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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

C(5)	-0.044	0.008	-5.250	0.000
Adjusted R-squared	0.556	Durbin-Watson stat	1.213	

As can be noticed in Table 1, the ERP seems to be positively correlated with the evolution of the money supply trend (a coefficient of 0.38, with a very high probability). This relation is in line with the historical evidence, as an acceleration of the money supply resulted in the increase of the ERP in the past decades in the United States (as can be noticed in the Fig. 1). In fact, the higher the money supply the highest the probability for stock exchange bubbles.

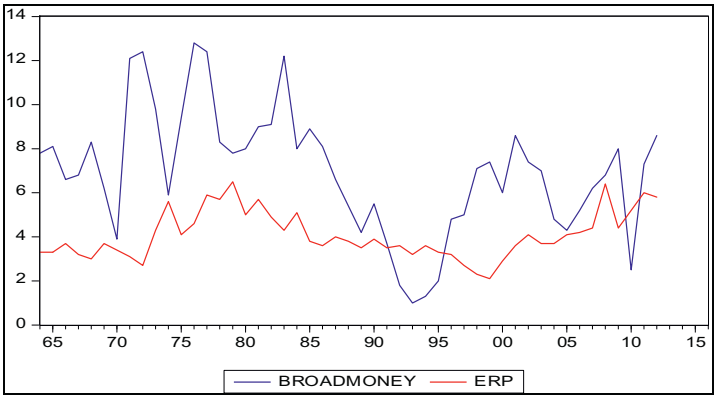

Fig. 1. The evolution of the ERP and of the broad money in the United States (1964-2012)
Source: The Federal Reserve (for the Broad Money) and Damodaran for the ERP

On the other hand, the ERP seems to be inversely correlated with the gap for private consumption (a coefficient of -0.14, with a 5% level probability). In fact, an evolution of the private consumption at a higher pace than its potential reflects an overheating momentum in the economy, reflected in a higher dynamics of the stock exchange indexes and, consequently, a lower ERP.

At the same time, ERP seems to be inversely correlated with the PER Trend (with a low probability) and Real Effective Exchange Rate Trend (a high probability), as can be seen in Table 1.

The R squared of the regression is high, around 60% of the ERP evolution being explained by the independent variables.

After estimating this OLS regression we forecasted each of the independent variable by ARIMA models. The series Broad Money Trend, Gap for private consumption, PER Trend and REER Trend are not stationary. Consequently we estimated the AR(1) model for the first difference level of each of these variables.

Based on these AR(1) models, we obtained forecasted valued for explanatory variables in eq. (1); afterwards, the ERP was forecasted (for the period 2013-2016), the results being presented in Fig. 2.

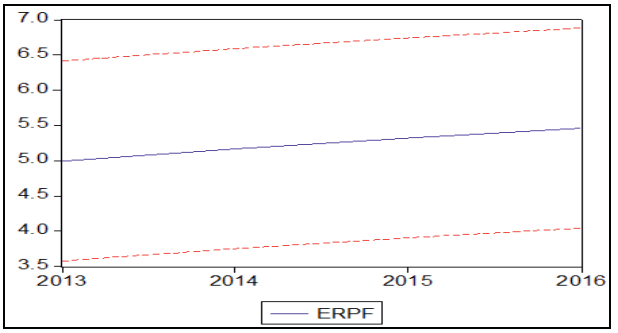

Fig. 2. The ERP forecasts for 2013-2016
Source: Own estimates based on the methodology employed

As can be noticed in Fig. 2, the ERP may gradually increase from 2013 until 2016, from around 5% to about 5.5%. This evolution would be determined by the acceleration of the money supply, by the decline of the PER trend and by the depreciation of the US dollar (the real effective exchange rate).

3. Conclusions

This analysis allows us several interesting conclusions regarding the ERP in the United States.

On the one hand, we may assist at a turning point of the ERP (inflexion from the decline over the past years to a gradual increase in the following years, as can be noticed in Fig. 3).

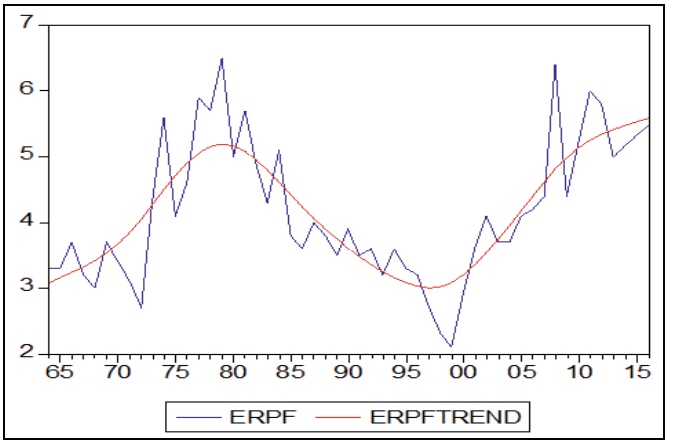

Fig. 3. The evolution of ERP (1964-2012) and forecasts for 2013-2016
Source: Damodaran and own forecasts based on the methodology employed

This evolution would be determined by the acceleration of the money supply, determined either by the re-launch of the investments flows in the economy and by the continuation of the FED monetary expansionism (at a slower pace). It seems that the dependence between the financial markets sentiment and the FED non-conventional monetary expansionism became very high. Consequently, we do not expect the inflexion of the FED monetary policy to be dramatic, as it might determine a shock for the stock markets, with negative consequences for the evolution of the real economy.

At the same time, the PER Trend would decelerate in the medium-run, evolution that may reflect the toppish signals for the stock markets (at present), but also the probability of a slower pace for the companies' profits in the following years (as they re-launch the investments in the real economy).

Last, but not least, the US dollar may depreciate in the following years, as the traces of the Great Recession vanish and the US economy enters a new economic cycle.

On the other hand, the forecasted ERP inflexion in 2013 and gradual increase in 2014, 2015 and 2016 expresses a high probability for corrections of the stock markets (which trade at present at historically high levels). This has happened in the past decades when the ERP change the trend, from downward to upside. While we do not expect another meltdown, we point out that a prolonged period of stock exchange decline (not severe in amplitude terms, but prolonged) is imminent, as for instance, happened at the beginning of the 2000s. In our view, a meltdown scenario would be supported by the failure of FED to convince the markets on the inflexion monetary policy opportunity, or by the persistent fiscal and budgetary risks (the debt limit).

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