

Money and Inflation in Belarus: Choosing an Appropriate Target for Monetary Policy*

- 1.1 In monetary economics, different money aggregates are usually defined, differing in the degree of liquidity. The existence of different measures of money that follow different paths raises the question of which one should be chosen as target for the monetary policy. This section deals specifically with the question for Belarus because it is an interesting issue for policy-making. Although the reasoning is technical, the text is written so as to allow non-specialists to follow the discussion.
- 1.2 In Belarus, four different monetary aggregates are usually considered. The narrower and more liquid definition of money consists in BRB notes and coins in circulation (outside the banking system), and is defined as M0. The inclusion of BRB demand deposits leads to M1, which is usually considered as the one capturing more closely the means of payment role of money. Less liquid definitions, which also allow for the store of value role, are those including respectively BRB time deposits (M2) and deposits in foreign currency (M3).
- 1.3 The issue of choosing a monetary aggregate to use as a target for monetary policy depends upon the ability of price prediction of each target. In general, the price level can be seen as the inverse of the domestic value of money, which in fact is its purchasing power over goods. Thus, a rise in money supply implies that fewer goods can be bought with the same amount of money, that is, the price level will rise.
- 1.4 The value of money depends not only on its supply but also on its demand. Money demand rises when the output of an economy grows, implying that more money is necessary to settle transactions. To abstract from this scale effect, money demand usually appears in the form of money velocity. Velocity of circulation measures the number of times money changes hands in a given period and is computed as the ratio of nominal GDP to the average nominal money supply along that period. A fall in money velocity implies that the demand for money is increasing. If, for example, inflation rises or if assets alternative to money become more attractive, economic agents will shift away from the domestic currency, thus leading to a rise in money velocity (the same amount of transactions have to be made with a lower level of money holdings), which in turn causes inflation.
- 1.5 If the velocity of circulation is stable around a certain level, then inflation will tend to be proportional to money growth in excess of output growth. Although short run shifts may cause divergent paths of money and inflation in the short run, as money velocity returns to its long-run level, inflation and money growth in excess of output growth will be roughly the same. Hence, by conducting tests to verify the “stationarity” of the money velocity of the monetary aggregates we are able to identify the money concept that is more appropriate to predict prices and therefore, the one that can be used as anchor for monetary policy in Belarus.

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Figure 1.1. Money Velocities for different aggregates in Belarus

