n is the economy's flexible-price level and y_t^* is Walrasian levels of output.

After observing u_t^{IS} and y_t^n , the central bank chooses r_t . So central bank minimizes $E[(y - y^*)^2] + \lambda E[\pi^2]$, where λ is a positive parameter that shows the relative weight bank puts on inflation and where the most desired level of inflation is normalized to zero.

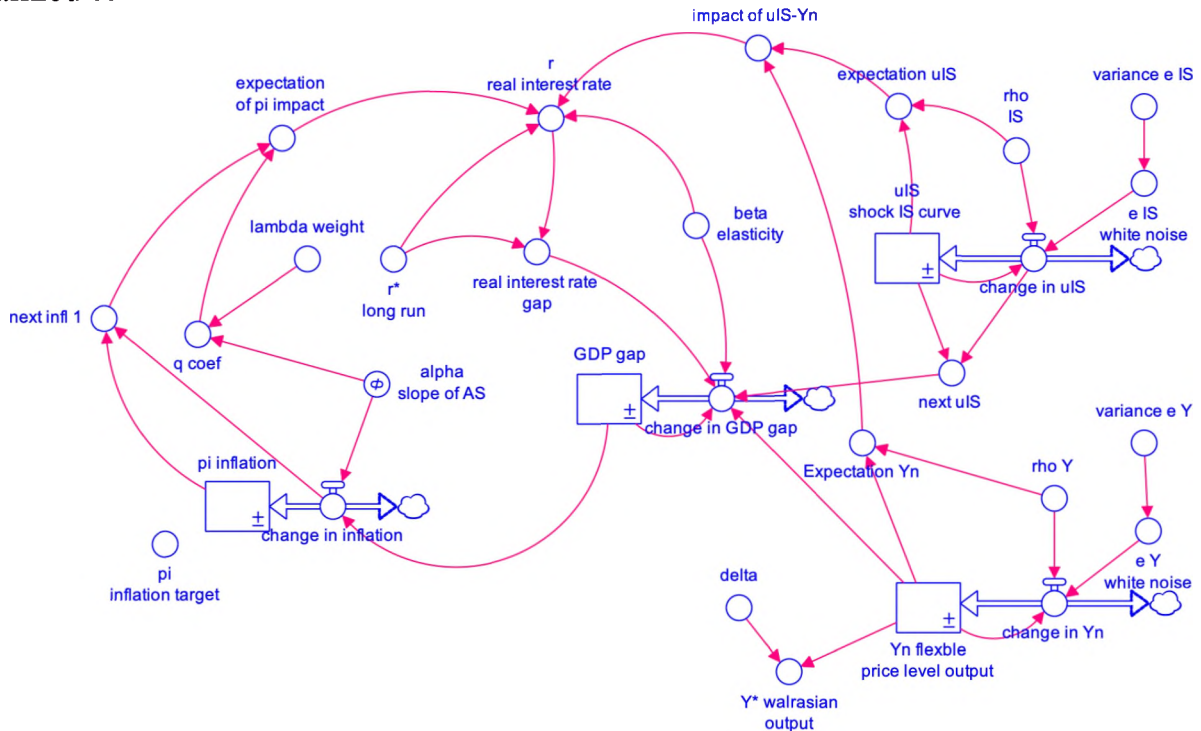


Figure 1. Backward - Looking model with System Dynamics

If λ approaches zero: the central bank doesn't care about inflation and pay more attention to bring departure of output gap to natural level. Then it follows that inflation is random walk.

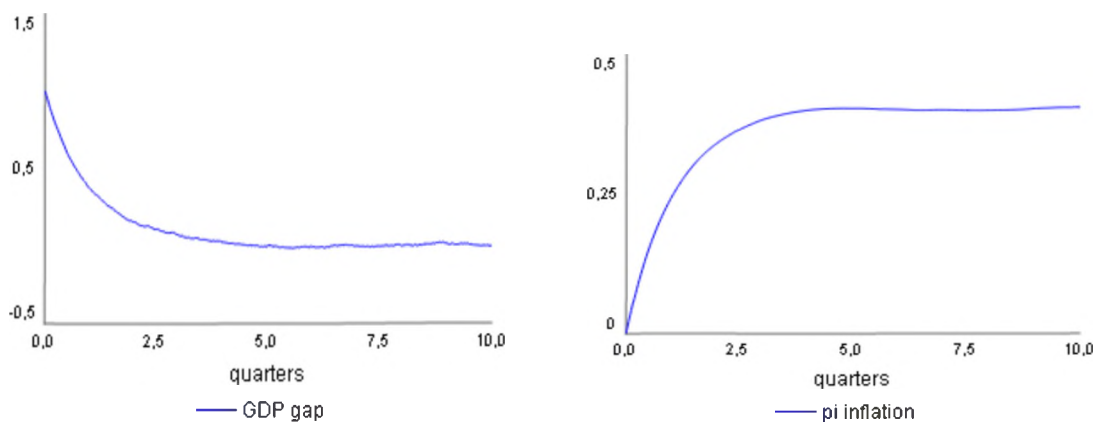


Figure 2. The choice of Central Bank $\lambda = 0$

If λ approaches infinity, this corresponds to a policy of returning inflation back to zero as soon as possible after shock. As λ approaches infinity, the variance of output does not approach infinity: even if the central bank cares only about inflation, it wants to keep output close to its natural level to prevent huge changes in inflation.

