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Composition of wealth, conditioning information, and the cross-section of stock returns

Nikolai Roussanov [a,b,*]

[a] The Wharton School, University of Pennsylvania, United States
[b] NBER, United States

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ABSTRACT

Value stocks covary with aggregate consumption more than growth stocks during periods when financial wealth is low relative to consumption. However, the conditional value premium does not exhibit such countercyclical behavior. Consequently, a one-factor conditional consumption-based asset pricing model can be rejected without making any arbitrary assumptions on the dynamics of the price of risk or the conditional moments. Empirical evidence is somewhat more consistent with a consumption-based model augmented with an aggregate wealth growth factor, which can be motivated by either recursive preferences or relative wealth concerns.

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1. Introduction

The central prediction of the canonical consumption-based asset pricing model (e.g., Breeden, 1979) is that average return on any security is proportional to its risk, measured by the conditional covariance of returns with aggregate consumption growth. This prediction fails dramatically when confronted with the cross-section of unconditional expected returns, and particularly for the equity portfolios of Fama and French (1993). In principle, the consumption-based model could still hold conditionally, if both the price of consumption risk and the covariances of returns with consumption growth vary over time, as argued, for example, by Campbell and Cochrane (2000). In this paper I show that the empirical properties of conditional moments of equity returns and aggregate consumption are inconsistent with the canonical conditional one-factor consumption-based model, without making any assumptions on the time-series behavior of aggregate risk aversion. The observed patterns of expected returns are potentially consistent with a generalization of the conditional consumption-based model that includes the return on the wealth portfolio as an additional priced factor. However, statistical evidence in support of the extended model, which may be hindered by the unobservable nature of aggregate wealth, is somewhat inconclusive. I identify a key feature of the data that drives the rejection of standard consumption-based Capital Asset Pricing Model (CCAPM): "value" stocks, which have high *unconditional* expected returns, typically do not exhibit a greater increase in *conditional* expected returns than "growth" stocks when their relative exposure to consumption risk rises. This fact is at odds with explanations of the value premium that appeal to a time-varying price of

* Tel.: +1 215 746 0004.
E-mail address: nroussan@wharton.upenn.edu

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consumption risk, such as Lettau and Ludvigson (2001), and thus underlies the economic (rather than purely statistical) rejection of the conditional CCAPM.[1] Imposing conditional moment restrictions prescribedby the theory in a flexible way that avoids tight parametric assumptions on the dynamics of conditional moments and risk prices reveals a conditional value premium puzzle of essentially the same magnitude as observed unconditionally.

These findings pose a challenge to some of the leading dynamic asset pricing models that rely on time-varying price of consumption risk, driven either by habit-dependent risk aversion, as in Campbell and Cochrane (1999), or by shifts in the distribution of wealth across heterogeneous investors, as, for example, in Chan and Kogan (2002). I explore an extension of the standard consumption-beta framework and consider a conditional two-factor model with contemporaneous aggregate consumption growth and aggregate wealth growth (proxied by the stock market return) — CWCAPM. Such a model can be motivated either by recursive preferences (Epstein and Zin, 1991; Duffie and Epstein, 1992) or by social status concerns (Bakshi and Chen, 1996; Roussanov, 2010). In the former class of models, wealth growth is an additional state variable because it captures innovations to the continuation utility that may not be reflected in current consumption, whereas in the latter set of models aggregate wealth enters individual preferences directly.[2] Such a conditional two-factor model substantially reduces the magnitude of pricing errors on the benchmark book-to-market and size portfolios, effectively eliminating the value puzzle. Nevertheless, the evidence in favor of the model is not conclusive as some pricing errors are statistically significant (e.g., large growth stocks actually outperform).

