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Disciplines

Finance | Finance and Financial Management

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Nikolai Roussanov*

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Social status concerns influence investors' decisions by driving a wedge in attitudes towards aggregate and idiosyncratic risks. I model such concerns by emphasizing the desire to "get ahead of the Joneses," which implies that aversion to idiosyncratic risk is lower than aversion to aggregate risk. The model predicts that investors hold concentrated portfolios in equilibrium, which helps rationalize the small premium for undiversified entrepreneurial risk. In the model, status concerns are more important for wealthier households. Consequently, these households own a disproportionate share of risky assets, particularly private equity, and experience greater volatility of consumption, consistent with empirical evidence.

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Diversification and risk-sharing are fundamental principles of modern finance and macroeconomics. However, empirical evidence suggests that household portfolios are poorly diversified, with many people reporting substantial holdings of a single stock. For the wealthiest households large shares in closely held businesses constitute a particularly important source of risk (e.g., Heaton and Lucas (2000a)). It is not surprising that entrepreneurs bear substantial undiversified risk, since it is important for mitigating moral hazard and/or adverse selection problems. Yet, from a standpoint of portfolio theory, entrepreneurship does not appear to be well compensated, implying that many investors are willing to take poorly rewarded risks despite the availability of superior investment opportunities such as public equity that earns a large risk premium (e.g., Moskowitz and Vissing-Jørgensen (2002), Hall and Woodward (2007)).

In the present paper I interpret these facts by appealing to the human desire for social status as a key driver of risk-taking behavior. If the satisfaction brought by "getting ahead of the Joneses" outweighs the danger of falling behind, risky activities with highly idiosyncratic payoffs, such as entrepreneurship, can be particularly attractive.[1] Friedman and Savage (1948) suggest that as people move to a higher "social class" their marginal utility of wealth rises. Consequently, they "take great risks to distinguish themselves" (p. 299), potentially exhibiting risk-loving behavior. Cole, Mailath, and Postlewaite (2001) as well as DeMarzo, Kaniel, and Kremer (2004) show that relative wealth concerns create a wedge in people's attitudes towards both aggregate risk and idiosyncratic risk, leading to underdiversified investment portfolios. Building on these insights, I incorporate preference for social status into a portfolio choice framework in which heterogeneous households can optimally choose their level of exposure to idiosyncratic risk. The main prediction of my model is that some investors optimally do not diversify: they hold portfolios concentrated in idiosyncratic assets that earn a positive average return, such as private equity.

I model social status as an increasing function of individuals' wealth relative to the average wealth level, in the spirit of Duesenberry (1949). The key feature of status preferences in my model is that wealthier households care more about their social position in relation to consumption than do poorer ones. Adam Smith suggested that at higher levels of income people value the "social esteem" brought on by their wealth more than the consumption of goods and services that this higher wealth can buy (see Smith (1759), p. 70). Despite its intuitive appeal, this form of social status concerns has received rel-

[1]Such preferences differ from "keeping up with the Joneses," for example, as in Abel (1990), where the risk of falling behind is more important.

atively little attention in the literature.[2] This property implies that investors' marginal utility of wealth rises when they "get ahead of the Joneses" (i.e., advance their relative wealth position). Consequently, they value a marginal dollar of wealth more highly in bad states of the aggregate economy than in good states, even if their own wealth stays constant. The sensitivity of marginal utility to economy-wide shocks increases aversion to aggregate risk and leads investors to reduce their portfolios' exposure to the public equity market. Conversely, at any level of risk aversion status-conscious investors load more heavily on individual-specific (e.g., entrepreneurial) risk, compared to a non-status seeking investor.

The social status model generates novel predictions for the cross-section of households' asset holdings. Qualitatively, richer households have a larger fraction of their wealth invested in individual-specific idiosyncratic assets, such as private equity, as well as in risky assets generally. Further, the standard deviations of individual portfolio returns as well as consumption growth rates are larger for the households in the upper half of the distribution. The reason for this heterogeneity is that status has luxury good properties in my model. At higher wealth levels investors' sensitivity to their relative position, and therefore their aversion to aggregate risk, increases, while overall risk aversion declines. Quantitatively, the model is calibrated to match both the overall levels of risk-taking and the shares of household wealth concentrated in a single risky asset that are observed in the U.S. data. In particular, I match both the low shares of risky assets held by low wealth households, and the large, highly concentrated equity shares of the very wealthy. The large idiosyncratic component of portfolio return risk is what allows the high levels of risky asset holdings (among the richer households) to be consistent with a smooth aggregate consumption growth process.

As both a test and an application of the model, I evaluate its ability to match the empirical dynamics of household wealth. Undiversified idiosyncratic risk manifests itself as dramatic variation in household wealth both across the population and over time. Empirically, the cross-sectional distribution of asset holdings in the U.S. is extremely concentrated, yet at the same time, there is substantial mobility across wealth percentiles over time (e.g., Hurst, Stafford, and Luoh (1998)). My model is able to account for much of the variability in wealth holdings at the top of the wealth distribution, since the richer households bear most of the idiosyncratic risk that drives wealth dispersion. In the simulated model a third of households in the top 1 % of the wealth distribution

[2] Important exceptions are Robson (1992) and Becker, Murphy, and Werning (2005), whose models of status based on rank feature a similar property.

are displaced over the course of 10 years, consistent with the data. I conclude that the dramatic idiosyncratic risk exposure predicted by the model for the wealthiest households is empirically reasonable.

This paper is organized as follows. The remainder of this introductory section places the paper in the context of economic literature on social externalities and portfolio choice. Section I develops the model of social status preferences and describes its qualitative implications for portfolio allocation. Section II describes the dynamic equilibrium and the numerical solution of the calibrated model. Section III introduces empirical evidence and evaluates the model's ability to explain the quantitative features of the data at both aggregate and household levels. Section IV concludes.

Social Status and Portfolio Choice: The Setting

A growing literature in psychology, sociology, and, more recently, economics documents the importance of relative wealth or relative income concerns on self-reported well-being (for example, see Clark and Oswald (1996), Brown, Gardner, Oswald, and Qian (2005) and Luttmer (2005)). Empirically, the intuition that the importance of status concerns increases with wealth is consistent with the evidence from subjective well-being surveys documented by McBride (2001) and Dynan and Ravina (2007).

Preferences featuring social externalities have previously been appealed to in order to understand the lack of diversification of household portfolios. Such models typically emphasize herding behavior. For example, DeMarzo, Kaniel, and Kremer (2004) show that preference for a "local good" can give rise to relative wealth concerns and in turn to undiversified portfolios, with households in each community tilting their portfolios toward community-specific assets. In these models investors attempt to "keep up with the Joneses" and therefore herd by overinvesting in correlated assets. However, these models are not able to explain large holdings of purely idiosyncratic assets, which is likely to be an important component of the private equity premium puzzle.

The intuition that the desire to increase relative wealth drives idiosyncratic risk-taking bears some resemblance to the behavioral portfolio theory of Shefrin and Statman (2000). These authors propose an objective function that combines "safety" and "potential," where the desire for wealth preservation makes low-risk assets the core of the optimal portfolio while an "aspiration" for higher wealth drives investment in high-risk assets (potentially including negative net present value gambles that have a long right tail). Their model builds on psychological theories, such as Lopes (1987), that do not tie an aspiration wealth level to relative position. More recently, Haisley, Mostafa, and Loewenstein (2008) explicitly link aspiration with the notion of "relative deprivation" (i.e., interpersonal comparisons) in a manner consistent with risk-loving behavior, suggesting a psychological basis for my model.

This paper aims to add to the growing literature that attempts to explain the apparent lack of diversification in household assets. While my model shares some features with existing ones as well as highlights mechanisms that are quite distinct from those studied previsouly, it is likely that a combination of approaches will be needed to successfully put together the pieces of the underdiversification puzzle. Among other approaches are models based on non-expected utility preferences, such as cumulative prospect theory (Barberis and Huang (2008)) and rank-dependent utility (Polkovnichenko (2005)), model misspecification and learning costs (Uppal and Wang (2003), Van Nieuwerburgh and Veldkamp (2010)), "familiarity" (Huberman (2001) and Massa and Simonov (2006)), anticipatory utility and optimism (Brunnermeier and Parker (2005) and Puri and Robinson (2007)). Overconfidence is also cited in explaining entrepreneurial behavior (e.g., Bernardo and Welch (2001)). Among the rational theories of entrepreneurship are real options-based models, such as Polkovnichenko (2003) and Miao and Wang (2007). While the illiquidity of private business investments might deepen the private equity premium puzzle (e.g., Kahl, Liu, and Longstaff (2003)), it can also provide a potentially attractive commitment mechanism that helps mitigate self-control problems (e.g., Laibson (1997)).

I. An Economy with Relative Wealth Concerns

A. Preferences over Consumption and Social Status

I consider a continuum of households, indexed by $i \in \Omega \subset \mathbb{R}$, with a total mass of one under the associated measure μ.[3] The wealth of household i at the beginning of time period t is denoted by W_t^i, and the per capita aggregate wealth $\bar{W}_t$ is given by $\bar{W}_t = \int_\Omega W_t^i d\mu(i)$. Each household (or investor) has a finite lifetime of T periods in which consumption and portfolio decisions are made, and a terminal period in which the remaining wealth (and status conferred by it) is bequeathed to an heir born in the beginning of the period. Therefore, there are T overlapping generations, with each new

[3] Aggregate wealth, therefore, equals per capita wealth. In a discrete approximation, per capita wealth is defined as $\bar{W}_t = \frac{1}{N}\Sigma_{i=1}^N W_t^i$ for some large N.

generation's wealth being drawn from the distribution of bequests.

At each time t each investor i aged A_t^i maximizes

$$E_t \left\{ \sum_{s=t}^{\tau} \delta^{s-t} \left[\frac{\left(C_s^i\right)^{1-\gamma}}{1-\gamma} + \eta \bar{W}_s^{1-\gamma} \left(\frac{W_s^i}{\bar{W}_s} \right) \right] + \delta^{\tau+1} \psi B \left(W_{\tau+1}^i, \bar{W}_{\tau+1} \right) \right\}, \tag{1}$$

where $\tau = t + (T - A_t^i)$.

Households' preferences are separable in consumption and social status, which is defined following Bakshi and Chen (1996) as household wealth scaled by the per capita wealth, $\frac{W_s^i}{\bar{W}_s}$.[4] Status concerns are often modeled via comparison of individual to per capita consumption (e.g., Abel (1990)), which can be motivated in part by the fact that consumption is more easily observed by outsiders than wealth. However, some of the most visible consumption goods are highly durable, for example, houses, cars, boats, and jewelry, and thus constitute an important part of household asset holdings.[5] Ownership of private businesses can often also be observed by outsiders and thus contributes to the visibility of entrepreneurs' wealth.

The use of a separable utility specification for consumption and status in (1) is primarily motivated by its simplicity, and is in line with much of the literature on social status (although in contrast to Bakshi and Chen (1996)). In particular, it provides a parsimonious way of capturing the intuition that status is a "luxury" while consumption is a "necessity." The first term in the period utility is the standard power utility over consumption C; the second term is the utility derived from social status.[6] The parameter that controls the relative importance of consumption and status is $\eta > 0$. This parameter is multiplied by an average wealth term, $\bar{W}_t^{1-\gamma}$, in order to ensure that the relative importance of status and consumption in individual utility is invariant to changes in aggregate wealth over time. A similar structure of period utility is used by Barberis, Huang, and Santos (2001) to model prospect theory preferences exhibiting loss aversion.

[4]In much of the economic literature on positional concerns status is often modeled more generally as a household's percentile rank in the cross-sectional distribution of wealth (e.g., Cole, Mailath, and Postlewaite (1992), Robson (1992)). I choose the simpler specification for convenience and parsimony. Roussanov (2008) provides conditions under which the more general rank-based models display the key features analyzed in this paper.

[5]Charles, Hurst, and Roussanov (2009) provide evidence that the empirical patterns of consumption expenditures on such visible goods are consistent with individuals signaling their unobservable wealth. In the Internet Appendix, available on the Journal of Finance website at *http://www.afajof.org/supplements*, I analyze a version of my model in which total consumption is explicitly used as such a signal and show that the central predictions of the model hold in that setting.

[6]In the case $\gamma = 1$, I assume that the consumption utility is logarithmic.

The parameter that controls the importance of bequest is $\psi \geq 0$. The bequest utility is specified as a function over terminal wealth B that has the same functional form as the period utility over consumption, including both the absolute and the relative components:

$$B\left(W^i_{\tau+1}, \bar{W}_{\tau+1}\right) = \frac{\left(W^i_{\tau+1}\right)^{1-\gamma}}{1-\gamma} + \eta \bar{W}^{1-\gamma}_{\tau+1}\left(\frac{W^i_{\tau+1}}{\bar{W}_{\tau+1}}\right). \quad (2)$$

This structure mirrors that of the period utility over consumption and status, in the sense that utility is derived both from the absolute size of the bequest (the first term) and from its size relative to the average wealth that determines its status value (the second term). This specification implies that the bequest motive is of a "warm glow" rather than a dynastic nature, that is, the person leaving a bequest cares about its size and not directly about his heirs' utility. This interpretation is consistent with the notion of status-driven wealth accumulation, as it can rationalize bequests to charities and large estates left by people with no heirs (see the discussion in Carroll (2000)). At the same time, such a specification of bequest utility could be given an altruistic interpretation in a model where relative wealth concerns are endogenous and the utility of future generations depends directly on their relative wealth position, as in Cole, Mailath, and Postlewaite (1992).

B. *Technology and Market Structure: Aggregate vs. Idiosyncratic Risk*

I model aggregate and idiosyncratic risk exposures via different assets available to investors. This approach follows Heaton and Lucas (2004), who consider entrepreneurs' portfolio choice and capital structure decisions jointly. This is in contrast to much of the existing literature. Portfolio choice models with agent-specific idiosyncratic risk commonly assume that the "amount" of such risk is exogenously fixed, usually in the form of a stream of labor or proprietary income. Conversely, models of entrepreneurial choice (e.g., Cagetti and De Nardi (2006)) usually abstract from the composition of financial portfolios.

A wide variety of investment opportunities provide a choice between aggregate and idiosyncratic risk, which poses a modeling challenge. I limit the set of assets available to households for the sake of tractability. In the model, every household can invest in three linear technologies with returns given by vector $\mathbf{R}^i = [R^f, R^a, R^i]$. These investment opportunities are:

- riskless storage technology with return R^f,

- common risky technology ("public equity") with return R^a, and
- idiosyncratic risky technology ("private equity") with return R^i, which is individual-specific.

The specification of the investment opportunities considered here captures the idea that investors might be able to choose the combination of aggregate and idiosyncratic risk optimally. This type of investment decision is meant to encompass human capital (career choice) as well as entrepreneurial investment. I assume that all households have access to the entrepreneurial technology.

The individual specific returns can be written as

$$R^i - R^f = \alpha^i + \beta^i(R^a - R^f) + \epsilon^i,$$

where $E[\epsilon_{R_i}|R^a] = 0$. I allow the return on the individual-specific investment to contain an idiosyncratic component that is associated with a nonzero risk premium, that is, in general $\alpha^i \neq 0$. With some abuse of terminology, I label this technology "private equity."Market incompleteness (i.e., agents cannot invest in each others' private asset) is important in that it allows idiosyncratic risk to be compensated by positive expected returns ($\alpha^i > 0$) without creating arbitrage opportunities.

The evolution of an individual household's wealth is given by

$$W^i_{t+1} = \left(W^i_t - C^i_t\right) \theta^{i\prime}_t \mathbf{R}^i_{t+1}, \tag{3}$$

where the vector of portfolio allocations to the three assets is given by $\theta^i_t = \left[1 - \theta^i_t - \tilde{\theta}^i_t, \theta^i_t, \tilde{\theta}^i_t\right]$.

The evolution of aggregate wealth is driven by the public equity return, since the idiosyncratic components of individual-specific private equity returns average out by the law of large numbers. In particular, aggregate wealth is given by

$$\begin{aligned} \bar{W}_{t+1} = {} & E_t\left[W^i_t\left(1 - C^i_t\right)\left(1 - \theta^i_t - \tilde{\theta}^i_t\right)\right] R^f + E_t\left[W^i_t\left(1 - C^i_t\right)\tilde{\theta}^i_t\left(\alpha^i + \epsilon^i_{t+1}\right)\right] \\ & + E_t\left[W^i_t\left(1 - C^i_t\right)\left(\theta^i_t + \tilde{\theta}^i_t\beta^i\right)\right] R^a_{t+1}, \end{aligned} \tag{4}$$

where the expectations are taken with respect to the cross-sectional distribution μ as well as idiosyncratic return realizations, so that the first two terms depend only on the information available at time t and only the last term depends on the realization of the public equity return at time $t + 1$.

Under rational expectations households make their decisions at each time t based on the above law of motion of aggregate wealth, taking it as exogenous. This gives rise to a notion of equilibrium in which all households correctly guess the consumption and portfolio choices of all other agents encompassed in this law of motion when making their own decisions.

C. Optimal (Un)Diversification

Consider a one-period version of the model, in which investors maximize expected utility over end-of period wealth and status $E\left[U\left(W^i,\bar{W}\right)\right]$, where

$$U\left(W^i,\bar{W}\right)=\frac{\left(W^i\right)^{1-\gamma}}{1-\gamma}+\eta\bar{W}^{1-\gamma}\left(\frac{W^i}{\bar{W}}\right). \tag{5}$$

Under this specification marginal utility of wealth is positive, while the first derivative with respect to aggregate reference wealth is negative (suppressing the i superscripts):

$$U_W=W^{-\gamma}+\eta\bar{W}^{-\gamma}>0 \text{ and } U_{\bar{W}}=-\gamma\eta\bar{W}^{-\gamma}\left(\frac{W}{\bar{W}}\right)<0 \text{ since } \gamma,\eta>0.$$

This is intuitive since, holding individual wealth fixed, an increase in per capita wealth reduces the individual's relative status and utility. While my model does not rely directly on this monotonicity of utility as a function of aggregate wealth, it is a commonly assumed feature in the literature on interdependent preferences (often referred to as "jealousy" - e.g., Dupor and Liu (2003)).

Investors' attitudes towards risk and, consequently, their portfolio allocations are determined by the properties of the marginal utility of wealth. Consider the problem of maximizing ethe xpected utility above subject to the constraint

$$W^i=W_0^i\left[R^f+\theta^i\left(R^i-R^f\right)+\tilde{\theta}^i(R^a-R^f)\right].$$

It follows from (4) that the aggregate wealth process can be written as

$$\bar{W}=\bar{W}_0\left[\xi_0+\xi_1(R^a-R^f)\right],$$

where the constants ξ_0 and ξ_1 are pinned down by aggregating asset demands over households and applying the law of large numbers to the idiosyncratic components of their portfolio returns.

The first-order conditions of the portfolio problem yield the standard Euler equations for each asset's return in excess of the risk-free rate (denoted generically as R^x):

$$E\left[U_W\left(W^i, \bar{W}\right) R^x\right] = 0.$$

The first-order Taylor expansion of the marginal utility function around $\left(W_0^i, \bar{W}_0\right)$ gives

$$\begin{aligned} U_W\left(W^i, \bar{W}\right) = \; & U_W\left(W_0^i, \bar{W}_0\right) + U_{WW}\left(W_0^i, \bar{W}_0\right)\left(W^i - W_0^i\right) \\ & + U_{W\bar{W}}\left(W_0^i, \bar{W}_0\right)\left(\bar{W} - \bar{W}_0\right) + o\left(W^i, \bar{W}\right), \end{aligned} \tag{6}$$

so that, ignoring higher-order terms, the Euler equation can be written approximately as

$$E\left\{\left[\begin{array}{c} U_W + U_{WW} W_0^i \left(R^f + \theta^i\left(R^i - R^f\right) + \tilde{\theta}^i (R^a - R^f) - 1\right) \\ + U_{W\bar{W}} \bar{W}_0 \left(\xi_0 + \xi_1 (R^a - R^f) - 1\right) \end{array}\right] R^x \right\} = 0.$$

The approximated Euler equations that determine optimal portfolio shares of the two risky assets weigh their expected returns against their pure wealth risk (covariance with the total portfolio return) and aggregate-wealth risk (covariance with the aggregate wealth growth):

$$\begin{aligned} E\left[R^x\right] = \; & -\frac{U_{WW}\left(W_0^i, \bar{W}_0\right) W_0^i}{U_W\left(W_0^i, \bar{W}_0\right)} Cov\left(R^x, \theta^i\left(R^i - R^f\right) + \tilde{\theta}^i (R^a - R^f)\right) \\ & - \frac{U_{W\bar{W}}\left(W_0^i, \bar{W}_0\right) \bar{W}_0}{U_W\left(W_0^i, \bar{W}_0\right)} Cov\left(R^x, \xi_1 (R^a - R^f)\right). \end{aligned} \tag{7}$$

This expression closely resembles the Intertemporal CAPM relation of Merton (1973). Individual risk preferences are controlled by the partial derivatives of the marginal utility of wealth with respect to the two state variables, own wealth and per capita wealth of the economy. The former derivative, denoted by U_{WW}, represents aversion to all wealth gambles. The latter, $U_{W\bar{W}}$, captures the attitude towards gambles that are correlated with aggregate wealth. When $U_{WW} < 0$ the consumer is risk averse and when $U_{WW} > 0$ the consumer is risk seeking. Similarly, when $U_{W\bar{W}} < 0$ the consumer dislikes aggregate risk (in addition to its contribution to own wealth risk), whereas when $U_{W\bar{W}} > 0$ the consumer seeks additional exposure to aggregate risk, relative to a no-status benchmark. The term that multiplies the first covariance in the equation above ($-\frac{U_{WW} W_0^i}{U_W}$) is the Arrow-Pratt coefficient of relative risk aversion (RRA). By analogy, we can name the term that multiplies the second covariance $(-\frac{U_{W\bar{W}}\bar{W}_0}{U_W})$ coefficient of relative aggregate-wealth risk aversion (RAWRA).

Under the preference specification (5) above, $U_{W\bar{W}} < 0$ and, consequently, agents are averse to aggregate wealth risk above and beyond its contribution to own wealth risk. From (7) it can be seen that investors require a higher expected return on assets that are more positively correlated with the public equity return (provided that $\xi_1 > 0$), even holding their contribution to the total portfolio variance fixed. Solving for portfolio demands yields

$$\left[\begin{array}{c}\theta^i\\ \tilde{\theta}^i\end{array}\right] = -\frac{U_W}{U_{WW}W_0^i}\Sigma^{-1}\left[\begin{array}{c}E\left(R^i - R^f\right)\\ E(R^a - R^f)\end{array}\right] - \xi_1\frac{U_{W\bar{W}}\bar{W}_0}{U_{WW}W_0^i}\Sigma^{-1}\left[\begin{array}{c}\beta^i\\ 1\end{array}\right] Var\left(R^a - R^f\right),$$

where Σ is the covariance matrix of the public and private equity returns. The first term gives the standard mean-variance efficient portfolio weights, and the second term represents the Merton-type hedging demand that reduces the weights of assets in proportion to their aggregate risk betas (the latter term is negative while the former is positive). In particular, the private equity allocation of the status-seeking investor, as a fraction of total wealth, approaches that of a power-utility investor with a coefficient of relative risk aversion equal to $-\frac{U_{WW}W_0^i}{U_W}$ as the beta of the private equity approaches zero, while the public equity allocation is always lower. Consequently, the lower is the beta of private equity, *ceteris paribus*, the greater is the relative share of private equity in the household's risky assets.

The above discussion relies on the first-order approximation of marginal utility of wealth. The effect of the "getting ahead of the Joneses" property on portfolio allocations can also be seen without an approximation of marginal utility if we rule out differences in higher order moments. In the special case of the model where the initial wealth distribution is degenerate (i.e., $W_0^i = W_0$ for all i), public and private equity returns are independent and identically distributed, and there is no riskless asset, it can be shown that in the unique rational expectations equilibrium, θ^i, the portfolio share invested in the idiosyncratic asset, is identical across investors and increasing in the status weight η, ranging between one-half (the power utility allocation) and one (details are in the Internet Appendix).

D. Getting Ahead of the Joneses

The property that marginal value of wealth is decreasing in aggregate wealth ($U_{W\bar{W}} < 0$) represents investors' desire to get ahead of the Joneses. This property captures the idea that an increase in aggregate wealth, holding individual wealth fixed, *lowers* marginal utility of wealth. This is in contrast to "keeping up with the Joneses" ($U_{W\bar{W}} > 0$), which *raises* marginal utility when the aggregate reference level is high.[7] The latter property is the one shared by most of the models of interdependent preferences used in the finance literature, including Abel (1990), Gali (1994), Bakshi and Chen (1996), and Campbell and Cochrane (1999).

The intuition for "getting ahead of the Joneses" is that an increase in relative status, holding individual wealth constant, *raises* marginal utility of wealth (Friedman and Savage (1948), Becker, Murphy, and Werning (2005)). Since status is an increasing function of the ratio of own wealth to reference wealth, as defined in (1), a decrease in aggregate wealth raises some people's status, making them better off but also raising their marginal utility of wealth. The latter effect causes them to avoid assets that pay off poorly in such states. In contrast, under "keeping up with the Joneses," investors overweigh assets that comove with aggregate wealth, since it is particularly painful for them to experience low consumption when aggregate wealth is high. This would lead to "underinvestment" in individual-specific assets and "herding" towards assets common to the reference group (e.g., as in DeMarzo, Kaniel, and Kremer (2004) and Gollier (2004)).

It is not obvious ex ante whether "getting ahead" or "keeping up" preferences are more relevant for modeling individual decision making. However, when modeling status preferences at the micro level, it is reasonable to require that relative status be treated by consumers as a luxury good, more important for the rich than than for the poor, whose basic consumption needs are more urgent. This assumption agrees with the existing survey evidence that wealthier people are more concerned with their relative position (e.g., McBride (2001) and Dynan and Ravina (2007)). The luxury feature of status preferences is captured here by the additive structure of utility and by its greater curvature with respect to consumption than with respect to relative wealth. Status can be a luxury good in the sense that the intratemporal marginal rate of substitution – the ratio of marginal utility of consumption to marginal utility of status (defined,

[7] The taxonomy of Dupor and Liu (2003) uses a slightly different but equivalent definition of "keeping up with the Joneses."

respectively, as $c = W^i$ and $s = \frac{W^i}{\bar{W}}$) – is decreasing in individual wealth.[8] The one period specification of my model can be written as $u(c,s) = c^{1-\gamma}\left[\frac{1}{1-\gamma} + \eta s^{\gamma}\right]$, so that the MRS is given by

$$\frac{u_c}{u_s} = \left[1 + \eta\left(1-\gamma\right)s^{\gamma}\right]\frac{s^{1-\gamma}}{c\eta\gamma} = \left(1 + \eta\left(1-\gamma\right)\left(\frac{W^i}{\bar{W}}\right)^{\gamma}\right)\frac{(W^i)^{-\gamma}}{\eta\gamma}\bar{W}^{\gamma-1},$$

which is a decreasing function of own wealth W^i (holding aggregate wealth fixed).

Various standard formulations of social externalities that feature "keeping up with the Joneses" do not possess this luxury property of status. Consider the utility function given by $\frac{1}{1-\gamma}\left(\frac{W^i}{\bar{W}}\right)^{1-\gamma}$, which is similar to the utility specifications analyzed by Abel (1990) and Gali (1994). The marginal utility of relative wealth, that is, the derivative with respect to $s = \frac{W^i}{\bar{W}}$ is $\left(\frac{W^i}{\bar{W}}\right)^{-\gamma}$. Differentiating this expression with respect to absolute wealth obtains $-\gamma\bar{W}^{-1}\left(\frac{W^i}{\bar{W}}\right)^{-\gamma-1} < 0$. Therefore, the importance of status *declines* with wealth. Under this specification of preferences the consumer derives utility only from status, so that marginal utility between consumption and status is not well defined. For a range of similar preference specifications that exhibit "keeping up with the Joneses" and that can be written in terms of both consumption and status, the MRS is either independent of or increasing in individual wealth, which is inconsistent with the idea that status is a luxury good (see discussion in the Internet Appendix).

E. Cross-sectional Heterogeneity

The "getting ahead of the Joneses" property of status preferences implies a wedge between relative risk aversion towards any wealth gambles, and relative aversion to risk that is correlated with per capita wealth. Further, the effect of "getting ahead of the Joneses" increases with relative wealth in a nonlinear fashion, driving down the risk aversion of the wealthiest investors and thus increasing their optimal exposure to idiosyncratic risk.

To illustrate this feature of the model, we can compute the relevant measures of risk aversion as functions of the state variables. The Arrow-Pratt coefficient of relative risk

[8] Ikeda (2006) defines quasi-luxury goods in a similar fashion and discusses conditions under which such goods are luxuries in the usual sense.

aversion (RRA) of agent i is given by

$$RRA = -\frac{W^i U_{WW}}{U_W} = \frac{\gamma \left(W^i\right)^{-\gamma}}{\left(W^i\right)^{-\gamma} + \eta \bar{W}^{-\gamma}} = \frac{\gamma}{1 + \eta \left(\frac{W^i}{\bar{W}}\right)^{\gamma}},$$

which is decreasing in relative wealth, $\frac{W^i_{t+1}}{\bar{W}_{t+1}}$, and is bounded from above by γ, its limit at zero wealth. This coefficient tends to zero as relative wealth grows.

To measure investors' desire to "get ahead of the Joneses," we can similarly calculate the relative aversion to aggregate wealth risk (RAWRA), which generates a Merton-type hedging demand that stems from the state-dependence of the utility function. Define

$$RAWRA = -\frac{\bar{W} U_{W\bar{W}}}{U_W} = \frac{\gamma \eta \bar{W}^{-\gamma}}{\left(W^i\right)^{-\gamma} + \eta \bar{W}^{-\gamma}} = \frac{\gamma \eta}{\left(\frac{W^i}{\bar{W}}\right)^{-\gamma} + \eta},$$

which is an increasing function of relative wealth, with the upper limit equal to γ. The lower limit as relative wealth falls is zero. Thus, the poorest individuals, while most risk averse, are the least averse to aggregate risk. Conversely, the wealthiest individuals are the least averse to pure wealth gambles, but also the most sensitive to aggregate fluctuations. The degree of divergence in risk attitudes for intermediate values of relative wealth is controlled by the magnitude of η, the status weight. The greater this parameter is, the steeper is the decrease in risk aversion and the increase in aversion to aggregate risk as relative wealth goes up. When $\eta = 1$ the two types of risk aversion are of equal magnitudes for the average investor (i.e., for i such that $\frac{W^i_{t+1}}{\bar{W}_{t+1}} = 1$). For $\eta > 1$ the aggregate risk aversion overtakes the RRA coefficient at lower relative wealth levels. Figure IV plots these two measures of risk aversion – RRA and RAWRA – as functions of relative wealth, $s^i = \frac{W^i}{\bar{W}}$, for the case $\gamma = 10$, $\eta = 1$. The sum of the two measures of risk aversion in this example is constant across wealth levels and equal to γ.[9]

[- Figure 1 about here -]

The cross-sectional differences in risk attitudes stem from the fact that these preferences exhibit more curvature with respect to consumption than with respect to (relative) wealth. Status is treated by consumers as a luxury: as consumption increases its

[9] This suggests that the social status model might in some cases have exactly the same aggregate asset pricing implications as the standard power utility model. For example, in the case of a degenerate initial wealth distribution and no idiosyncratic asset, the first-order approximation for the marginal utility (7) collapses to the usual CRRA expression $E\left[R^a - R^f\right] = \gamma \theta^* Var\left(R^a\right)$, where $\theta^* = \theta^i = \xi_1$. See the Internet Appendix for a discussion.

marginal utility falls, whereas marginal utility of status is flat, so that the marginal value of a unit of wealth does not decrease as fast. This drives down the risk aversion towards pure wealth gambles among wealthier individuals. Since relative wealth position is a luxury, the strength of the "getting ahead of the Joneses" motive increases with wealth, driving up the aversion to aggregate risk. Carroll (2002) argues that a preference for wealth as a luxury good is key to explaining the heterogeneity in portfolio composition across households, in particular the fact that the rich save a larger fraction of their wealth than the poor and that they hold a much larger share of risky assets (including entrepreneurial ventures) in their portfolios.

F. The Role of Skewness

In a situation where the marginal utility is highly nonlinear as a function of either own wealth or aggregate wealth, the approximation might not be very accurate and the higher-order moments of returns (such as skewness) might play a role in individual portfolio allocation. Considering higher-moment properties of returns is particularly relevant when considering investments in which tail payoffs are especially important, such as entrepreneurial ventures. Continuing the Taylor expansion of the marginal utility of wealth (6) to the second order as in Harvey and Siddique (2000), we obtain

$$\begin{aligned} U_W\left(W^i,\bar{W}\right) &= U_W\left(W_0^i,\bar{W}_0\right) + U_{WW}\left(W_0^i,\bar{W}_0\right)\left(W^i - W_0^i\right) \\ &\quad + U_{W\bar{W}}\left(W_0^i,\bar{W}_0\right)\left(\bar{W} - \bar{W}_0\right) + \frac{1}{2}U_{WWW}\left(W_0^i,\bar{W}_0\right)\left(W^i - W_0^i\right)^2 \\ &\quad + U_{WW\bar{W}}\left(W_0^i,\bar{W}_0\right)\left(W^i - W_0^i\right)\left(\bar{W} - \bar{W}_0\right) \\ &\quad + \frac{1}{2}U_{W\bar{W}\bar{W}}\left(W_0^i,\bar{W}_0\right)\left(\bar{W} - \bar{W}_0\right)^2 + o\left(W^i,\bar{W}\right), \end{aligned}$$

which leads to the equation determining optimal portfolio weights

$$
\begin{aligned}
E\left[R^{x}\right] \quad = \quad & -\frac{U_{WW}\left(W_{0}^{i},\bar{W}_{0}\right)W_{0}^{i}}{U_{W}\left(W_{0}^{i},\bar{W}_{0}\right)}Cov\left(R^{x},a^{i}\left(R^{i}-R^{f}\right)+\tilde{a}^{i}(R^{a}-R^{f})\right) \\
& -\frac{U_{W\bar{W}}\left(W_{0}^{i},\bar{W}_{0}\right)\bar{W}_{0}}{U_{W}\left(W_{0}^{i},\bar{W}_{0}\right)}Cov\left(R^{x},\xi_{1}(R^{a}-R^{f})\right) \\
& -\frac{1}{2}\frac{U_{WWW}\left(W_{0}^{i},\bar{W}_{0}\right)W_{0}^{i2}}{U_{W}\left(W_{0}^{i},\bar{W}_{0}\right)}Cov\left(R^{x},\left[\theta^{i}\left(R^{i}-R^{f}\right)+\tilde{\theta}^{i}(R^{a}-R^{f})\right]^{2}\right) \\
& -\frac{1}{2}\frac{U_{W\bar{W}\bar{W}}\left(W_{0}^{i},\bar{W}_{0}\right)\bar{W}_{0}^{2}}{U_{W}\left(W_{0}^{i},\bar{W}_{0}\right)}Cov\left(R^{x},\xi_{1}^{2}(R^{a}-R^{f})^{2}\right),
\end{aligned}
$$

since $U_{WW\bar{W}} = 0$ under the preference specification considered here. Note that the term multiplying the covariance of excess return with the squared return on the optimal portfolio can be interpreted as the relative preference for skewness following Kraus and Litzenberger (1976) and Harvey and Siddique (2000). Whenever this term is negative it implies that investors are willing to accept a lower expected return on an asset that exhibits greater co-skewness with the optimal wealth return. Therefore, an asset with greater skew will receive a higher weight in the optimal portfolio, holding all else equal. Similarly, the term multiplying the covariance of excess return with the squared return on the aggregate asset captures the preference for co-skewness with the market.

Under the status preferences, relative preference for skewness inherits the cross-sectional properties of relative risk aversion:

$$
RPS = -\frac{W^{i2}U_{WWW}}{2U_{W}} = -\frac{1}{2}\frac{\gamma\left(1+\gamma\right)\left(W^{i}\right)^{-\gamma}}{\left(W^{i}\right)^{-\gamma}+\eta\bar{W}^{-\gamma}} = -\frac{1}{2}\frac{\gamma\left(1+\gamma\right)}{1+\eta\left(\frac{W^{i}}{\bar{W}}\right)^{\gamma}}.
$$

Specifically, preference for positive skew (or, aversion to negative skew) is greatest in the limit of zero relative wealth, coinciding with the power utility value of $\frac{\gamma(1+\gamma)}{2}$, and declines to zero as relative wealth grows to infinity. Thus, the poor investors value positive skewness the most and the wealthy investors the least.

Analogously, we can define a measure of relative preference for co-skewness with aggregate wealth:

$$
RPAWCS = -\frac{\bar{W}_{0}^{2}U_{W\bar{W}\bar{W}}}{2U_{W}} = -\frac{1}{2}\frac{\gamma\left(1+\gamma\right)\bar{W}^{-\gamma}}{\left(W^{i}\right)^{-\gamma}+\eta\bar{W}^{-\gamma}} = -\frac{1}{2}\frac{\gamma\left(1+\gamma\right)\eta}{\left(\frac{W^{i}}{\bar{W}}\right)^{-\gamma}+\eta}.
$$

Again, similar to the aversion to aggregate wealth risk, preference for aggregate wealth co-skew is increasing in relative wealth, with the lower bound of zero and approaching $\frac{\gamma(1+\gamma)}{2}$ as relative wealth grows to infinity. These features of marginal utility have the following interpretation: while poorer investors prefer assets that have a large upside (even with low probability), wealthier investors seek assets that perform well when the aggregate wealth return takes extreme (positive or negative) values (e.g., options on the stock market index).

For assets with highly idiosyncratic (in the sense of low public equity beta) and positively skewed payoffs, the "getting ahead of the Joneses" property and the preference for positive skew make different cross-sectional predictions within the framework of the status model. While skewness implies that the attractiveness of the private equity asset is decreasing in wealth, the "getting ahead of the Joneses" property implies that it rises with wealth. The resulting pattern of individuals' investments in entrepreneurial private equity thus depends on the relative magnitudes of these two effects. Given that the skewness preference is of second-order importance relative to risk aversion for low values of utility curvature γ, for poorer households preference for skewness is more likely to be revealed through low-cost activities (e.g., buying lottery tickets, as long as they represent positive net present value gambles) rather than entrepreneurial investment, which requires substantial outlays and carries large downside risk as well as upside potential. As long as the skewness of private equity returns is only moderately positive, we can expect the declining risk aversion effect to dominate and therefore its portfolio share to increase with wealth. In the case in which private equity exhibits positive co-skewness with the public equity asset, the latter prediction is reinforced since under the "getting ahead of the Joneses" model, wealthier investors have a stronger preference for co-skewness with aggregate wealth.

G. Relative vs. Absolute Status

Since in my model investors have decreasing relative risk aversion it is important to compare and contrast the model's predictions with other models that fall into this class. One such model that is most closely related to mine in spirit as well as structure is the Capitalist Spirit model of Carroll (2002). In his model households care about both consumption and type of status derived from the absolute (rather than relative) level of wealth. Increasing risk tolerance as a function of wealth follows from the status motive acting as a luxury relative to consumption, so that the rich can afford to take a greater amount of risk. In my model, status, which is given by relative wealth, is also a luxury in the sense that is it more valuable to a wealthier household. Similarly, Wachter and Yogo (2007) rationalize the upward sloping portfolio shares of risky assets as a function of wealth within a model that explicitly features luxury *goods* consumption. Even with decreasing risk aversion, the more standard portfolio-theoretic models typically predict that household financial portfolios are well diversified, making it difficult to match both the level and the concentration of risky asset holdings.

Consider an economy in which investors maximize

$$E_t \left\{ \sum_{s=t}^{\tau} \delta^{s-t} \left[\frac{\left(C_s^i\right)^{1-\gamma}}{1-\gamma} + \eta W_s^i \right] + \delta^{\tau+1} \psi \frac{\left(W_{\tau+1}^i\right)^{1-\gamma}}{1-\gamma} \right\}.$$

This specification of preferences is similar to the Carroll (2002) model in terms of its central features and at the same time has the same number of parameters (and essentially the same structure) as the model developed in this paper. In the Internet Appendix I show that this model has the same structure of demands for pure wealth gambles as the relative wealth model, except that the coefficients of risk aversion and skewness preference are functions of absolute rather than relative wealth. However, since aggregate wealth does not enter preferences directly in this model, at any level of wealth the allocation to private equity is determined solely by its contribution to the properties of the total portfolio return (i.e., variance, skewness, and potentially higher moments). This is in contrast to the relative wealth model, where the private asset's comovement with aggregate wealth has a separate role in determining its portfolio share. When individuals' marginal utility does not depend on aggregate wealth directly, this implies that households' optimal portfolios are well diversified and closely resemble the aggregate stock market index. Consequently, the Capitalist Spirit model or similar models with decreasing relative risk aversion are unlikely to share the ability of the relative wealth model to match the level of entrepreneurial portfolio concentration, generate allocation to the idiosyncratic asset that is increasing in wealth, and thus explain the portfolio compositions of the wealthy households.

II. Quantitative Analysis

This section defines the equilibrium concept associated with the dynamic version of the model and the calibration of model quantities to aggregate data.

A. Equilibrium Dynamics

Each household i aged A_t^i at time t solves the recursive problem

$$V(W_t^i, \bar{W}_t, A_t^i; I_t) = \max_{C,\theta} \left\{ \frac{\left(C_t^i\right)^{1-\gamma}}{1-\gamma} + \eta \bar{W}_t^{1-\gamma} \frac{W_t^i}{\bar{W}_t} + \delta E\left[V(W_{t+1}^i, \bar{W}_{t+1}, A_{t+1}^i; I_{t+1}) \middle| I_t \right] \right\}, \tag{8}$$

subject to the resource constraint (3) and the law of motion of aggregate wealth (4), where I_t denotes the set containing all information up to time t, available to all households. This dynamic programming problem can be simplified by taking advantage of scale-independence and the fact that agents cannot influence their current-period status (see the Internet Appendix for details).

Since aggregate wealth is a state variable that enters the objective function of each household, optimal consumption and investment policies that solve (8) generally depend on the wealth distribution and its evolution. Because of the heterogeneity in consumption and investment choices across wealth levels, the wealth distribution affects the evolution of aggregate wealth (4) via aggregation of individual wealth portfolios. This law of motion is exogenous to any individual household, but under rational expectations it must be consistent with all households' optimal decisions. The expression in (4) can be written as

$$\frac{\bar{W}_{t+1}}{\bar{W}_t} = \xi_0\left(I_t\right) + \xi_1\left(I_t\right) R_{t+1}^a,$$

where $\xi_0\left(I_t\right)$ and $\xi_1\left(I_t\right)$ are determined in equilibrium and can vary over time reflecting shifts in the wealth distribution. Therefore, requiring aggregate wealth dynamics to be consistent with equilibrium implies that the state space, which includes the space of wealth distributions, is potentially infinite-dimensional.

In practice the coefficients in the law of motion can be approximated very well by constants (or, more generally, simple functions of lagged aggregate wealth growth). Such an approximation simplifies the problem dramatically, making it possible to obtain a numerical solution and calibrate the model (this is a special case of the approach proposed by Krussell and Smith (1998)). My approximation procedure consists of solving the individual optimization problems, simulating future wealth distributions for a large number of periods using the optimal policies, updating the resulting law of motion for aggregate wealth by projecting its simulated path on the public equity return realizations, and repeating the procedure until the law of motion stabilizes. The computational procedure is detailed in the Internet Appendix.

B. Parametrization

I solve the model for $T = 7$ periods so that each period corresponds to a 10-year investment horizon. Thus, if the youngest agents enter the model at age 20 then the last decision-making period corresponds to the age of 80 years. Table I lists the parameters of the investment opportunity set as well as the benchmark values of preference parameters. The unconditional means of the stock return and the risk-free rate (i.e., 10-year Treasury bond yield) approximately match those in the U.S. data, at annualized values (for corresponding logarithmic returns) of 11% and 5%, respectively.[10] The risk-free rate is constant.

[- Table I about here -]

The equity returns are i.i.d. I assume that the expected excess return on the idiosyncratic asset is equal to the public equity premium, consistent with the findings of Moskowitz and Vissing-Jørgensen (2002). I assume that the standard deviation of the idiosyncratic project/private equity return is three times as high as that of public equity, which is similar to the volatility of publicly traded individual stocks (see Campbell, Lettau, Malkiel, and Xu (2001)). This implies annualized standard deviations of public and private equity logarithmic returns of 15% and 45%, respectively. Heaton and Lucas (2004) and Polkovnichenko (2003) consider similar volatility levels in calibrating entrepreneurial project hurdle rates. Alternatively, one could use data on the returns to private equity and/or venture capital investments to calibrate the private equity returns. It is not clear whether returns accruing to private equity funds are representative of returns accruing to individual entrepreneurs, since fund returns aggregate individual investments, reducing idiosyncratic risk.

I model public and private equity returns as jointly lognormally distributed and use Gauss-Hermite quadrature (with 10 nodes along either dimension) to evaluate expectations (e.g., Judd (1999)). In the benchmark calibration I allow private equity returns to covary positively with public equity by setting $\beta^i = 0.5$. This is qualitatively consistent with the empirical evidence in Heaton and Lucas (2000b) that income streams from proprietary businesses are positively correlated with the stock market return. For the

[10]This assumption overstates the *real* risk-free rate in the data; however, it allows me to sidestep the tension generated by the equity premium and risk-free rate puzzles in calibrating aggregate portfolio holdings. Since explaining these puzzles is not the focus of this paper, I parameterize the model to make them less pronounced.

two-state public equity return process I use this beta to restrict the conditional mean of the private equity return in each of the aggregate states.

The initial wealth distribution used as a starting point for the iterative procedure is calibrated using the percentiles of the U.S. wealth distribution from the 2001 Survey of Consumer Finances (SCF). Table I displays the set of points used to approximate the distribution.

C. Calibration

In order to calibrate the key parameters of the status model, namely, the consumption utility curvature γ and the status utility weight η, I simulate the model's solution for a range of parameter values and compare its quantitative predictions at the aggregate level to the data. The empirical and simulated moments for the aggregate quantities of interest are displayed in Table II. The primary targets of my calibration are two key statistics of the data on individual household portfolio allocations: average holdings of risky assets (specifically, public and private equity) and the degree of portfolio concentration. I choose preference parameters so as to closely match these two moments of household portfolio holdings.[11] I use data from the 2001 SCF to estimate the average share of household assets allocated to risky assets (including stocks, mutual funds, corporate bonds, private businesses, etc.) and the average share allocated to "concentrated equity," the household's largest risky asset holding (such as a private business or an individual stock). I only consider households that report positive holdings of risky assets, since in my model all households are marginal in the stock market as there are no costs associated with stock market participation. A detailed description of the data can be found in the Internet Appendix. The model counterparts of these moments are the average share of wealth allocated to risky assets (both public and private equity) and the average share of private equity.

[- Table II about here -]

In addition, I use the set of empirical facts about aggregate consumption growth volatility to constrain my calibration. I compare the standard deviations (annualized, in percentage points) of average logarithmic consumption growth generated by the model for a range of parameter values with those from the U.S. data. The reported consumption

[11] Piazzesi and Schneider (2007) propose a framework for modeling both asset prices and quantities endogenously in a similar portfolio choice context; here I focus on quantities taking prices as exogenous.

volatility measures are based on estimates obtained using micro data from the Consumer Expenditure Survey (CEX). The estimates of volatility of average consumption growth are from Malloy, Moskowitz, and Vissing-Jørgensen (2005), and the average consumption growth volatility is based on the quarterly estimates of Wachter and Yogo (2007); both studies use CEX household consumption expenditure data for nondurable goods and services. I also report the standard deviation of growth in the logarithm of per capita consumption from NIPA. These comparisons should be viewed with some caution, since the model numbers are based on 10-year periods, whereas consumption data are based on quarterly consumption growth observations (however, Malloy, Moskowitz, and Vissing-Jørgensen (2005) estimate a growth rate of quarterly consumption over long horizons, whereas I use the 20-quarter estimate). Household-level consumption data are available in the CEX for less than 25 years, making it difficult to estimate the volatility of consumption growth between 10-year periods. Still, since the aggregate consumption process is close to a random walk at the annual frequency, this problem might not be too severe.

Alongside the empirical estimates of consumption volatility the table displays corresponding quantities obtained using simulated data produced by the social status model for the consumption curvature parameter $\gamma = 14$ and status weight $\eta = 1$, values chosen to approximately match the empirical quantities. I also report the corresponding model quantities for the case $\eta = 0$ (i.e. standard constant relative risk aversion (CRRA) preferences with no status concerns) and $\gamma = 16$, which is also chosen so as to best match the target moments. I also calibrate a version of the Capitalist Spirit model outlined in Section I to the two moments of portfolio holdings.

The social status model can match the average portfolio shares fairly closely. The model slightly understates the average share of risky assets (allocation to equity, both public and private, in total assets), at 26% vs. 28% in the data. The model matches the degree of portfolio concentration at the aggregate level almost exactly, producing the 17% of total equity concentrated in the “single largest asset” (vs. 12% in the data). Consequently, the model only slightly overstates the average fraction of total assets devoted to private equity, at 6%. The model can match these asset quantities without dramatically overshooting the volatility of consumption growth. The annualized standard deviation of growth rate in the logarithm of per capita consumption growth is twice as high in the model as in the data (3.4 versus 1.71%), but the former number aggregates over both stockholders and non-stockholders. The volatility of average consumption growth, which is measured in the data only including stock-owing households, is matched much more closely, at 4.6 and 5.6% in the data and in the model, respectively. The model also overstates the average individual consumption volatility by almost four percentage points, although the empirical estimate is conservative because it aims to reduce the influence of measurement error and thus potentially eliminates some genuine idiosyncratic variation; see Wachter and Yogo (2007) for details.

The standard power utility (CRRA) model calibrated similarly to the status model can match the average allocation to risky assets, but not the allocation to private equity, producing only half as much portfolio concentration on average (9 vs. 18%). The power utility curvature implied by this calibration is $\gamma = 16$. Despite similar levels of risky asset holdings the CRRA model overstates aggregate consumption volatility more than the status model: the volatility of log aggregate consumption growth is 5% and volatility of the average consumption growth rate is 11%. The difference stems from the fact that under the CRRA preferences a greater share of individual consumption is affected by aggregate risk than in the status model. At the same time, the *average* volatility of individual consumption growth is higher, at 16%. The reason is that under the status model, most of the idiosyncratic risk is borne by a small number of households (the wealthiest ones), whereas under the CRRA model it is distributed evenly across the population since there are no differences in portfolio shares.

The last column of Table II reports the moments of the Capitalist Spirit model. Because these preferences are not scale-independent, for simplicity I calibrate a two-period version rather than the fully dynamic life-cycle model. As a consequence, I only report the moments of asset holdings and not of consumption, since the latter are not directly comparable to the data. Despite the additional degree of freedom, the ability of this model to match aggregate portfolio holdings is similar to that of the power utility model. The Capitalist Spirit model with $\gamma = 25$ and $\eta = 1$ matches the average risky asset share of 28% exactly, but the concentrated holdings of private equity are too low at 10%.

Even though the private equity concentration puzzle is less prominent at the aggregate rather than individual level, it appears sufficient to distinguish the social status model from the more standard models (whether with constant relative risk aversion or decreasing relative risk aversion), given the parameters of the economic environment specified above.

III. Evaluation and Extensions

In this section I evaluate the ability of the social status model to explain quantitative as well as qualitative features of the data at a disaggregated level. In particular, I assess the calibrated models' predictions for the cross-section of individual portfolio allocations and compare its performance to the more standard alternatives. I show that the social status model does a better job explaining the cross section of household asset holdings than the competing models matched to the same aggregate quantities. I also evaluate the model's predictions for the individual wealth variability over time as well as discuss its implications for savings behavior and entry into entrepreneurship.

A. Heterogeneity in Risky Asset Holdings

The main challenge for the portfolio choice model is to explain the heterogeneity in asset holdings across households, given the constraint imposed by matching the aggregate quantities. The empirical measures of risk-taking and diversification that I analyze are averages of portfolio shares taken over two subsamples of households, subdivided into wealth percentile groups. The first subsample includes all "stockholders" defined broadly as households who own both directly held equity and equity held through mutual funds or other managed accounts. The second subsample comprises "stockholders with concentrated holdings," stockholders that report positive holdings of one of the following: directly held individual stocks, private business, investment real estate, and other similar risky assets. As discussed above, my empirical analog of "private equity" in the model is the single largest asset from the above list owned by a household. In addition, I look at total "undiversified" equity, which is the sum of all such concentrated holdings (i.e., all equity, public and private, that is held directly rather than in managed accounts).

To evaluate the model's ability to explain portfolio allocation decisions I consider the variation in the portfolio shares across the wealth distribution. The average allocations by wealth quantile obtained from the SCF are summarized in Table III. The salient feature of the data is that both the share of risky assets in households' portfolios and the degree of asset concentration in the largest risky asset are increasing in wealth.

[- Table III about here -]

Table IV reports the corresponding quantities produced by the calibrated social status model as well as the power utility model. The social status model broadly matches the cross-sectional patterns of risky asset holdings (Panel A). The average allocation among the bottom half of the wealth distribution is around 20 % in the data: 19 for all stockholders and 24 for those with concentrated equity; the latter number is matched by the model. Consistently with the data, the share of risky assets in the social status model is increasing in wealth. At the top 5th percentile of the wealth distribution households in the data invest just over one-half of their wealth in equities, or close to 60% for concentrated equity-holders, which is captured by the model. For the highest (top 1%) wealth percentile, the model overshoots the risky asset allocation (63% in the data for stockholders and 68% for concentrated shareholders), predicting risky asset allocation of 98%.

The standard power utility model, which features constant portfolio shares across the wealth distribution, cannot match the heterogeneity in portfolio allocations. The equity share of 29 % predicted by the CRRA model are not too far from the empirical estimates for the bottom 90% of the wealth distribution. However, within the top decile of the distribution, the standard model dramatically understates the level of risky asset holdings. The more interesting comparison is with the Capitalist Spirit model, which was designed in part with the aim of explaining the heterogeneity in risky asset holdings. Indeed, as can be seen in Panel B of Table IV, this model does generate substantial cross-sectional variation in equity shares. In fact, it produces *too much* heterogeneity: it understates the risky asset holdings of the bottom half of the distribution at 15%, and dramatically overstates the allocations of the rich, predicting that the wealthiest 1% of investors asset positions are 120% in equity. In fairness to the Capitalist Spirit model, these extreme differences are due in part to the fact that I chose to calibrate a parsimonious version that has the same number of parameters as the social status model. The original model in Carroll (2002) has additional parameters, including nonzero direct utility curvature over wealth, and might be able to match the cross-section of risky asset holdings with more precision.

[- Table IV about here -]

B. Heterogeneity in the Degree of Portfolio Concentration

Explaining the cross-section of portfolio concentration is an even greater challenge. The social status model does a good job of matching the average portfolio shares allocated to private equity among *all* stockholders, as well as its increasing profile. The model predicts that on average 15% of equity, or 5% of total assets, is concentrated in the idiosyncratic asset in the lower deciles of the wealth distribution. This is similar to the average shares in the data for all stockholders (14 and 3%, respectively). Both the CRRA and the Capitalist Spirit models understate the share of risky assets invested in private equity, at around 10%, which combines with the overstated level of total equity holdings to produce exactly the 3% of total assets in the concentrated holding observed in the data. In the top decile of the distribution, however, the concentration shares increase sharply, up to almost 30% of total assets for the richest 1% of households. Neither the standard CRRA model nor the Capitalist Spirit model with decreasing relative risk aversion can match this increase.

The social status model exhibits a sharp increase in concentration shares over the top wealth percentiles, predicting that 83% of risky asset holdings of the top 1% of households are comprised of private equity. This prediction appears to overshoot the average empirical shares of the *single largest* concentrated equity holding, which stands at 37% of risky assets. However, if we extend the notion of concentrated investment to include all "undiversified" equity, the difference becomes less dramatic. In the data, for households in the top 1% of the wealth distribution and for those in the next 4%, the average shares of total equity holdings that are undiversified are 77% and 54%, respectively, corresponding to 51 and 31% of total assets. Conditional on households having nonzero holdings of such concentrated equity assets, these quantities are even greater, with 83% of equity held by the top 1% of households in the form of undiversified investments, thus coming very close to the model's prediction.

It is difficult to assess the extent to which the model may be overstating under-diversification of the rich using the SCF data. It is possible that some of the equity positions that I classify as diversified, such as those held in mutual funds and "managed accounts" are in fact highly exposed to idiosyncratic risk. In particular, it is likely that some of the managed account holdings of the very wealthy might include hedge fund and private equity fund investments, which can have large idiosyncratic risk exposure.[12]

The standard CRRA portfolio model with $\gamma = 16$ calibrated to match the same aggregate quantities cannot match either the heterogeneity in risk taking or the extent of portfolio concentration among the rich, since it predicts that the portfolios shares do not vary with wealth. The Capitalist Spirit model predicts that portfolio shares do vary with

[12] Calvet, Campbell, and Sodini (2007) document that wealthier households appear to hold better-diversified portfolios than poorer ones, but at the same time also invest more aggressively, and as a result are exposed to more idiosyncratic risk.

wealth. However, unlike the total risky asset holdings, the allocation to private equity implies by the Capitalist Spirit model is *decreasing*, rather than increasing, in individual wealth. This feature of the model can be attributed to the declining preference for positively skewed payoffs that accompanies decreasing relative risk aversion, as discussed in section I. The allocation to private equity under standard power utility preferences is driven by the diversification benefit (i.e., maximizing the portfolio's Sharpe ratio), but also by the concerns about higher moments of the portfolio return distribution, such as skewness. The Capitalist Spirit model behaves similarly to a power utility model with a certain coefficient of relative risk aversion corresponding to a given wealth level; as wealth increases both risk aversion and the preference for skewness decrease, so that the portfolio allocation more closely resembles the mean-variance efficient portfolio.

The ability to match the risky asset holdings and portfolio concentration of the richest households without generating excessive volatility of aggregate consumption growth is a distinctive feature of the social status model. The reason the social status model is able to reconcile the aggregate facts with evidence on the portfolio holdings of the very wealthy is that it predicts a greater degree of portfolio concentration for investors with high wealth, relative to the average investor.

The model's allocations to private equity are empirically plausible in that they generally follow the same increasing pattern as the allocation to undiversified equity holdings in the data, although the predicted magnitudes are higher for the top wealth groups. The magnitudes are sufficiently similar to conclude that the model can broadly match the empirical patterns of risk taking and the degree of portfolio concentration simultaneously. It is possible that some of the heterogeneity in private equity holdings is due to a combination of luck and illiquidity (or inertia): if portfolio shares representing investments in private businesses are difficult to rebalance, over time they will be positively correlated with past returns. However, this would imply that entrepreneurial investment is even costlier from a diversification perspective and therefore more difficult to reconcile with standard models.

