NORTH-HOLLAND

P^* Revisited: Money-Based Inflation Forecasts with a Changing Equilibrium Velocity

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Alternate recursive estimates of equilibrium velocity are obtained by applying regression trees and OLS methods to a standard representation of *M*2 demand. Equilibrium velocity is defined as the velocity level that would be expected to hold if deposit rates were at their long-run average (equilibrium) value. We simulate the alternative models to obtain real-time forecasts of inflation and evaluate the performance of the forecasts obtained from the alternative models. While a P^* model based on a constant equilibrium velocity does not provide accurate inflation forecasts over the 1990s, we find that a model based on our time-varying equilibrium velocity estimates is quite accurate.

Keywords: Inflation forecasting; *M*2 velocity; Quantity equation

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I. Introduction

Given an estimate of real potential output, Q^*, and an estimate of equilibrium velocity, V^*, P^* is defined as the equilibrium level of prices supported by the current quantity of money in circulation, M:

$$P^* \equiv \frac{MV^*}{Q^*} \tag{1}$$

As Hallman et al. (1991) showed, P^* can potentially provide a useful anchor for the price level and as such be utilized as a tool for predicting inflation. The framework for understanding the monetary dynamics of inflation relies on the simple idea that if the

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current price level, P, deviates from its equilibrium level, P^*, then inflation will tend to move so as to close this gap between the actual and equilibrium price levels—the price gap.

However, implementation of the framework requires a firm understanding of what the level of equilibrium velocity is. Much of the original appeal of the Hallman et al. study was based on the simplicity of their definition of V^*. Using the $M2$ monetary aggregate, they showed that assuming a constant equilibrium velocity for their sample (1955–1988) was a sufficiently accurate representation despite the waves of financial innovation, which had taken place during that time period. As monetary practitioners and theorists have always recognized, however, continuous innovation in financial markets implies that such presumed observed constancies cannot be taken for granted.[1]

By now, it is well known that the presumption of constancy of the equilibrium velocity of $M2$ is no longer valid. As early as 1991 the stability of the historical statistical relationships involving $M2$ was already being questioned at the Board of Governors. [See Feinman and Porter (1992) for an early accounting of this breakdown. Orphanides, Reid and Small (1994) discuss the role of financial innovation in this breakdown.] And consequently, it was recognized that using the P^* framework to forecast inflation, based on the assumption of a constant equilibrium velocity for $M2$, was no longer reliable.

In this paper we investigate how to adapt the original P^* framework to an environment in which V^* may be time varying. Specifically, we provide some guidance regarding how the equilibrium velocity of $M2$ could be adjusted in real time to enable continuing use of the price gap for forecasting inflation.

An obvious ex post "correction" could been obtained directly by simply computing the value of V^* that would have eliminated the inflation forecast errors resulting from the incorrect assumption of a constant V^*. But such an exercise is circular and would be useless for forecasting inflation in real time. Rather, information from other variables observed contemporaneously with velocity should be brought into consideration. To that end, we examine the co-movements of velocity and the opportunity cost of money suggested from traditional money demand formulations as our alternative source of information regarding potential changes in equilibrium velocity and compute the change in V^* implied in that relationship.[2] We examine several alternative specifications of V^* that could have reasonably been obtained in real time by recursive estimation, as soon as the breakdown in equilibrium velocity was recognized. Eventually, each of our estimates exhibits a noticeable upward shift in equilibrium velocity of about the same amount, although they differ somewhat regarding the date when the shift became evident.

Using these alternative specifications of V^* we then show the corresponding 1-year-ahead inflation forecasts for the 1990s. The results suggest that much of the deterioration in the inflation forecasts obtained from the P^*framework using the incorrect assumption of constant equilibrium velocity is reversed once we account for the apparent shift in equilibrium velocity.

[1] Indeed, in recognition of this truism, Hallman et al. warned that "[if] permanent shifts to velocity are empirically significant, actual prices would diverge from P^* in the long run."

[2] Koenig (1994) recognized the usefulness of bringing information from such sources to bear on the P^* framework when he proposed a simultaneous estimation of money demand and P^*models.