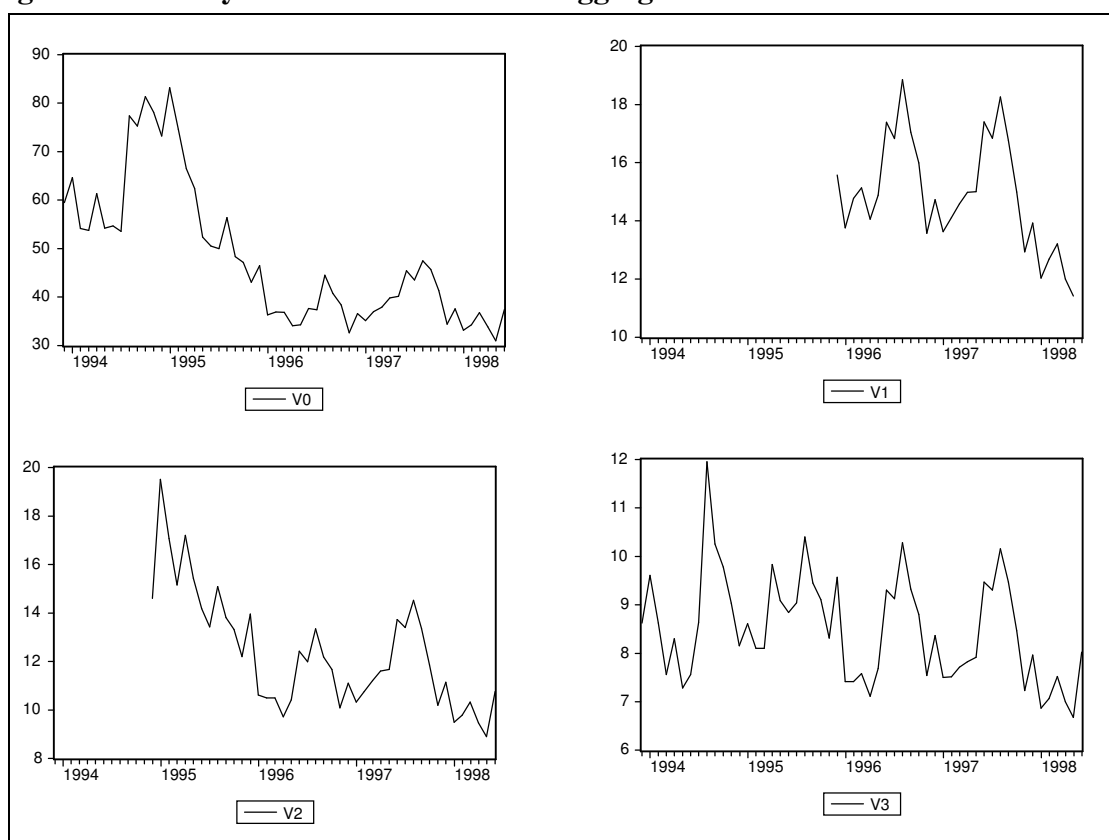


Table 1.1. Unit root tests

Money velocity	Period ¹	Dummy Variable	ADF value	Tabulated 5% Critical Value	Conclusion ²
V3	1993:12 – 1998:06	No	-4.1650	-2.9202	Reject unit root
V3	1993:12 – 1998:06	Yes	-4.1650	-2.9202	Reject unit root
V2	1994:12 – 1998:06	No	-2.2005	-2.9446	Can not reject unit root
V1	1995:12 – 1998:06	No	1.6295	-3.0521	Can not reject unit root
V0	1993:12 – 1998:06	No	-1.5077	-2.9157	Can not reject unit root
V0	1993:12 – 1998:06	Yes	-3.5805	-2.9157	Reject unit root

¹ Different time periods have been considered due to the availability of data.

² The null hypothesis (i.e., that there exists a unit root) is rejected if the ADF value is smaller than the tabulated critical value. When the null hypothesis is rejected, the series are stationary.

- 1.6 Figure 1.1 displays the money velocities in Belarus, corresponding to the four money aggregates defined above. Visual inspection suggests that M3 velocity is more stable than the other aggregates. This is confirmed by the Augmented Dickey-Fuller tests displayed in Table 1.1.³ When conducting the tests a dummy variable was also tested, so as to allow for a regime change after the hyperinflation episode. The cases in which the dummy was significant were included in Table 1.1.
- 1.7 The results reveal that V3 is stable around a constant level, even when no change in regime is accounted for.⁴ M0 velocity can only be shown to be stable if the change in regime is considered, while M1 and M2 velocities are not stable, either accounting or not for a change in regime.
- 1.8 These results suggest that in Belarus both M0 and M3 may provide appropriate guides to predict prices. An error correction model (ECM) capturing the relationship between money and inflation was estimated for these two aggregates, yielding the following results:^{5, 6}

A forecasting model for inflation using M0 as explanatory:

$$\Delta p_t = 0.12 - 0.09[p + y - m_0]_{t-1} + 0.09\Delta(m_0)_{t-6} + 0.13\Delta(m_0)_{t-7} + 0.26D_1 + 0.10D_2$$

(2.31) (-1.95) (1.57) (2.12) (10.18) (2.41)

$$R^2 = 0.92, \text{ Adjusted } R^2 = 0.86, \text{ Standard Error of Regression} = 0.039$$

A forecasting model for inflation using M3 as explanatory:

$$\Delta p_t = -0.04[p + y - m_3]_{t-1} + 0.19\Delta(m_3)_{t-1} + 0.13\Delta(m_3)_{t-2} - 0.09\Delta(m_3)_{t-4} -$$

(-2.23) (3.14) (2.03) (-1.43)

$$-0.10\Delta(m_3)_{t-7} + 0.15\Delta(m_3)_{t-9} + 0.18D_1 + 0.10D_2$$

(-2.20) (2.92) (8.10) (3.88)

$$R^2 = 0.96, \text{ Adjusted } R^2 = 0.91, \text{ Standard Error of Regression} = 0.026$$

- 1.9 The actual and predicted inflation under these two models are depicted in Figures 1.2 and 1.3. The estimation results indicate that the predictions obtained by the monetary aggregate M3 are better than those obtained when M0 is taken as the explanatory variable.⁷ Thus, M3 provides a better inflation predictor.

