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Ultimate consumption risk and investment-based stock returns ☆

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ABSTRACT

Motivated by recent works documenting that the returns formed on real investment predict aggregate economic activities, we study whether the ultimate consumption model proposed by Parker and Julliard (2005) explains the cross-section of investment-based stock returns. We find that the ultimate consumption model with horizons from 3 to 4 years outperforms the contemporaneous consumption model. The linearized model's performance is better than that of the Fama-French three-factor model and comparable to that of the Chen-Roll-Ross model. The explanatory power of the ultimate consumption model arises from the close business-cycle relationship between the ultimate consumption growth and the investment-based returns.

1. Introduction

Among the empirical asset-pricing models, the Fama and French (1993) three-factor model has been widely used for risk adjustment since it explains most CAPM-related anomalies (Fama & French, 1996). Recent empirical studies, however, document stock market anomalies which the Fama-French three-factor model cannot explain (see Hou, Xue, and Zhang (2015) and reference therein). One challenge is to understand the negative relationship between real investment (and asset growth) and subsequent stock returns. For example, Titman, Wei, and Xie (2004) report that firms with high capital investments earn low subsequent returns. Xing (2008) finds that firms with low investment growth rates have higher returns than those with high investment growth rates. In addition, Cooper, Gulen, and Schill (2008) show that the growth in total assets has strong predictive power for future stock returns.

Given that one central function of capital market is to price real investment accurately, examining whether corporate investment is fairly priced in the cross-section of stock returns is an important research question. The literature, however, has not thoroughly investigated the driving force behind the negative relationship between firm's investment and equity returns. A few exceptions include the work of Cooper and Priestley (2011), the four-factor model proposed by Hou et al. (2015), and the five-factor model of Fama and French (2015). Cooper and Priestley (2011) show that the five-factor model

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of Chen, Roll, and Ross (1986) explains the return spread between low and high asset growth portfolios. Hou et al. (2015), and Fama and French (2015) suggest asset pricing models which explain a broad set of stock market anomalies including asset growth anomaly. Despite outstanding empirical performance, previously proposed empirical models have relatively many factors compared with the Fama-French three-factor model. Although one may include additional factors to explain anomalous stock return behavior, one should be cautious about models with many factors.

In this paper, we focus on the *one factor* consumption-based asset pricing models to overcome the shortcomings of the prior works. Although the consumption-based model has suffered from its poor empirical performance (Breeden, Gibbons, & Litzenberger, 1989; Cochrane, 1996; Mankiw & Shapiro, 1986), researchers have paid considerable attention to the consumption-based models. One reason is that consumption-based models are general in that any factor model can be regarded as a specialization of consumption-based model documented by Cochrane (2005). In addition, Cochrane (2008, p. 267) expresses the importance of consumption-based models: "At some level, the consumption-based models must be right if economics is to have any hope of describing the stock markets." Therefore, a promising research direction is to improve our understanding of consumption-based models rather than to propose alternative asset pricing models.

Among various consumption-based models, we are particularly interested in the ultimate consumption-based model proposed by Parker and Julliard (2005). Our choice of specific consumption-based model is motivated by recent empirical studies which document that the return spread between low and high investment portfolios predict aggregate economic activities including future consumption growth. Cooper and Priestley (2011) find that return spread between low and high asset growth contains information about industrial production growth and GDP growth. Wang (2013) reports that the return spread between low and high investment-to-asset portfolios is a powerful predictor for future GDP growth. Most importantly, Min, Kang, and Lee (2017) show that the zero-cost portfolios that take a long position in low-investment stocks and a short position on high-investment stocks predict future consumption growth. Note that the success of the ultimate consumption model of Parker and Julliard (2005) in explaining the cross-section of 25 size and book-to-market sorted portfolios arises from the predictive power of Fama-French factors for future consumption growth. Likewise, we expect the ultimate consumption model explain well the cross-section of asset growth portfolios given that return spread between low and high investment portfolios predict future consumption growth.

First, using the generalized method moment (GMM) cross-sectional estimator, we evaluate the empirical performance of the one-factor ultimate consumption model in explaining the 10 investment-sorted portfolios and 25 size-investment sorted portfolios. As documented in the previous literature, we find that the performance of contemporaneous consumption CAPM is disappointing in that its adjusted R^2 is near zero, and the estimated pricing error is economically large and statistically significant. In a sharp contrast, we observe the substantially improved performance of the consumption model when we increase the horizon S to measure the consumption growth. Focusing on the 10 investment-sorted portfolios, the largest cross-sectional R^2 of 0.671 occurs with horizon of four years ($S = 15$) for equal-weighted portfolios, and we observe the highest R^2 of 0.727 at $S = 9$ for value-weighted portfolios. In addition, the average difference between the sample equity returns and the model-implied returns has its quarterly absolute value under 1% and statistically insignificant when $S \geqslant 9$. Therefore, the remarkable increase in cross-sectional explanatory power in horizons from $S = 9$ to $S = 15$ indicates that the ultimate consumption risk with business-cycle horizon is closely connected to the cross-section of investment-sorted returns. In sum, the ultimate consumption model explains well the cross-section of investment-based returns.

Our result is inconsistent with the finding of Parker and Julliard (2005) who find the hump-shaped explanatory power with its peak at $S = 11$ using the 25 size and book-to-market sorted portfolios. Then, why does the best-performing horizon differ across test assets? One possible explanation is to consider the business-cycle consumption risk by Bandi and Tamoni (2017). They decompose the consumption growth into its subcomponents based on their persistence. In their model, the business-cycle components, with periodicity between 2 and 8 years, play an important role in explaining the cross-section of returns. Therefore, we do not restrict ourselves to define the best-performing horizon, which may differ from asset to asset, and focus on the "business-cycle" frequency consumption shocks as the potential driving force behind the success of the ultimate consumption model.

Second, we evaluate the ability of linearized ultimate consumption model to explain the lowest (highest) investment portfolio returns and the return spread between the two portfolios. We then compare the empirical performance of the ultimate consumption model with the two well-known asset pricing models, which are the Fama-French three-factor model and the Chen-Roll-Ross model. For ultimate consumption model, we find that the proportion of actual return spread explained by the expected return increases with the horizon S. When equal-weighted portfolios are employed, the ultimate consumption models with $S = 11$ and $S = 15$ capture 27% and 48% of the actual premium, while the Fama-French three-factor model explains 36% of the actual spread between the lowest and highest investment portfolios. Finally, the Chen-Roll-Ross model explains 67% of the actual return spread.

At a first glance, the ultimate consumption model performs worse than the competing asset pricing models. However, that is not the case for the following reasons. First, the ultimate consumption model better explains the actual return of the two extreme portfolios than any other models. When we use the 10 equal-weighted investment-sorted portfolios, the actual quarterly return of the lowest investment portfolio is 5.9% and it is 2.3% for the highest investment portfolio. We find that the expected returns of the ultimate consumption model with $S = 15$ are 4.3% for the lowest investment portfolio and 2.6% for the highest investment portfolio, respectively. In a sharp contrast, the Fama-French model desperately fails in that its expected returns for the lowest and highest investment portfolios are −3.9% and −5.1%. In the Chen-Roll-Ross model, the