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Utilizing financial market information in forecasting real growth, inflation and real exchange rate

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ABSTRACT

In this paper we build an open economy extension of the Gordon (1962) valuation model that suggests a simple forecasting system for three macroeconomic variables; the real growth, inflation and real exchange rate. All the forecasting equations in our system utilize current financial market information in the form of dividend yields and short-term interest rate. Our empirical results indicate that these simple forms of financial market information are relevant for forecasting the time-varying underlying trends in the macroeconomic data for the U.K., Eurozone and Japan, when treating the U.S. as the world market.

1. Introduction

The recent downturn in economic activity has again intensified research on the connections between the financial market and macroeconomic performance. It is clear that even though the aggregate stock market indexes like the S&P 500 for the U.S. market and S&P 350 for the Euro market have experienced a strong positive long-run (e.g., 5-year) trend for decades, even fairly short-term (e.g., from 3 to 6 months) periods of decreasing stock market indexes are always worrying for the financial market practitioners and policy makers, in view of their potential real economy effects. In the current situation, although during the most recent months the stock markets globally have experienced some kind of recovery, the overall, 'final' medium- and long-term macroeconomic effects of the experienced almost 2-year slack in some parts of the global financial system are yet to be seen.

Stock and Watson (2003) lay a good ground for the empirical analysis of the role of financial market prices and/or returns in forecasting macro economy.[1] The basic idea in almost all the analyses in this area[2] is the fact that asset prices are forward-looking, and they form a class

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[1] See also Domian and Louton (1997) and Black, Fraser and Groenewold (2003) for the previous analyses on the relationships between the stock market returns and the real economy.

[2] Based on their own studies and a huge number of studies by other researchers Stock and Watson (2003) give an extensive review on the possibilities of the sets of different kinds of financial market and other economic indicators that might have a role to play in forecasting especially the values of economic growth and inflation. However, in this paper we want to focus primarily on the role of simple stock market information. Another comprehensive review on these issues is provided by Cochrane (2006) in his collection of some of the most essential articles on our theme. Other recent papers focusing especially on real growth and inflation forecasting in the U.S. and Euro area are for example Banerjee and Marcellino (2006) and Marcellino, Stock and Watson (2003). See also Heilemann and Stekler (2007) and the other articles in the special issue of the International Journal of Forecasting (2007/2) for the discussion on current directions of research trying to resolve the problems (both theoretical and empirical) in macroeconomic forecasting.

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of potentially useful predictors of future values of macroeconomic indicators like output growth and inflation. Stock & Watson also argue that actually the role of asset prices in forecasting future aggregate economic conditions is basically rooted in some fairly simple foundational macroeconomic concepts. Among these are the theory by Irving Fisher stating that the nominal interest rate is comprised of real interest rate plus expected inflation, and the hypothesis that stock prices reflect the expected present discounted value of stock market fundamentals, e.g., future earnings or dividends.[3] However, the general finding from the studies on macro forecasting using several types of financial data sets is that it seems to be the case that some data forecast some macro variables in some countries for some time periods, but the sets of relevant forecasting financial data collections vary a lot between countries and time periods (see Stock and Watson (2003)).

Put it more precisely, for example Guo (2002) first replicated the Campbell, Lettau, Malkiel and Xu (2001) result for the U.S data, that in the period of 1963:Q1–1997:Q4 the excess stock market returns were statistically insignificant in predicting GDP growth if stock market variance was also included to the forecasting equation. However, when he extended the data sample to cover the period of 1947:Q2–2000:4, he found that the excess returns actually drove out the variance in forecasting output growth. On the other hand, for the case of inflation forecasting, Goodhart and Hofmann (2000) added the changes in share prices and (nominal) exchange rate to the inflation forecasting equation, which also included the real GDP growth, broad money growth, short-term nominal interest rate, and changes in the house prices, all these with appropriate numbers of lags. The regression analysis was conducted using semi-annual and quarterly data for eleven countries, and the sample period varied from the largest of 1966:Q1–1998:Q3 (for the U.S.) to the smallest of 1982:Q1–1998:Q3 (for Canada). The overall result was that the asset market variables (changes in share prices and nominal exchange rate) were not very useful in out-of-sample forecasting compared to the more traditional 'leading variables' of inflation, like the change in the amount of broad money.