³ The number of lags in the test was determined so as to eliminate residual auto-correlation and was 0, 12, 6 and 4 for V0, V1, V2 and V3, respectively.

⁴ Some additional tests were also performed on the separate series of the level of prices, money supply and real output. M3, prices and real output were shown to be non-stationary along the time period considered (1993:12 – 1998:06), which means that the three series together co-integrate in the form of a stationary V3.

⁵ Lower case letters are used to denote the natural logarithm of the variables. For example, p represents $\ln(P)$ and the difference of it (the dependent variable in the equations above) is the inflation rate.

⁶ D_1 is a dummy variable representing the change in regime in May 1995. It is of value one until April 1995 and of value zero thereafter. D_2 is a pulse dummy capturing the January 1997 price release, that is set to zero for all periods except January 1997, where it has value one.

⁷ At the first sight residuals in 1.3 may appear to be larger than those of 1.2, but this is because the displaying range is smaller. As shown above, the correlation coefficient is substantially higher in the second specification.

1.10 However, M3 does not offer a useful anchor for the monetary policy under flexible exchange rates. Since M3 includes foreign currency deposits, the value of this aggregate in domestic currency depends on the exchange rate. For example, an exchange rate depreciation will imply an expansion of M3 and consequently an increase in prices, even though no further BRB emissions occurred. Nevertheless, M3 may still be used to forecast inflation, in the lines of the estimation results obtained above.

Figure 1.2. Actual and Predicted Inflation when M0 is chosen as Explanatory Variable

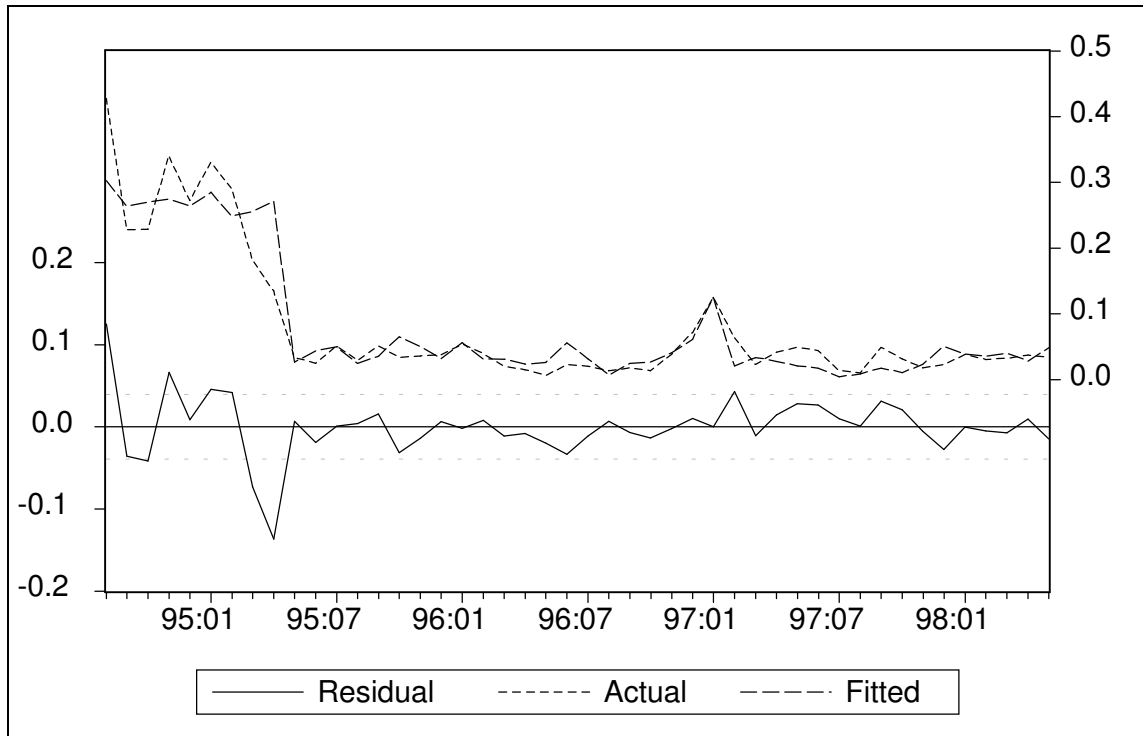


Figure 1.3. Actual and Predicted Inflation when M3 is chosen as Explanatory Variable

