

Discussion of Heaton and Lucas' "Can
heterogeneity, undiversified risk, and trading
frictions solve the equity premium puzzle?"

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November 2006

1 Introduction

Heaton and Lucas' chapter reviews the role background risk plays for the equity premium. With background risk we understand risk idiosyncratic to the agent, such as labor income risk or entrepreneurial risk. Why are we obsessed with the role of background risk for explaining the equity premium? The obvious first answer is that it might work: individual consumption growth is orders of magnitude more volatile than aggregate consumption growth.

But there is also a broader motivation. The study of heterogeneity in macroeconomics aims at explaining the evolution of the joint distribution of consumption, earnings, and wealth. The promise of this line of research is to provide tools to evaluate government policies and to deepen our understanding of inequality. To this end, macroeconomic facts such as the evolution of consumption inequality represent useful restrictions of microeconomic theories – any micro theory of inequality and markets should be consistent with these macro facts (see e.g. Krueger and Perri (2006) and Storesletten, Telmer and Yaron (2004a) for examples of such approach). Risk and individuals' attitudes towards risk are at the heart of these theories, and the equity premium puzzle – the inability of reasonably calibrated consumption-based asset-pricing model to explain the premium – represents a major road block for this literature.

In their chapter, Heaton and Lucas analyze labor income risk, transaction costs (in connection with background risk), entrepreneurial risk and the role of limited stock market participation, and I will now review their findings.

2 Labor income risk

Workers' labor earnings are subject to idiosyncratic fluctuations. To evaluate the role of such risk, one must take a stand on the market structure for hedging such risk. Due to asymmetric information or limited enforcement, it seems plausible to assume that agents have only limited insurance against these shocks. A natural starting point is to follow Huggett (1993) and Aiyagari (1994) and assume no insurance markets for idiosyncratic risk, over and above that agents can save in aggregate assets such as stocks and bonds. This is the approach Heaton and Lucas pursues, and it represents in some sense the maximum kick one can get out of idiosyncratic risk.

Solving such models requires in general numerical techniques.¹ The problem is that

¹Two well-known exemptions are when preferences are either linear-quadratic or of the constant

in absence the of complete markets (a representative agent), the standard aggregation results break down, so the whole wealth distribution enters as a state variable (see e.g. Ríos-Rull, 1994). To date, the most fruitful solution approach has been the one suggested by Krusell and Smith (1997, 1998). They show that by focusing on a restricted set of relevant moments of the wealth distribution, such as the average capital stock and the fraction of constrained agents, one can obtain a remarkably good prediction of future prices and the evolution of these relevant moments, a result they interpret as “approximate aggregation”.²

Now, let us review the results documented in Heaton and Lucas’ chapter. They consider an exogenous autoregressive process for labor income. Overall, they find very little effect of idiosyncratic labor income risk on asset prices in general and on the equity premium in particular. The main reason for the result is that the labor-income process is not very persistent (the autocorrelation is just 0.6), so that agents are able to smooth these shocks quite well by simply using a bond to buffer the shocks. As is well known, with sufficiently loose constraints on borrowing and a sufficiently low interest rate, agents can insure transitory shocks arbitrarily well by borrowing and lending (Telmer, 1993; and Levine and Zame, 2002). Once idiosyncratic risk has been aggregated away, one is back to the representative-agent economy (and the associated equity premium puzzle).

However, the consensus view in labor economics is that agents are subject to substantial and highly persistent shocks to earnings. For example, Abowd and Card (1989) obtain this conclusion based on covariance structure of labor earnings.³ Indeed, when allowing more persistent shocks, the asset-pricing implications can be substantial. For example, Storesletten, Telmer and Yaron (2006) show, using a reasonable calibration, that idiosyncratic labor income risk can account for between one third and one sixth of the empirical equity premium (see also Storesletten, Telmer and Yaron, 2007).

absolute risk aversion type. Alternatively, one could put additional restrictions on markets or on the income process. In particular, Constantinides and Duffie (1996) focus on a class of models with multiplicative unit-root shocks, which implies an autarky result, so the model can be solved analytically (see also Chapter STY). An important alternative branch of the literature focus on constrained-efficient limited enforcement models that also allow analytical results (see e.g. Alvarez and Jermann 2001, and Lustig 2004).