None of the above mentioned studies attempt to derive a forecasting system based on similar long-run arbitrage conditions that we use. Our theoretical framework is based on a set of simple stock and currency market arbitrage conditions added to the standard equilibrium conditions for the nominal and real interest rates (Fisher parity and Euler equation), so we are not attempting to derive a fully specified general equilibrium model for a dynamic aggregate economy. However, based on these already simple long-run equilibrium conditions we are able to derive a three-equation system for forecasting real growth, inflation and real exchange rate, that seems to work in out-of-sample forecasting exercises clearly better than e.g. the simple structural time series models for real growth and inflation forecasting utilized in many of the papers mentioned above.

One of the main contributions of our system model is that it yields also a forecasting equation for the real exchange rate, which is one of the most important macroeconomic variables due to e.g. its role in describing the international competitiveness of real economies. Previously, for example Ehrmann, Fratzscher and Rigobon (2005) analyzed the degree of financial transmission between money, bond, equity and currency markets between the United States and the Euro area. They found strong international spillover effects, both within asset classes as well as across financial markets. They also reported that the direct transmission of financial shocks within asset classes is strengthened through indirect spillovers via other asset prices. These results call for a better understanding of international cross-market financial linkages, which so far has been missing in the literature. Phylaktis and Ravazzolo (2005) used a data set of a group of Pacific Basin countries over 1980–1998 and analyzed it with cointegration and VAR models. They found an evidence of positive correlation between foreign exchange and stock markets and that the U.S. stock market acted as a conduit through which the foreign exchange and the local stock markets are linked.

For the part of the exchange rate vs. stock market discussion perhaps the most intriguing recent paper for our analysis is the one by Hau and Rey (2004). They introduce three main hypotheses for this relationship, based on the portfolio rebalancing effects presented by Kouri (1982) and Branson and Henderson (1985). According to their first hypothesis foreign equity market appreciations relative to the home equity market induce a portfolio rebalancing effect in the form of a home investor's reductions of foreign equity holdings for the purpose of reducing her exchange rate risk exposure. This results in foreign equity outflows and a home currency appreciation. Their second hypothesis states that if the foreign currency appreciates, it increases the home currency share of assets in the foreign market and the higher overall foreign exchange rate risk exposure for the home residents may induce foreign equity market outflows, and the foreign outflows should produce negative foreign equity excess returns, when returns are measured in local currency. The third hypothesis states that the equity-flow innovations change the demand for currency balances and for equity. Foreign equity market inflows appreciate the foreign currency relative to home currency and induce excess returns in the foreign equity. All these hypotheses gain support from their empirical analysis using monthly portfolio flow data for the period of January 1990–September 2003 from France, Germany, Japan, Switzerland, and U.K., and treating the U.S. as the home country. However, the low-frequency nature of the portfolio flow data and the inclusion of two price variables (exchange rate and the stock price(s)) in the VAR representations of the data appear inconsistent with any particular causal ordering, so the direction of causality between the two markets remains more or less an unsolved question.

This paper contributes to both 'branches' of macro forecasting and of financial market connections to the currency market literature. We propose a model which includes many of the insights from the above papers in a somewhat compact way. We start from basic macroeconomic equilibrium conditions mentioned, but not formally introduced/analyzed, also in Stock and Watson (2003). However, we extend their work to an open economy context, and arrive finally at a prediction model consisting of three simple equations for real economic activity, inflation and real exchange rate. In the empirical analysis we are especially interested in our model's ability to extract the underlying time-varying long-run trends in the forecasts of the aggregate macro data based on simple, but noisy contemporaneous observations from the stock markets.

The rest of the paper proceeds as follows. In Section 2 we derive our forecasting model. In Section 3 we describe the data used in the empirical analysis and in Section 4 we report the results from our empirical analysis based on some standard time series analytical tools. Finally, Section 5 gives conclusions and discussion.

[3] For an early practical implementation of this latter idea, see Mitchell and Burns (1938).