The key innovation in my empirical analysis is testing conditional implications of asset pricing models without specifying a particular parametric structure on the dynamics of returns and factor risk prices.[3] I develop an intuitive econometric procedure based on nonparametric kernel regression. I estimate the conditional market prices of risk using the information contained in the cross-section of asset returns via cross-sectional regressions of conditional expected returns on conditional covariances, both estimated nonparametrically for each point in the state space.[4] This approach is robust to misspecification of both the conditional moments and the prices of risk. This is important, since most conditional asset pricing models do not describe explicitly the dependence of covariances or risk prices on the observed conditioning variables, and, as emphasized by Brandt and Chapman (2007), using ad hoc specification (e.g., linearity) can lead to spurious rejections. I use Monte Carlo simulation analysis to demonstrate that the pricing error tests based on my estimation methodology have sufficient power to reject a false model, yet also allow for a true conditional model to be detected even when the unconditional tests are likely to reject it (e.g., when the wealth portfolio return is imperfectly observed by the econometrician).

Given the difficulty of measuring the wealth portfolio, I provide additional evidence in support of the CWCAPM that relies on the fact that total wealth returns reflect news about future consumption growth (Bansal and Yaron, 2004; Hansen, Heaton and Li, 2008; Hansen, Heaton, Lee and Roussanov, 2007). This complementary approach involves using long-run rather than contemporaneous consumption growth to test the conditional CCAPM, e.g., as in Parker and Julliard (2005). I show that covariances of portfolio returns with long-run consumption growth vary less over time than the contemporaneous covariances. Using these covariances in asset pricing tests results in small and insignificant pricing errors, but the advantage over the standard model seems to come primarily from the differences in unconditional rather than conditional covariances across portfolios. This result suggests that the mixed evidence in favor of the CWCAPM may be in part due to the fact that the stock market is a poor proxy for the total wealth portfolio, as originally pointed out by Roll (1977). The latter is especially relevant in the presence of composition effects, whereby the relative contributions of financial and human capital to total wealth change over time (Lustig and Van Nieuwerburgh, 2008; Lustig, Van Nieuwerburgh and Verdelhan, 2009; Bansal, Kiku, Shaliastovich and Yaron, 2012).

This paper is structured as follows. Section 2 describes the class of consumption-based conditional asset pricing models that feature composition effects. Section 3 introduces the new econometric methodology for estimation and testing of conditional factor models. I present the main empirical results in Section 4. In Section 5 I investigate statistical properties of the nonparametric tests using

[1] A number of authors have argued that conditioning information substantially improves the empirical performance of consumption-based models by allowing the price of consumption risk to vary over time, in particular, Lettau and Ludvigson (2001), Lustig and Van Nieuwerburgh (2005), Petkova and Zhang (2005), and Santos and Veronesi (2006). However, others have suggested that the superior performance of the conditional models may be an illusion caused by the low statistical power of standard asset pricing tests (e.g., Lewellen and Nagel, 2006; Ferson and Siegel, 2009; Nagel and Singleton, 2011).

[2] Garleanu and Panageas (2009) build a heterogeneous-agents model with recursive preferences in which prices of risk associated with consumption growth and with news about future utility are both functions of the cross-sectional composition of wealth. While their explicit setup features a single source of aggregate uncertainty and thus collapses to a conditional one-factor model, a more general version of such a model can be a seen as an example of a two-factor CWCAPM. Such priced sources of risk that are not fully reflected in contemporaneous consumption are news about long-run growth pioneered by Bansal and Yaron (2004), investment-specific shocks introduced by Papanikolaou (2011), and innovations to uncertainty explored by Bansal, Kiku, Shaliastovich and Yaron (2012) as well as Campbell, Giglio, Polk and Turley (2012).

[3] In early contributions to the conditional CAPM/ICAPM literature, Bollerslev, Engle and Wooldridge (1988) model the dynamics of conditional covariances explicitly using GARCH methodology, Campbell (1987) and Harvey (1989) also model conditional covariances explicitly via linear instrumental variables; Shanken (1990) pursues a similar approach.

[4] Following Pagan and Schwert (1990), it is common to use nonparametric regression to estimate conditional volatility of stock returns. For other studies that have used nonparametric techniques to identify nonlinearities in stochastic discount factors, see, for example, Gallant, Hansen, and Tauchen (1990) and Bansal and Viswanathan (1993), Chen and Fan (1999), Wang (2003), and Chen and Ludvigson (2009) use nonparametric methods to test conditional moment restrictions implied by asset pricing models. The procedure developed here is also related to the conditional method of moments of Brandt (1999).