²Heaton and Lucas (1996) simplify their computational problem by considering economies with a particularly simple form of heterogeneity – there are only two types of agents in the economy. Since the distribution of wealth can be fully characterized by one state variable – the wealth of the first agent – it is feasible to solve this problem without relying on the Krusell-Smith approach.

³Clearly, even though earnings were to follow a unit-root process, these fluctuations need not impact on consumption allocations, provided that the fluctuations were predicted or fully or partly insurable.

3 Transaction costs

What about transaction costs? Could it be that with costs on each transaction, the near-complete insurance result above would vanish? Heaton and Lucas assume proportional transaction costs for stocks, but frictionless trading in bonds. Their main finding is that implausible costs would be required to account for the equity premium. The intuition for this result is that even with large motives to trade (transitory shocks), agents satisfy their trading needs using bonds. As for stocks, the agents buy and hold, but do not require a large premium for doing so. And it doesn't help to consider more persistent labor-income shocks, because this would reduce the motives for trading (because it is harder to "self insure" against permanent risk), which implies an even smaller role for transaction costs (in fact, in Constantinides and Duffie (1996), agents do not trade at all even in the absence of constraints, so constraints on portfolio allocations would be irrelevant!)

4 Concentrating aggregate risk on fewer hands

The source of the equity premium puzzle is that all agents share equally the aggregate risk and that the aggregate consumption process does not fluctuate much. Clearly, one way out would be to concentrate the aggregate risk on fewer agents, so that the aggregate consumption process for the stock owners could be very volatile, even with quite smooth aggregate consumption. Heaton and Lucas consider two such channels for concentrating risk on fewer hands: limited stock-market participation and entrepreneurial risk.

4.1 Entrepreneurial risk

Entrepreneurs are interesting because they hold large stakes in one or a few companies (due to, say, asymmetric information problems). Since entrepreneurs' holdings amount to a large share of the aggregate US wealth and the firm-specific risk in these companies is likely to be correlated with the market portfolio, it is particularly important to investigate entrepreneurs' income and consumption processes.

Heaton and Lucas (2000) document some important facts about business owners. First, they have more volatile income growth, substantially larger than the volatility of workers' individual earnings growth. Moreover, they own substantial amounts of publicly traded stocks, as well as large stakes in their own companies. However, it

turns out that the aggregate wage income of the entrepreneur has a low correlation with the market return on equity. At this point, one might have high hopes for this channel of individual risk to deliver large asset-pricing implications.

In order to evaluate the quantitative implications of this “entrepreneurial risk”, Heaton and Lucas (2000) focus on the *labor income* of entrepreneurs, emphasizing the larger volatility and higher correlation with the return on the market portfolio. So the entrepreneurs’ holdings in their own companies are treated as exogenous and non-tradeable, and the income from these holdings are incorporated in the stochastic labor income. When calibrating the economy, Heaton and Lucas focus on relatively transient shocks ($\rho = 0.8$) and find small effect.

Does this paper close the discussion on the role of entrepreneurs? The key shortcoming of their argument is that entrepreneurs are assumed to have a fixed amount of capital invested in the firm, and hence a fixed exposure to risk. A more plausible and standard model of entrepreneurs would allow them to accumulate and decumulate wealth in their own company, maintaining the assumption that the return on this firm-specific capital is idiosyncratic albeit with a small aggregate component (as in Angeletos and Calvet (2006) – see also see Krebs (2003)). The following argument shows that this channel could potentially yield a large equity premium.

Consider the following version of a Constantinides-Duffie model with entrepreneurs. Each entrepreneur is born with one unit of capital, invested in a backyard storage technology with idiosyncratic return, but no labor income over and above this. Bonds and stocks in zero net supply. Idiosyncratic returns are independent over time and across people. If the expected return on the backyard technology is sufficiently low, a no-trade result will apply: the agents will consume the same fraction of the gross return on their respective backyard storage, and will reinvest the rest in their storage. However, their ownership of stocks and bonds will remain zero. With this autarky result in hand, it is clear that the model is observationally equivalent to the standard Constantinides-Duffie model, which can deliver a large equity premium (see Storesletten, Telmer and Yaron (2007) for an example).

4.2 Limited participation

What about limited stock-market participation? Empirically, stock owners’ consumption has substantially larger conditional variance than that of individuals who do not hold stocks (Attanasio et al. (2002), Brav et al. (2002), And Vissing-Jørgensen (2002)). An important and interesting paper by Fatih Guvenen (2005) documents that this channel has a surprisingly large potential for accounting

for the empirical asset prices. Since this paper speaks so directly to the issue at hand, I think it's useful to review it here.

Güvenen (2005) examines a real-business-cycle model with heterogeneous agents. Agents differ in two respects - in their preferences (they have different intertemporal elasticity of substitution, henceforth *EIS*) and in their access to equity markets. A majority of agents (80%) are barred from the stock market and have a low EIS of 1/10. A minority (20%) have high EIS of 1/2 and have full access to stocks and bonds.

Interestingly, a plausibly calibrated version of this simple model has a surprisingly good performance in terms of explaining financial statistics such as the equity premium, the Sharpe ratio, the covariance between the risky rate and the risk-free rate, the predictability of returns, etc. The intuition for this good performance is that it can be reinterpreted as a version of the external habit-model of Campbell and Cochrane (1999), henceforth *CC*. In particular, Güvenen shows that the "external habit" of *CC* has approximately the same stochastic properties as the non-stockholders of Güvenen's model, so that the pricing kernels are quantitatively very similar in the two models.

The main channels for the large equity premium in his model are that, first, limited participation concentrates more aggregate risk on the stock-holders. Consequently, their consumption growth is much more volatile than the aggregate consumption growth and they require a premium for shouldering this risk. Second, the non-stockholders must smooth their consumption through the bond market. Since they have a lower EIS than the stockholders, they are more interested in smoothing consumption. In particular, in recessions (booms) the non-stockholders want to reduce wealth (accumulate wealth). This is picked up by the stockholders, further adding to the pro-cyclical variability of their consumption growth, and therefore increasing the premium they require to hold stocks. Interestingly, the resulting movements in the distribution of wealth (between stockholders and non-stockholders) are not extremely large in the current model.

Returning to Heaton and Lucas, their critique against stories for the equity premium based on limited participation is that, first, it is not clear where the participation constraint comes from. In fact, it turns out that the non-participants in Güvenen's model are willing to pay substantial amounts to gain access to equity markets. (a possible reply to this critique is that non-stockholders have labor income risk and also have their wealth tied up in housing, due to house ownership being tax advantaged). Second, the required concentration of aggregate risk on stockholders might be implausibly large.

Finally, at the end of the day, we are aiming for consumption-based models of asset

pricing that are consistent with both asset-pricing facts and business-cycle facts. Any serious business-cycle model must incorporate a theory of fluctuations in aggregate labor supply, since hours worked is very pro-cyclical.

However, endogenous labor supply makes it harder to account for the equity premium.

If one were to introduce endogenous labor supply in any of the asset-pricing models based on idiosyncratic labor-income risk (such as Constantinides and Duffie (1996), Heaton and Lucas (1996), Krusell and Smith (1997), Guvenen (2005), or Storesletten, Telmer and Yaron (2006)), individuals would exploit the opportunity to smooth the marginal utility of consumption by varying their labor supply. In particular, Uhlig (2005) considers a representative-agent model with large risk aversion and shows that such model has two undesired properties. First, the aggregate labor supply becomes countercyclical. Second, the equity premium fall substantially.

5 Conclusion

Bottom line, the view of Heaton and Lucas is that the equity premium puzzle cannot be resolved by introducing incomplete markets and heterogeneity. While I agree that heterogeneity alone is unlikely to account for the whole premium, it seems clear that heterogeneity delivers a significant share of the equity premium.

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