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Central Bank's interventions and the Fisher hypothesis: a threshold cointegration investigation

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Abstract

The long-run relationship between nominal interest rates and inflation is examined, allowing for structural breaks and asymmetric mean reversion. From a Threshold AutoRegressive (TAR) test applied to the residuals of the cointegration relationship (while allowing for both a break in the mean of the long-run equation and a smooth regime-transition), there is strong evidence for non-linear mean reversion properties for the real interest rates of the US Treasury Bill market. This suggests asymmetric changes to inflation shocks in the Central Bank's reaction function. The existence of different regimes is consistent with some interpretations of the monetary policies run by the Fed, such as credibility and opportunism.

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1. Introduction

Despite intensive empirical studies and an extensive literature, it seems that no consensus has emerged about the statistical properties of the real rate of interest and more generally about the validation of the Fisher effect, which is a relationship that

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postulates a nominal interest rate in any period equal to the sum of the real interest rate and the expected rate of inflation.

It is important to understand this lack of consensus for two main reasons. First of all, the real interest rate is a crucial determinant of investment, savings and all intertemporal decisions. This means that a potential non-stationarity of the real interest rate would have important consequences concerning the effects of monetary policies and also for economic and financial models. Secondly, it seems that many studies using theoretical models (such as the Capital Asset Pricing Model (CAPM)) or econometric methodologies (such as the Generalized Moments Methods (GMM)) routinely assume that the real interest rate is stationary. This should be very confusing, as empirical works indicate that this is not so or at best holds only over short periods.

The statistical characterisation of the real interest rate has therefore been investigated by many macroeconomists, unfortunately with contradictory findings. As the literature clearly indicates, the nominal interest rate is non-stationary (Fama and Gibbons, 1982; Mankiw and Miron, 1986); it has, however, proven difficult to provide definitive evidence concerning the *ex ante* real interest rate, since it is inherently unobservable. For instance, Rose (1988) tested for cointegration using the techniques suggested by Engle and Granger (1987). At the annual frequency, none of the tests indicated cointegration at even the 10% significance level. By conducting a re-examination of the Fisher effect in the postwar United States, Mishkin (1992) noted the Fisher effect's lack of robustness to the period considered and found that the evidence did not support a short-run relationship in which a change in expected inflation is associated with an immediate change in interest rates. More recently, Garcia and Perron (1996) re-analysed the data using Markov Switching (MS) methods and found support for a stable real rate of interest, subject to infrequent changes in the constant. These authors concluded that the *ex ante* real rate of interest was effectively stable, but subject to two mean shifts over the period 1961–1985. To summarize, the empirical evidence gives a mixed picture of the statistical properties of the real rate of interest, and it is probably fair to say that the generating mechanism for the real rate is not well understood.

However, as has been mentioned by Coakley and Fuertes (2002), the growing interest in inflation targeting and the opportunistic behaviour of the Central Banks are two of the reasons for exploring asymmetries in the key variables studied here. According to the proponents of the opportunistic approach (Orphanides and Wilcox, 1996), when inflation is moderate but still above the long-run objective, the Fed should not take deliberate anti-inflation action, but rather should wait for external circumstances (such as favourable supply shocks and unforeseen recessions) to deliver the desired reduction in inflation.

The main goal of this article is thus to resolve the Fisher effect 'puzzle' for the period 1951–1999 with the application of recent econometric methods to the quarterly US Treasury Bill real interest rates.

The main innovation of our methodology is therefore to undertake an investigation of potential asymmetries (as a smooth transition extension of the Self-Exciting Threshold AutoRegressive (SETAR) model) with cointegration tests robust to structural

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