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Consumption growth, preference for smoothing, changes in expectations and risk premium

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ABSTRACT

This paper derives a relationship between consumption growth, the consumption–wealth ratio and its first-difference, and asset returns. Using quarterly data for sixteen OECD countries, we find that the three-factor asset pricing model explains a large fraction of the variation in real stock returns. The model captures: (i) the concerns of agents with states of the world in which consumption growth is low; (ii) the preference of investors for a smooth consumption path as implied by the intertemporal budget constraint; and (ii) the role played by shifts in expectations about future returns due to positive or negative news about their wealth.

1. Introduction

The finance theory suggests that expected returns should go in tandem with risk. However, the existing empirical evidence shows that differences in the exposure of consumption growth to economic risk is not sufficient to explain the variation in risk premium (Breeden, 1979; Campbell, 1996; Mankiw & Shapiro, 1986).

While several papers try to shed more light on this question and document stock return predictability (Campbell & Shiller, 1988; Fama & French, 1988; Lettau & Ludvigson, 2001; Ren, Yuan, & Zhang, 2014; Sousa, 2010a, 2012a), two main lines of investigation have been successfully explored within the representative agent formulation. The first approach focuses on the consumer's intertemporal budget constraint and makes use of data on consumption, (dis)aggregate wealth and labour income to obtain empirical proxies that track variation in expectations about future returns (i.e. *cay* by Lettau and Ludvigson (2001), and *cday* by Sousa (2010a)). The second approach is based on the concept of long-run risk (Epstein & Zin, 1989), and generates predictability as a result of the persistence of cash-flow news. In this framework, low-frequency movements and time-varying uncertainty in consumption growth play an important role in explaining risk premium.[1]

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[1] Another strand of the literature introduces time-varying risk-aversion in preferences and is based on the habit persistence model of Campbell and Cochrane (1999). Sousa (2012b) tests the assumption of constant relative risk aversion (CRRA) using

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In this paper, we present an asset pricing model that combines three key ingredients: (1) concerns about states of the world in which consumption growth is low; (2) the preference for consumption smoothing; and (3) shifts in expectations about future returns. More specifically, we derive an equilibrium relationship between consumption growth (Δc), the consumption–wealth ratio (cay) and its first-difference (Δcay) and asset returns. On the one had, our framework takes into account the fact that investors have a preference for a smooth path of consumption, as implied by the intertemporal budget and in line with the work of Lettau and Ludvigson (2001) and Sousa (2010a). On the other hand, our theoretical approach makes it explicit that when facing consumption risk, investors value more (less) states of the world in which consumption growth is low (high). Thus, although we do not rely on a specific functional form for the preferences of the representative agent, we show that consumption growth is a factor that helps to explain risk premium in the same spirit of the consumption-capital asset pricing model (C-CAPM) and the recursive preferences framework (Bansal & Yaron, 2004; Epstein & Zin, 1989). Consequently, we show that the implied stochastic discount factor and expectations about future stock returns can be expressed as a function of those three factors (i.e. Δc, cay and Δcay).

Then, we assess empirically whether such links contain relevant information for forecasting risk premium.[2] Using quarterly data for a panel of sixteen OECD countries, we find that our three-factor model explains a large fraction of the variation in real stock returns. In particular, at the 4-quarter horizon, the predictive ability of the model (as expressed by the adjusted R-square statistic) is strong for Australia, Belgium and US (both 9%), Canada (13%), Finland (15%), Denmark (17%), France (21%) and UK (24%). The results are robust to the inclusion of additional control variables and show that our model outperforms the benchmark frameworks that are widely used in the literature.[3] Moreover, they do not reflect a "look-ahead" bias (Brennan and Xia, 2005).

We also explore the relationship between stock return predictability and country characteristics. We find that the traditional fundamental variables are strongly linked with the dynamics of market returns and help to improve the forecasting power of the model. By contrast, the cross-country heterogeneity that we uncover in the predictive regressions seem to accrue less to differences in the liquidity of the equity market, but the level of development of the financial market appears to strengthen the ability of the model to capture the time-variation in risk premium.

The paper is organized as follows. Section 2 presents the theoretical approach. Section 3 describes the data and discusses the empirical results. Section 4 concludes.

macroeconomic data, and shows that the representative agent may indeed display habit-formation preferences.

