Monetary Policy with Endogenous Money Supply
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Abstract
We develop a modified cash-in-advance model where we add asset market to goods and money market. In our model, money supply changes with households borrowing decisions. Moreover, the model has two separate price systems: asset and general price systems. As a result, in our steady state analysis, while an expansionary monetary policy can tame asset prices, its effect on general price level is the same regardless of asset demand.

Motivation:
- Asset prices, borrowing, and debt stock are closely related in an economy.
- We observe that asset prices are correlated to money supply.
- Asset prices and general price level do not follow the same path which requires a dual price system, general price level, and asset prices.

Model
- A representative agent model
- A modified Cash-in-Advance (CA) model
- In a CA model, “money” is in the form of cash only, where more model bank deposits are money as well.
- Consequently, in the model, money’s demand is driven by the quantity of money in the economy. If in the debt stock, we use an agent’s average in periods, we period borrowing or saving in negative at period. If the interest rate is 1
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Assets
- Households have the opportunity to build up wealth in the form of assets which have no returns other than their nominal appreciation or depreciation. \( A_t \) is the nominal value of an agent’s asset stock at period. \( A_t \) is how much assets is purchased at period.
- The nominal value of assets is determined by the quantity of assets purchased by multiplying the quantity of assets \( q_t \) by the general price level \( P_t \) and the asset price level \( P_{A_t} = P_t \).
- The quantity \( q_t = q_{t-1} + q_{t-1} \) where \( q_t \) is asset period depreciation and is in terms of \( \frac{d_q}{d_t} = q_{t-1} + q_{t-1} \) where \( P_{A_t} = P_t \).
- Asset supply is constant at a “p” every period. Therefore, asset market equilibrium conditions, \( q_t = d_t \), demand equals supply.

The Budget Constraint
- \( F_t = F_{M_t} + F_{P_t} + F_{A_t} + F_{D_t} + F_{C_t} + F_{L_t} + F_{H_t} \)
- Households have a constant stream of real income, \( Y_t \). They can borrow, \( B_t \) (saving \( s_t \)), they can also consume, \( C_t \) and save, \( s_t \).

Market Clearing
- To close the money market, we have a borrowing limit \( d_t = s_t - d_t \)
- The borrowing limit is the net worth of households, the difference between their asset stock and debt stock. We assume that banks lend as long as the net worth is positive. More debt than assets implies a negative \( d_t \), savings.
- The asset market equ. in condition \( A_t = d_t \), where \( d_t \) is asset demand, \( q_t \) is asset supply, \( q_t = d_t \) in equilibrium, \( A_t \) is determined in the model. Asset prices make sure that demand equals supply.

Results
- \( \frac{d_q}{d_t} = \frac{1}{1 + s_t} \) is the markup of asset stock as increasing, \( d_t = d_t < 0 \)
- We assume asset stock \( A_t \) has a steady state too. This requires buying assets to keep asset stock steady when assets are being sold.
- \( \frac{d_q}{d_t} = \frac{1}{1 + s_t} \) is the markup of asset stock as increasing, \( d_t = d_t < 0 \), as long as there is demand for assets, \( d_t > 0 \), an expansionary monetary policy lowers steady state asset price inflation.
- \( \frac{d_q}{d_t} = \frac{1}{1 + s_t} \), regardless of asset demand, an expansionary monetary policy lowers steady state general price inflation too.

Conclusion
- Adding a second price system to a model where money provided to purchase not only goods but assets too is necessary to analyze the effects of monetary policy on inflation, and asset price inflation.
- A sudden drop in asset prices reduces households’ asset too, but rather than.
- A low interest rate policy is intended to increase asset prices. But as long as the real value of asset stock is strong, this will lead to negative inflation rates and household saving instead of borrowing, it is the case for Japan.

Further Research: This model assumes debt stock and asset stock are steady, \( d_t = d_t \) and \( A_t = A_t \), which is a significant restriction on the model. Analyzing the dynamics of the model rather than the steady state of the model is necessary.

References