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An econometric model for estimating the equity risk premium

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Abstract

In this paper we estimate the relation between the equity risk premium and the fundamental macroeconomic and financial variables in the United States during the period 1964-2012 by applying the standard OLS regression and the Hodrick-Prescott filter. Consequently, based on these results and applying the ARIMA models we forecast the evolution of the equity risk premium in the United States for the period 2013-2016. According to our results the equity risk premium in the United States is going to gradual increase in the following years, an evolution determined by the FED monetary policy perspectives, but also by the narrowing of the private consumption gap.

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Keywords : equity risk premiun; fundamentals; ARIMA

1. Introduction

The concept of equity risk premium (ERP) is a central one in modern finance and accounting theory, being related to the research of Markowitz (1952) on financial markets.

There are several methods for estimating ERP (Cohen, 2009): firstly, the ERP can be estimated from the CAPM; secondly, by surveying investment professionals; thirdly, by using the actual returns unbiased estimates for the expected returns of assets.

In this paper we study the relation between the equity risk premium and several macroeconomic and financial variables. In our view, the equity risk premium may be influenced on the money supply in the economy (the broad money): the increase of the money supply may lead to an increase of the stock indexes, resulting in possible bubbles.

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At the same time, the equity risk premium may be influenced by the evolution of the private consumption (the main component of the GDP in the United States, with a weight of 68%) and its trend. This gap may reflect the states of over-optimism and over-pessimism of the investors in the financial markets.

We also study the relation between the equity risk premium and the valuation indicators of the S&P 500 index (the PER indicator). A higher value of PER may express a lower risk aversion of the investors, and consequently would lead to a decline of the ERP.

Last, but not least, we also include in our analysis the Real Effective Exchange Rate, an indicator important both from the real economy or financial economy sides. On the one hand, the evolution of the real effective exchange rate is a barometer of the external competitiveness of an economy. On the other hand, it may reflect the changes in terms of financial markets risk aversion, as was several times noticed over the past years (since the launch of the Great Recession).

2. Data and methodology

In this paper we took into account the ERP computed by Damodaran (annual data, for the period 1964-2012) and presented on his website.

For the macroeconomic and financial variables described above we used the annual data from St. Louis Federal Reserve (for the broad money and the private consumption) and from the Bank for International Settlements (for the real effective exchange rate). For the evolution of PER we employed the Stock Market Data Used in "Irrational Exuberance" by Robert Shiller (2005).

In order to capture the structural dynamics of the relation between the ERP and the above mentioned elements we took into account the structural components of these elements (determined by employing the Hodrick-Prescott filter). We estimate the following equation:

$$ERP = C(1) + C(2) * BMTRENDF + C(3) * GAPPCF + C(4) * PERTRENDF + C(5) * REERTRENDF + \varepsilon \quad (1)$$

In the above equation ERP is the annual equity risk premium for the United States, BMTRENDF represents the forecasts for the trend of the broad money and GAPPCF reflects the forecasts regarding the evolution of the gap between the private consumption and its trend. At the same time, the PERTRENDF represents the forecasts for the trend of PER for S&P 500, while the REERTRENDF reflects the forecasts for the trend of the real effective exchange rate.

The econometric filter Hodrick – Prescott is a frequently employed method in order to distinguish between the structural (trend) and cyclical component of the macroeconomic variables. The filter is based on the following formulae:

$$Min\{\sum_{t=1}^{T}(Y_t - Y_t^*)^2 + \lambda\sum_{t=2}^{T-1}((Y_{t+1}^* - Y_t^*) - (Y_t^* - Y_{t-1}^*))^2 \quad (2)$$

in which Yt is the macroeconomic variable, Yt^* represents its trend and λ represents a smoothness parameter. In this paper we employ a value of 100 for this parameter, in line with the value use in the paper of Hodrick and Prescott (1997). The results of the OLS regression (according to formula 1) are presented in table 1.

Table 1. The OLS regression according to formula 1.

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	6.956	1.033	6.734	0.000
C(2)	0.383	0.091	4.217	0.000
C(3)	-0.136	0.067	-2.039	0.048
C(4)	-0.022	0.021	-1.036	0.306