[2] An interesting application of Epstein–Zin–Weil preferences can be found in Rapach and Wohar (2009). The authors describe the dynamics of asset returns by means of a vector autoregressive process and find that U.S. investors display sizable mean intertemporal hedging demands for domestic stocks and small mean intertemporal hedging demands for foreign stocks and bonds.

[3] In this context, some authors argue that portfolio outcomes can be improved by accounting for the nonlinearity of the behaviour of stock markets (Jawadi, 2008, 2009; Jawadi, Bruneau, & Sghaier, 2009). This can, in turn, be explained by the asymmetric response of investors to good and bad news, the interaction between arbitrage and noise traders, the existence of market frictions, the presence of transaction costs, the occurrence of stock market crises or the time-variation in the joint distribution of market returns and predetermined information variables (Adcock, Céu Cortez, Rocha Armada, & Silva, 2012).

2. Consumption smoothing and intertemporal budget constraint

Consider a representative agent economy in which wealth is tradable. Defining W_t as time t aggregate wealth (human capital plus asset wealth), C_t as time t consumption and $R_{w,t+1}$ as the return on aggregate wealth between period t and $t+1$, the consumer's budget constraint can be written as

$$W_{t+1} = R_{t+1}(W_t - C_t) \quad \forall t \tag{1}$$

where W_t is total wealth and $R_{w,t}$ is the return on wealth, that is,

$$R_{t+1} := \left(1 - \sum_{i=1}^{N} w_{it}\right) R^f + \sum_{i=1}^{N} w_{it} R_{it+1} = R^f + \sum_{i=1}^{N} w_{it}(R_{it+1} - R^f) \tag{2}$$

where w_i is the wealth share invested in the ith risky asset and R^f is the risk-free rate.

From Eq. (1), one obtains

$$R_{t+1}^{-1} = \frac{W_t}{W_{t+1}} - \frac{C_t}{W_{t+1}} = \frac{C_t}{C_{t+1}} \left(\frac{W_t}{C_t} \frac{C_{t+1}}{W_{t+1}} - \frac{C_{t+1}}{W_{t+1}} \right). \tag{3}$$

we have

$$R_{t+1} = e^{\Delta c_{t+1}} - [e^{\Delta cw_{t+1}} - e^{cw_{t+1}}], \tag{4}$$

where $cw_t := \log(C_t/W_t)$.

Taking logs on both sides of the Eq. (3), we get:

$$\log R_{t+1}^{-1} = \log \left[\frac{C_t}{C_{t+1}} \left(\frac{W_t}{C_t} \frac{C_{t+1}}{W_{t+1}} - \frac{C_{t+1}}{W_{t+1}} \right) \right], \tag{5}$$

which can be written as

$$r_{t+1} = \Delta c_{t+1} - \Delta cw_{t+1} - \log(1 - e^{cw_t}), \tag{6}$$

where $cw_t := \log(C_t/W_t)$ and $\Delta c_{t+1} = \ln(C_{t+1}/C_t)$.

As cw is not observable, we need a proxy for it. Following Lettau and Ludvigson (2001), we have

$$cw_t \approx \kappa + cay_t, \tag{7}$$

where cay denotes the deviations of consumption from its equilibrium relationship with asset wealth and labour income.[4]

Consequently,

$$r_{t+1} \simeq \Delta c_{t+1} - \Delta cay_{t+1} - \log(1 - e^{cay_t}). \tag{8}$$

Thus, the stochastic discount factor, m_t is:

$$m_{t+1} \propto [\Delta c_{t+1} - \Delta cay_{t+1} - \log(1 - e^{cay_t})]. \tag{9}$$

Our pricing kernel consists of three terms. The first term – which includes Δc_{t+1} – reflects the concern of agents with consumption risk in that payoffs are valued more highly in states of the world in which consumption growth is low. The second term – which includes cay_{t+1} – reflects the preference of agents for a smooth consumption path, i.e. agents allow consumption to rise (fall) temporarily above (below) its equilibrium level when they expect higher (lower) future returns. Finally, the third term – which includes Δcay_{t+1}, i.e. the first-difference of cay – captures the changes in expectations about future returns. Thus, in this paper, we derive a relationship between asset returns, consumption growth (Δc), the consumption–wealth ratio (cay) and the first-difference of the consumption wealth ratio (Δcay).

[4] In the Appendix, we also present the derivation based on the use of $cday$ (Sousa, 2010a) as a proxy for cw.