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Uninsurable risk and financial market puzzles

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A B S T R A C T

We compare the empirical performances of three risk-sharing arrangements involving idiosyncratic skill shocks: (a) where individuals are unable to directly insure their consumption against individual-specific shocks, (b) where agents strike long-term insurance contract with financial intermediaries involving a truth revelation constraint as in Kocherlakota and Pistaferri (2009), (c) full risk sharing. Based on the widely accepted assumption of cross-sectional log-normality of individual consumption levels, we work out closed form expressions of the pricing kernels for (a) and (b). We put these three models to test four financial market anomalies, namely the equity premium, currency premium, risk-free rate, and consumption-real exchange rate puzzles simultaneously in an integrated framework. We find that the pricing kernel associated with (a) outperforms the other two models in terms of the produced estimates of the agent's preference parameters and the model ability to predict the equity and currency premia, the risk-free rate, and the log growth in the exchange rate. However, the predictive ability is still far from satisfactory for all three models under scrutiny.

1. Introduction

There are four well known puzzles in the macro-finance literature. Two of these puzzles are home based. Mehra and Prescott (1985) and Hansen and Jagannathan (1991), among others, observe that the

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covariance of aggregate per capita consumption growth with the excess return on the market portfolio over a risk-free asset is very low, so that the representative-agent consumption CAPM can explain the observed market premium only if the typical investor is extremely risk averse. This is known as the *equity premium puzzle*. In addition, Weil (1989) observes that, given the lack of variability of aggregate consumption growth, the representative-agent must have a negative rate of time preference for the model to match the observed mean risk-free rate. This anomaly is known as the *risk-free rate puzzle.*

The other two puzzles appear on the international front. Economic theory predicts that in a complete market setting, the log real exchange rate growth between any two countries equals the difference in the logs of the foreign and domestic stochastic discount factors (Brandt *et al.*, 2006). With a representative agent in each country, the log real exchange rate growth must be perfectly correlated with the difference in the log growth rates of marginal utilities of aggregate per capita consumption of respective countries. This implies that, under the standard assumption of power utility, the log real exchange rate and log relative consumption should be perfectly correlated. In practice, however, it is observed that the correlation between relative consumption and the real exchange rate is close to zero or even negative. The real exchange rates are more volatile and persistent than the log relative consumption. This is the *consumption-real exchange rate puzzle* documented by Kollmann (1991, 1995) and Backus and Smith (1993). The fourth anomaly with the representative-agent model is that it is unable to reconcile the highly volatile excess return on currency with the smooth aggregate consumption growth rate unless the agent is assumed to bear an implausibly high level of risk aversion. This is the *currency premium puzzle*, illustrated by Lustig and Verdelhan (2007), for example.

The representative-agent consumption CAPM is implicitly based on the assumption of market completeness. In the absence of complete contingent claims markets, agents are not able to completely insure their consumption against idiosyncratic risks they face and hence realized IMRS can differ across individuals. Bewley (1982), Mehra and Prescott (1985), Mankiw (1986), Constantinides and Duffie (1996), Brav et al. (2002), Semenov (2004), Basu and Wada (2006), and Balduzzi and Yao (2007), among others, argue that consumers' heterogeneity induced by market incompleteness may be relevant for asset pricing.

To assess the potential of the incomplete market hypothesis in explaining the Backus and Smith (1993) puzzle and the Mehra and Prescott (1985) equity premium puzzle, Kocherlakota and Pistaferri (hereafter KP) (2007, 2009) assume that markets are complete with respect to country-specific shocks (individuals can fully insure their consumption against cross-country shocks), but domestic markets are incomplete (individuals cannot completely insure themselves against idiosyncratic skill shocks). This partial insurance creates heterogeneity across individuals making it necessary to relax the assumption of a representative agent within each country. KP (2007, 2009) consider two forms of partial insurance against idiosyncratic skill shocks. The first KP call domestically incomplete (DI) markets. Under this formulation, individuals are unable to directly insure their consumption against individual-specific shocks. The second form of partial insurance they label as Private Information Pareto Optimal (PIPO). Here, the agents are able to sign insurance contracts, which allow them to completely insure themselves against idiosyncratic shocks, subject to the incentive constraint that agents reveal truth about their private skill shocks to the financial intermediary.

For each of these two forms of partial insurance, KP (2007) derive a restriction relating the growth rate of the real exchange rate to the difference in the growth rates of the moments of the cross-sectional distributions of consumption in two countries. Using household-level consumption data for the US and the UK, they show that the asset pricing model associated with the PIPO insurance scheme fits the data on real exchange rates with the relative risk aversion coefficient of around five, while the complete risk-sharing (CRS) model and the DI model both perform poorly. In another companion paper, KP (2009) demonstrate the superior performance of the PIPO model to explain the observed mean equity premium in the US when households have a relative risk aversion coefficient between five and six.[1]

[1] Constantinides and Duffie (1996), Brav et al. (2002), Semenov (2004), Basu and Wada (2006), and Balduzzi and Yao (2007) also argue that the model with heterogeneous consumers can help explain the excess return on the market portfolio over the risk-free rate with a plausible value of the relative risk aversion coefficient.