MACROECONOMIC STABILIZATION POLICY IN THE CONTEXT OF INVENTORY DYNAMICS

by

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ABSTRACT

The aggregate demand-aggregate supply (AD-AS) model presented in most intermediate and advanced macroeconomic texts may provide misleading insights into the effects of economic stabilization policies. Conventional analysis of the AD-AS model shows that policies which raise demand during periods of peak unemployment and reduce demand during periods of low unemployment tend to stabilize the economy. This paper:

(1) Develops a dynamic version of the AD-AS model;

(2) Shows that the model produces a very long period oscillation (approximately 50 years);

(3) Shows that conventional stabilization policies increase damping of the long cycle;

(4) Adds inventories to the base model;

(5) Shows that inventories introduce a business cycle fluctuation to model behavior;

(6) Shows that conventional stabilization policies destabilize the business cycle behavior mode.

The paper should help explain why standard "stabilization" policies tend to destabilize the business cycle in the System Dynamics National Model.

A simple dynamic version of the static AD-AS model is developed which describes the disequilibrium adjustment mechanisms

controlling output, employment, capital investment, consumption, price level, interest rate, and expected inflation. The dynamic equations are very simple, involving only the concepts of exponential stock adjustment, exponential smoothing, a Phillips curve, and conservation of physical flows. The base model contains a total of six states. All system parameters have a direct physical interpretation and empirical estimates for most have been made in the literature. Simulation of model response to a demand disturbance reveals the dominant mode to be a long cycle with a period of about 50 years.

Changes in model behavior under four different stabilization policies are examined. Two of the policies are so-called "automatic stabilizers":

(1) Graduated income tax, and

(2) Countercyclic government transfers to consumers.

The other two are discretionary stabilization policies:

(3) Countercyclic government spending

(4) Countercyclic manipulation of the money supply.

All four policies tend to increase damping of the long-period cyclic mode in the base model and thereby confirm the stabilizing effects of those policies.

The base model is then modified to include conservation of the level of inventory and feedback from inventory adequacy to the output decision. The structural modification involves adding one

state variable and modifying desired output equation. The augmented model with inventories exhibits a new 5-year oscillatory mode superimposed on the original long cycle. The new mode closely resembles the business cycle in period and amplitude and phase relationships. The four stabilization policies reduce damping and therefore destabilize the business cycle mode while simultaneously increasing damping and therefore stabilizing the long cycle. Over the course of the business cycle, inventory lags employment by about 90 degrees so when employment is lowest (and unemployment is highest) inventories are falling most rapidly. Increasing demand at this point causes inventories to fall more rapidly, increasing inventory undershoot and subsequent employment overshoot, thereby reducing stability.

Behavioral analysis includes linearizing the DYNAMO model using DYNASTAT and calculating the system eigenvalues and eigenvectors for each model run. Analysis of eigenvalues reveals the effect of changes in structure, parameters, or policies on all modes of behavior. Insights into policy effects on hidden behavior modes can be obtained through eigenvalue analysis which is difficult or impossible to glean through visual inspection of standard DYNAMO printouts and plots. Linearization does no violence to the dynamics of the model since it is designed to deal with small cyclic excursions around a stationary equilibrium.

The analysis provides a simplified explanation of why the System Dynamics National Model produces stabilization policy conclusions which run counter to the conventional wisdom. The work should help bridge the gap between familiar models in macroeconomic theory and the full System Dynamics National Model.