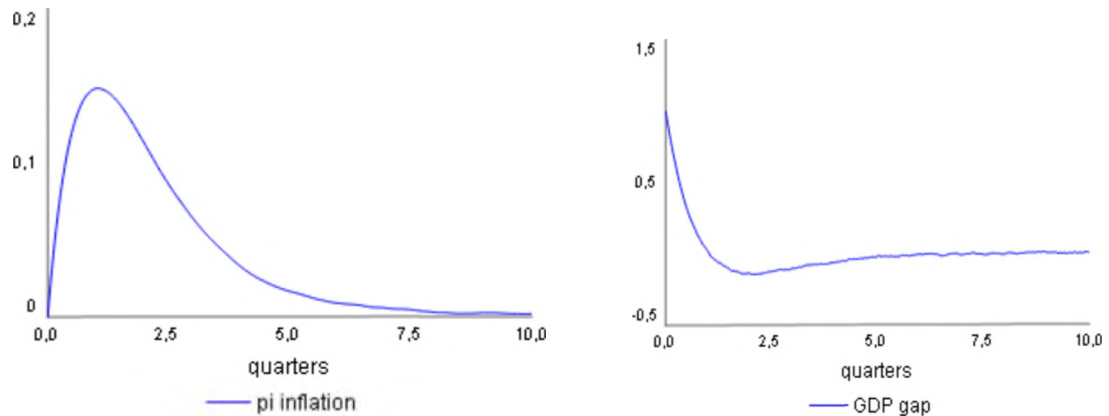


Figure 3. The choice of Central Bank $\lambda = 200$

If λ rises: the central bank pays more attention to stabilizing inflation, it induces departures of output from its natural rate to return inflation to its optimal level after a departure.

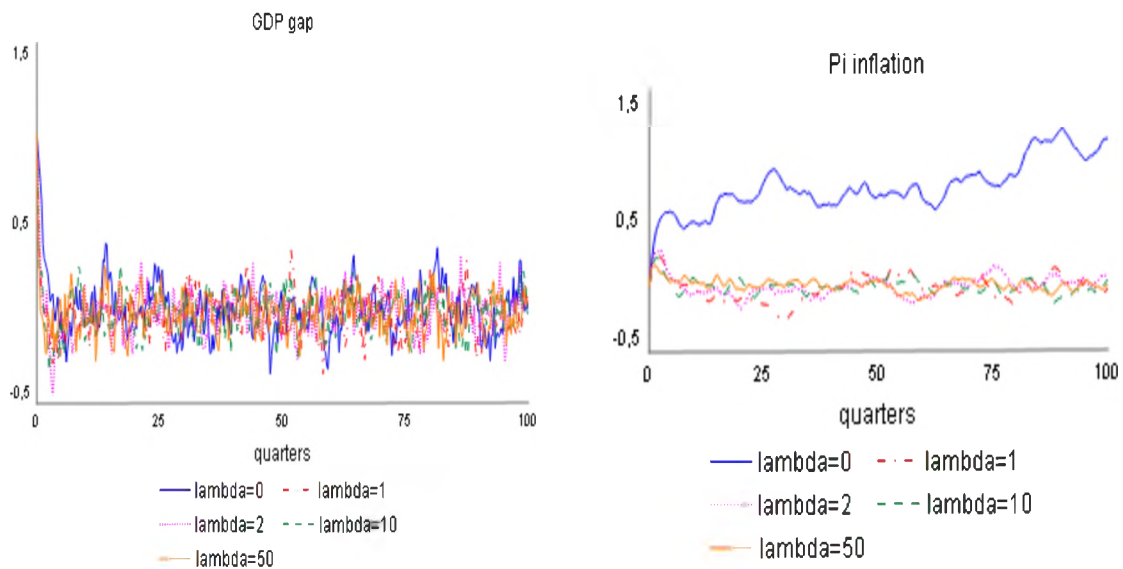


Figure 4. The choice of Central Bank $0 \leq \lambda \leq 50$

The central bank cares about inflation, it should react aggressively to changes in both output and inflation to keep inflation under control; responding to one but not the other is inefficient.

At present time, the issue of monetary policy is very relevant because of its impact on the economic system of Ukraine. Monetary policy itself, as an integral part of the economic policy of the state, has a decisive influence on the course of

economic processes in a market economy. Solving these problems and further implementing the NBU with effective and adequate monetary policy conditions will be important prerequisites for ensuring the socio-economic development of Ukraine. Therefore, we will continue to explore the peculiarities of monetary policy, in particular, using the system dynamics method.

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MODELLING WAGES AND PRICE BY USING SYSTEM DYNAMICS

Wages as an indicator is not only an indicator that determines the overall standard of living of employees. From this status and forms of realization, the shares in GDP largely depend on the possibilities of economic development in general. In a modern market mechanism, wages are becoming an increasingly important factor in the reproduction of social production. This indicator acts as one of the main regulators of the labor market. However, the analysis and assessment of the impact of wages on the labor market and, above all, the employment in Ukraine is not given due attention, which leads to negative consequences - accelerated growth of unemployment, the destruction of motives and incentives to work, etc.

The dynamics of real wages in the country characterize the dynamics of the real standard of living of the living wage population. Real wage indices make it possible to relate it to other economic indicators, such as employment, income and consumption, and production. The wage calculation is usually related to the total number of hours worked and the average wage in the country:

$$\text{Average Wage} * \text{Total Hours}$$

The average wage is a drain in our model because the initial nominal hourly wage is the average wage that changes all the time.

The average wage increase is calculated by multiplying the average wage by delaying the rate of wage growth: