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Saving-based asset-pricing

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ABSTRACT

This paper explores the implications of a novel class of preferences for the behavior of asset prices. Following a suggestion by Marshall (1920), we entertain the possibility that people derive utility not only from consumption, but also from the very act of saving. These "saving-based" preferences are related to models of habit formation and the spirit of capitalism, but incorporate the feature that people have *anticipatory* habits because they care about the future accumulation of wealth. We derive the Euler equations for these preferences and estimate them with GMM. Our estimates suggest that the preference for saving is economically significant.

1. Introduction

Unlike the traditional Capital Asset Pricing Model (CAPM), the Consumption-Based Asset Pricing Model (CCAPM) evaluates assets by taking into account their exposure to macroeconomic risk, and not simply by comparing their returns to those of other assets.[1] The CCAPM thereby forges a link between the financial sector and the real economy. Unfortunately, the linearized CCAPM poses a conundrum: In order to explain the magnitude of the observed equity premium, it requires an exceptionally high degree of relative risk aversion. This is the genesis of the famous "Equity Premium Puzzle", first posed by Mehra and Prescott (1985): Given conventional estimates of risk aversion, the return to the market relative to the risk free rate is much too large to be reconciled with the canonical model of rational portfolio choice. Campbell and Cochrane (1999) and Constantinides and Duffie (1996) explain the equity premium by using, respectively, models with habit persistence and uninsured idiosyncratic risks, but both still require high degrees of risk aversion (e.g., Cochrane, 2001). After more than two decades, the equity premium is still one of the great outstanding puzzles in finance (e.g., Kocherlakota, 1996; Mehra and Prescott, 2003; Mehra, 2008).

A rich literature, dating back to Grossman and Shiller (1981) and Hansen and Singleton (1982), estimates the non-linear stochastic discount factor of the CCAPM using the Generalized Method of Moments (GMM) developed by Hansen (1982). However, GMM estimates of the risk aversion coefficient are not very plausible, owing mainly to the problem of weak instruments. Stock and Wright (2000) provide an example of this problem.

We propose a new class of preferences to explain the equity premium paradox and to improve the empirical performance of the CCAPM. Our preferences are inspired by Marshall (1920), who suggested that people save, not only to acquire future consumption, but also because they derive pleasure from the *act* of saving itself. He motivated this notion with a vivid example:

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[1] Seminal works on the CCAPM include Rubinstein (1976), Lucas (1978), and Breeden (1979).

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> The extra pleasure which a peasant who has built a weather-proof hut derives from its usance, while the snow is drifting into those of his neighbors who have spent less labor on building theirs, is the price earned by his working and waiting. It represents the extra productiveness of efforts wisely spent in providing against distant evils, or for the satisfaction of future wants, as compared with what would have been derived from an impulsive grasping at immediate satisfactions (Marshall, 1920).

In other words, the very effort of providing for the future confers utility, over and above the utility actually enjoyed in the future. Marshall emphasizes that this notion is more general than this quaint example might suggest. A retired physician, for example, might find fulfillment in lending money to a factory so that it can improve its machinery (e.g., Marshall, 1920). He derives pleasure from the act of lending. In other words, the utility function depends upon saving, $u(C_t, S_t)$.

Saving constitutes the accumulation of wealth. With this in mind, denote consumption and wealth at time t by c_t and w_t respectively. We can then formalize Marshall's idea by writing utility as a function of both consumption and the gross growth rate of wealth, $u(c_t, w_{t+1}/w_t)$.[2] Gootzeit et al. (2002) dubbed this the "Marshallian recursive" class of preferences because, when expressed in a continuous-time setting, they turn out to be a form of recursive preferences (e.g., Obstfeld, 1990, Epstein, 1987, and Epstein and Hynes, 1983). In this paper we prefer to adopt the less precise, but more evocative, name *saving-based preferences*.

1.1. Interpretation

The distinguishing feature of saving-based utility is, as the name suggests, that *the very act of saving confers utility*. This is where Marshall parted company from the classical and other neoclassical economists, for whom *saving was merely deferred consumption.* Economists in the 19th century (as well as most economists today) adhered to the doctrine of "abstinence": people abstain from current consumption only in order to acquire future, but are "impatient" and so discount future utility relative to current utility.[3] One way of thinking about Marshall's novel suggestion is that, since people derive utility from the act of abstention itself, the discount factor depends upon the rate of saving, and so is no longer exogenous.

But what exactly does it mean for saving to appear in the utility function? This is a deep methodological question that has surfaced in other settings where arguments other than consumption have been introduced into the utility function. Consider social status, for example. There is a rich literature that incorporates some measure of status into the utility function.[4] How should this be interpreted? To address this question, Postlewaite (1998) proposes a fundamental distinction between "direct" concerns and "instrumental" concerns.[5]

- Concerns for status are *direct* if people "care about the opinions of others *for their own sake*" (Postlewaite, 1998, p. 781, his emphasis). Status then *directly* affects utility, since, as he puts it, people are "hardwired" psychologically to care about their social standing. The modern literatures on external habit formation or "keeping up with the Joneses" (e.g., Abel, 1990; Campbell and Cochrane, 1999; Wachter, 2005, *inter alia)* and the "spirit of capitalism" (e.g., Zou, 1994; Bakshi and Chen, 1996; Smith, 2001; Gong and Zou, 2002; Zhang 2006a) exemplify this interpretation.
- Concerns for status are *instrumental* if people care about the opinions of other people because they "indirectly affect the goods and services they and their children will ultimately consume" (e.g., Postlewaite, 1998, p. 781). In this case people do not care *intrinsically* about status, but view it as an instrument to achieve other ends. For example, relative wealth may serve as a signal in the mating market (e.g., Cole et al., 1992) or as a signal of non-observable ability (e.g., Rege, 2008). Putting status in the utility function can then be interpreted as a kind of reduced-form that summarizes the indirect benefits (e.g., Postlewaite, 1998).

Postlewaite's taxonomy also applies to saving-based preferences. Is a "taste" for saving direct, or is it instrumental? Our reading of Marshall (1920) is that he sees clear, direct, psychological benefits from saving: The peasant in the earlier quote takes pride in his foresight and industry. Indeed, there is a distinct *schadenfreude* in the pleasure he takes from seeing "the snow...drifting into those of his neighbors who have spent less labor on building theirs" (Marshall, 1920). Similarly, the doctor in Marshall's (1920) other example derives a "warm glow" from lending to build the factory. This is not to preclude an instrumentalist interpretation, however. Perhaps an ostentatiously cozy hut reaffirms the peasant's place in the village hierarchy; perhaps contributing to the building fund for the factory will help the doctor seal a marriage with the mayor's daughter. Psychological and instrumental interpretations are not mutually exclusive.

The distinction between direct and instrumental interpretations arises starkly in another example, suggested by a penetrating question from a referee. It is common (e.g., Sidrauski, 1967; Brock, 1974, *inter alia*) to motivate the use of money in general equilibrium models by inserting real balances into the utility function, $u(c_t, m_t/p_t)$. This is normally interpreted as a shorthand to capture the transactions services provided by money (see Woodford, 2003, p. 102). In other words, no one seriously thinks that real balances provide direct, psychological benefits. In fact, money (as a medium of exchange) is *defined* by its instrumental use as the thing that reduces transaction costs. For money then, it is important to establish whether a utility function with real balances as an argument can be derived as a reduced form from a model with an explicit transaction cost. This was accomplished by Feenstra (1986) in a famous paper that proved the functional equivalence of money-in-utility models and models with explicit transaction cost technologies.

Inserting saving into the utility function invites comparison with inserting money into the utility function. The obvious difference is that saving-based utility has a compelling direct interpretation, while money has only an instrumental interpretation. Suppose that we entertain an instrumentalist interpretation of saving-based preferences, however. It is then natural to ask if there is an analogue to Feenstra's (1986) functional equivalence result: Given some "savings technology" that reduces transactions costs and preferences $U(c_t)$ defined over consumption alone, can we derive a reduced-form utility function $u(c_t, s_t)$? The answer is yes, and we sketch a simple framework where it might come about.

Consider the basic framework developed by Lucas and Stokey (1983). Unlike their model, there is no "cash good", a good for which the seller requires immediate payment in cash at the beginning of the period. Instead, there is a pure "credit good": The consumer receives the good at the beginning of the period, but the seller provides "trade-credit" so that the consumer does not

[2] There are other formulations that would also serve this purpose. For example, utility could depend upon the absolute growth of wealth $w_{t+1} - w_t$, or upon the growth rate of wealth $(w_{t+1} - w_t)/w_t$. Since they would yield roughly the same predictions we chose the gross growth rate because it seems to be the most tractable.

[3] The most famous statement of this doctrine was by Fisher (1919, p. 371). Gootzeit et al. (2002) discuss in greater detail the relation of Marshall's idea to those of other early writers.

[4] Duesenberry (1949), Frank (1985), and Robson (1996) are famous examples.

[5] Manski (2000) makes a similar distinction.