C. Wealth Mobility

In the model, *individual* consumption growth volatility is sharply increasing in wealth along with the volatility of portfolio returns, reaching 20% for the wealthiest 5% of households and 37% for the top percentile (Table IV). Much of this volatility is idiosyncratic, driven by the returns on "private equity." Does the social status model imply too much variability in individual consumption and wealth, in particular for the richest households? The model does predict high volatility of portfolio returns and consumption growth for the top 1% of households, at 22 and 37% (log, annualized), respectively. Unfortunately, it is impossible to assess directly whether these quantities are empirically reasonable. Data on individuals' portfolio returns are unavailable in the U.S., while consumption data from the CEX lack sufficiently long panel dimension to estimate individual consumption growth volatility over long horizons. In addition, the CEX does not do a very good job sampling the wealthiest households. Wachter and Yogo (2007) report estimates of individual consumption volatility growth by wealth groups; while they do not consider the top percentile of the distribution, their estimates of coarser groups are of similar magnitudes to those produced by my model.

In order to evaluate the model's predictions for the degree of exposure to idiosyncratic risk I look at the cross-sectional dynamics of household wealth using data from the Panel Study of Income Dynamics (PSID). Although this data set, like the CEX, undersamples rich households, it has a long enough panel dimension to estimate changes in household wealth over 10-year periods, which match the horizon in my simulated model.

While it is well known that the distribution of household wealth in the U.S. is extremely wide and highly concentrated, there is also a substantial amount of cross-sectional wealth mobility over time. I estimate 10-year transition probabilities of wealth deciles following Hurst, Stafford, and Luoh (1998). They estimate transition probabilities using the PSID wealth supplements over the period 1984 to 1994. I update their estimates with data from the 1999 supplement. I next adjust the estimated transition rates to limit the influence of measurement error and, most importantly, to remove life-cycle accumulation/decumulation effects that are absent in my model, in order to provide an appropriate benchmark for evaluating the model's predictions. Details of this estimation can be found in the Internet Appendix.

Table V displays the probabilities of moving upwards or downwards and staying in the same percentile group conditional on being in a given wealth quantile at the beginning of a 10-year period. The empirical transition matrix displays a substantial degree of mobility, especially in the right tail of the wealth distribution (Panel A). Among the households in the top 1%, two-thirds are staying in the same decile, and one-third fall into a lower decile. In the 95th to 99th percentile group, over half of all households fall behind after 10 years. At the same time, the movement between the top and the bottom half of the distribution is very limited, with 98% of households in the bottom

50% remaining there after 10 years.

[- Table V about here -]

The social status model is able to generate patterns of social mobility that very closely mimic those in the data for the top percentiles of the wealth distribution. The quantitative features of the transition distribution for the status model are summarized in Table V (Panel B). Note that for the top 1% of the distribution the model matches the empirical transition probabilities particularly closely, with a quarter of households moving down into a lower percentile group after the 10-year period. In contrast to the social status model, the standard power utility model (Panel C) produces highly persistent cross-sectional wealth distribution, with persistence probabilities of 95% in the top percentile of the distribution (compared to about 67% in the data and 76 under the status model). For lower percentile groups the match between the social status model and the data is less close, but the model still outperforms the neoclassical benchmark. The Capitalist Spirit model produces even less mobility than the CRRA model (Panel D). Overall, even though the social status model is not specifically designed to explain social mobility, it does a good job matching the empirical facts for mobility in the upper end of the wealth distribution. I therefore conclude that the model's predictions for the degree of households' exposure to idiosyncratic investment risk are reasonable.

D. Entrepreneurship and Concentration

In matching the cross-sectional predictions of the social status model for the degree of portfolio concentration I have so far ignored the fact that a large fraction of households, even among stockholders, have no concentrated holdings. In the context of the model, this fact should not be surprising if not all investors have access to idiosyncratic investment opportunities that earn a positive abnormal return ("alpha"). Separating households that do own concentrated assets helps to match the model's predictions for the idiosyncratic risk exposure of the wealthiest investors' portfolios. At the same time, conditioning on participation in the "private equity" market also reveals that the model dramatically understates the degree of portfolio concentration in the bottom half of the wealth distribution. As documented in Table III (Panel B), households in the lower half of the distribution that do own idiosyncratic assets on average have between 80 and 90% of their total equity concentrated in such investments, which corresponds to 20% of their total assets. These concentration shares decline somewhat at higher wealth levels before displaying the sharp increase in the top 5% group. In contrast, in the model the poorer households have the lowest concentration shares (3% of total assets allocated to private equity).

The reason for the discrepancy is not surprising. In the model I allow households to invest a small fraction of their wealth in private equity. In the data, the concentrated equity stakes, especially among the poorer households, are driven by business owners. Given the potential importance of asymmetric information in the private equity market and in the financing of small businesses, incentive considerations should dictate that entrepreneurs' stakes in their businesses must be large relative to their outside assets. Bitler, Moskowitz, and Vissing-Jørgensen (2005) show that this prediction is indeed borne out in the data. Still, this does not explain why poorer households choose to become entrepreneurs if doing so requires a potentially dramatic increase in portfolio and consumption risk relative to other investment opportunities. For example, setting the minimum required business owner's private equity stake to 20% of total assets, which is consistent with estimates obtained by Bitler, Moskowitz, and Vissing-Jørgensen (2005), would imply that, in the social status model, only the wealthiest 5% of households find it optimal to become entrepreneurs. In order to confirm this intuition I solve the model while restricting the share of private equity to total assets to be at least 20%, or else zero. Table IV (Panel C) displays the resulting cross-section of private equity shares. Indeed, they are zero for all households outside of the top decile of the wealth distribution.

One possibility for reconciling the model with the data along this dimension is to allow for heterogeneity in investment opportunities among investors. In particular, suppose individuals draw idiosyncratic entrepreneurial projects randomly from a distribution of systematic risk exposures. For example, suppose some entrepreneurs have access to projects that provide a hedge for aggregate risk in the form of a negative beta with public equity. Then a concentrated investment in such a project might be optimal even for poorer investors, for whom the status-seeking motive is very weak. Alternatively, for investors with high consumption curvature γ, and therefore a strong preference for positive skew, a large *positive* beta of private equity may be more attractive because it can magnify the private asset's contribution to the skewness of the total portfolio (by increasing the co-skewness with the stock market). The bottom line of Table IV (Panel C) shows private equity shares simulated from the model with the minimum concentration constraint of 20% and increased systematic risk of private equity: $\beta^i = 1.5$. It is evident that in this case even the households in the bottom half of the wealth distribution are willing to invest half of their assets in private equity, because it is a good hedge against the risk of public equity. The probability of drawing a project with high co-skewness with public equity (or a large diversification benefit) is likely to be small empirically, however. This is consistent with the huge discrepancy in the rate of participation in the private equity market reported in Table III between the richer and the poorer households. Only 8% in the bottom half of the wealth distribution own concentrated equity, compared to 83% of households in the top 1% of the distribution.

An interesting direction for future research would be to calibrate a model with explicit heterogeneity in private equity investment opportunities. One likely prediction is that the nonlinear effect of "getting ahead of the Joneses" on risk preferences might lead to a sharp increase in participation rates at the very top of the wealth distribution, with little variation across lower percentiles. Hurst and Lusardi (2004) find that the relationship between individual wealth and entry into entrepreneurship is highly nonlinear, but strongly positive only among the top 5% of the distribution. Importantly, liquidity constraints do not appear to be driving the effect of wealth on entry rates, suggesting a role for preference-based explanations. At the same time, empirically there is some evidence of a link between concentration of financial portfolios and entrepreneurship: Calvet, Campbell, and Sodini (2007) report that the financial portfolios of entrepreneurs (not including their business) are on average less diversified than those of non-entrepreneurs. This evidence lends further support to the unified view of household diversification offered in this paper.

E. Saving and Consumption Dynamics

The social status model generates considerable heterogeneity in saving rates. The optimal consumption-wealth ratios reported in Table VI show that the richest 10% of the households consume a much smaller function of their wealth than the poorest half, and consequently save more. For example, the youngest households (e.g.,, 20-year olds) at the bottom half of the wealth distribution consume just over 40% of their initial wealth (over a 10-year period), as do power utility households, whereas the richest 1% of the young consume only 14%. The difference is even more dramatic for old households: the poorer households consume up to 60% of their wealth in the second-to-last period of their lifetime (i.e., at age 80), while the richest still consume about 14%, thus leaving a disproportionately large amount of wealth for their heirs. This prediction of the model is consistent with the stylized empirical observation that the rich elderly do not dissave as predicted by the standard life-cycle model (e.g., see Dynan, Skinner, and Zeldes (2004)). The intuition for the high saving rate among the very rich is that future status utility provides additional benefit for saving, above and beyond the desire to smooth consumption over time. This motive is particularly strong for the wealthy, since future status is relatively more important to them. This prediction is typical for models where wealth confers social status; Cole, Mailath, and Postlewaite (1992) and Corneo and Jeanne (1999) discuss the "oversaving" effects generated by relative wealth concerns.

The differences in consumption-wealth ratios across the wealth distribution are not driven by the bequest motive as such. Rather, they are due to the fact that the marginal utility of wealth is increasing in relative wealth (a consequence of the "getting ahead of the Joneses" property). This shifts the importance from consumption towards wealth accumulation as an individual's wealth grows (relative to the average). Some of the empirical facts concerning the heterogeneity in savings rates can be explained by other models in which preferences for bequest are non-dynastic and have luxury good properties (e.g., Carroll (2000), DeNardi (2004)). The social status model possesses this desirable feature even though it was not specifically designed to explain savings behavior.

In the absence of labor income the simulated savings rates in my model can only be compared to the data qualitatively (rather than quantitatively). I leave out labor income in order to focus attention on the endogenous choice of exposure to idiosyncratic risk, which is driven by relative wealth concerns. The illiquidity of individual human capital and its depreciation with age can be major determinants of saving behavior as well as portfolio choice over the life cycle (e.g., see Viceira (2001), Cocco, Gomes, and Maenhout (2005), Gomes and Michaelides (2005), and Storesletten, Telmer, and Yaron (2007)). However, it is likely that these effects are muted for the very wealthy, whose investment behavior is the primarily focus of this paper, since for them human capital is likely to constitute a much smaller fraction of total wealth than for an average U.S. household. Incorporating labor income into the social status model would be important for evaluating its predictions for the entire cross-section of households, in particular its ability to match the observed degree of wealth inequality.

IV. Conclusion

In this paper I develop a theory of household investment behavior based on the idea that people care about their relative position, and that wealthier people value status particularly highly. The latter assumption implies that marginal utility of wealth increases with relative status. Consequently, my model makes the prediction that investors optimally hold undiversified portfolios in equilibrium, overweighing idiosyncratic risk and under weighing aggregate risk relative to the neoclassical benchmark. This feature of the model suggests that cross-sectional dispersion in accumulated wealth can be generated without subjecting agents to exogenous idiosyncratic shocks. Empirically, such shocks are not sufficient to explain the inequality in consumption and wealth, hinting that undiversified portfolios may be playing an important role (Cochrane (1991), Venti and Wise (1998), Campbell (2006)). Thus, my model's ability to rationalize individual portfolio holdings and resulting wealth dynamics potentially lends support to the argument of Friedman (1953), who emphasizes the role of individual choice and, in particular, risk preferences in shaping the distribution of income and wealth.

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Table I
Calibration

This table presents the the model parameters and the percentiles of the wealth distribution used in the calibration. Panel A displays the parameters of the asset returns used in calibration, annualized via logarithmic returns. The public equity return and risk-free rate are based on 10-year CRSP value-weighted returns and 10-year Treasury yields, respectively. The private equity return is calibrated to have the same mean return as public equity, with a standard deviation three times as high. Systematic risk of private equity is captured by its beta (loading) on public equity. Panel B displays the range of preference parameter values used in simulations. Panel C contains a discrete approximation of the wealth distribution used to initialize the simulated model: for each relative wealth level x the fraction of households with wealth below this level, $(\frac{W^i}{\bar{W}} \leq x)$ is given by $F(x)$. This distribution matches the distribution of households net worth in the 2001 SCF.

Panel A: Technology parameters

Parameter		Value
Risk-free Rate	R^f	5%
Public Equity Risk Premium	$E(R^a) - R^f$	6%
Public Equity Return Volatility	$\sigma(R^a)$	15%
Private Equity Risk Premiums	$E(R^i) - R^f$	6%
Private Equity Return Volatility	$\sigma(R^i)$	45%
Systematic risk of private equity	β_{R^i,R^a}	0.5

Panel B: Preference parameters (status benchmark)

Parameter		Value
Curvature of Consumption Utility	γ	14
Status Utility Weight	η	1
Subjective Discount Factor	β	0.97^{10}
Bequest Utility Weight	ψ	1

Panel C: Initial wealth distribution

x	0.005	0.013	0.027	0.053	0.133	0.267	0.533	1.333	2.665	5.330
$F(x)$	0.162	0.187	0.219	0.257	0.328	0.447	0.603	0.819	0.920	0.971

Table II
Asset Holdings and Consumption Growth Volatility

The table plresents average portfolio allocations to public and private equity and measures of consumption growth volatility in the U.S. data and in the model. The "Data" column reports total (public and private) equity as a share of total assets and the share of assets allocated to concentrated equity (private business or individual stock) for households with positive equity holdings, obtained from the 2001 SCF, and consumption growth volatility measures, which are annualized logarithmic estimates using quarterly expenditures: † denotes aggregate consumption from NIPA (5-year horizon), ‡ denotes individual consumption from CEX (5-year horizon), and ♭ denotes individual consumption from CEX (quarterly horizon). The "Social Status" column reports moments simulated for the calibrated social status model with $\gamma = 14, \eta = 1$. The 'CRRA' column reports moments simulated for the calibrated power utility ($\eta = 0$) model with $\gamma = 16$. The "Capitalist Spirit" column reports moments simulated for the calibrated version of the Capitalist Spirit model with $\eta = 1$ and $\gamma = 25$. All quantities are in percentage points.

	Data	Social Status	CRRA	Capitalist Spirit
Equity/total assets	28	26	29	28
Concentrated/total equity	18	17	9	10
Conc. equity/total assets	5	6	3	2
$\sigma\left(\ln\left(\bar{C}_{t+h}/\bar{C}_t\right)\right)$	1.71†	3.4	5	
$\sigma\left(\frac{1}{N}\sum\ln\left(C^i_{t+h}/C^i_t\right)\right)$	4.6‡	5.6	11	
$\frac{1}{N}\sum\sigma\left(\ln\left(C^i_{t+h}/C^i_t\right)\right)$	9♭	12.6	16	

Table III
Portfolio Allocation: Data

The table displays portfolio allocation measures across percentiles of the wealth distribution. Panel A presents average portfolio shares of households that report owning stocks, mutual funds, and other publicly traded risky assets ("equity"). Panel B presents average portfolio shares of households that report having concentrated equity stakes, such as shares of private businesses, individual stocks, investment real estate, etc. Participation rate is the fraction of households that own such assets. "Concentrated equity" is the largest of: private business holdings, individual stock holdings, investment real estate holding, etc. "Undiversified equity" is the sum of all such holdings (i.e., all equity held directly, outside of mutual funds or other managed accounts).

Panel A: All stockholders

Wealth percentile	Bottom half	50-90	90-95	95-99	Top 1%
Equity/total assets, %	19	26	44	52	63
Concentrated/ total equity, %	14	17	20	27	37
Concentrated equity/total assets, %	3	5	10	17	26
Undiversified/total equity, %	19	29	41	54	77
Undiversified equity/total assets, %	4	9	19	31	51

Panel B: Stockholders with business or other concentrated equity

Wealth percentile	Bottom half	50-90	90-95	95-99	Top 1%
Equity/total assets, %	24	34	48	59	68
Concentrated/total equity, %	90	63	44	44	45
Concentrated equity/total assets, %	20	21	21	28	32
Undiversified/total equity, %	80	70	60	69	84
Undiversified equity/total assets, %	20	24	30	42	58
Participation rate, %	8	30	53	66	83

Table IV
Portfolio Allocation: Model

The table presents portfolio allocations produced by the model calibration. Panel A displays average portfolio shares simulated from the status model with $\gamma = 14$, $\eta = 1$. Panel B displays average portfolio shares simulated for the Capitalist Spirit model with $\gamma = 25$, $\eta = 1$. Panel C displays average portfolio concentration simulated for the status utility model with the share of private equity to total assets restricted to be either zero or at least 20%. The benchmark case has $\beta_{R^i,R^a} = 0.5$; the alternative case features negative aggregate risk exposure of private equity, $\beta_{R^i,R^a} = 1.5$.

Panel A: Social Status

Wealth percentile	Bottom half	50-90	90-95	95-99	Top 1%
Equity/total assets, %	24	24	27	62	98
Private/total equity, %	15	15	17	42	83
Private equity/total assets, %	5	5	6	30	82
Portfolio mean return, %	6	6	6	8	12
Portfolio std. dev., %	4	4	5	11	22
Mean consump. growth, %	2	2	2	5	10
Std. cons. growth, %	7	7	8	18	37

Panel B: Capitalist Spirit

Wealth percentile	Bottom half	50-90	90-95	95-99	Top 1%
Equity/total assets, %	15	23	103	122	123
Private/total equity, %	11	11	7	2	1
Private equity/total assets, %	2	3	7	3	1
Portfolio mean return, %	5	5	12	14	14
Portfolio std. dev., %	3	4	12	14	14

Panel C: Social Status, restricted

Wealth percentile	Bottom half	50-90	90-95	95-99	Top 1%
Private equity/total assets, bchmrk.	0	0	1	27	82
Private equity/total assets, altern.	52	50	48	62	70

Table V
Wealth Mobility

This table displays probabilities of transition between wealth percentile groups over 10-year periods. Panel A reports empirical transition probabilities estimated using the PSID wealth supplement data for 1984-1999. Panel B reports transition probabilities simulated in the Social Status model with $\gamma = 10$, $\eta = 1$. Panel C reports transition probabilities simulated in the CRRA model with $\gamma = 8$, $\eta = 0$. Panel D reports transition probabilities simulated for the calibrated version of the Capitalist Spirit model with $\eta = 1$ and $\gamma = 25$.

Panel A: data

Wealth quantile	Bottom half	50-90	90-95	95-99	Top 1%
Move down	0.00	0.19	0.43	0.52	0.33
Stay	0.89	0.73	0.32	0.44	0.67
Move up	0.11	0.07	0.25	0.04	0.00

Panel B: Social Status

Wealth quantile	Bottom half	50-90	90-95	95-99	Top 1%
Move down	0.00	0.04	0.15	0.07	0.24
Stay	0.97	0.95	0.79	0.86	0.76
Move up	0.03	0.02	0.06	0.07	0.00

Panel C: CRRA

Wealth quantile	Bottom half	50-90	90-95	95-99	Top 1%
Move down	0.00	0.04	0.13	0.09	0.05
Stay	0.98	0.94	0.77	0.86	0.95
Move up	0.02	0.02	0.10	0.05	0.00

Panel D: Capitalist Spirit

Wealth quantile	Bottom half	50-90	90-95	95-99	Top 1%
Move down	0.00	0.01	0.06	0.03	0.03
Stay	1.00	0.98	0.92	0.97	0.97
Move up	0.00	0.01	0.01	0.00	0.00

Table VI
Consumption as a Share of Wealth

This table reports consumption over a 10-year period as a share of beginning-of-period wealth by age and wealth group simulated from the Social Status model with $\gamma = 10$, $\eta = 1$.

Wealth quantile	Bottom half	50-90	90-95	95-99	Top 1%
20 years old	42	42	42	37	14
50 years old	46	46	45	37	14
80 years old	60	60	59	43	14

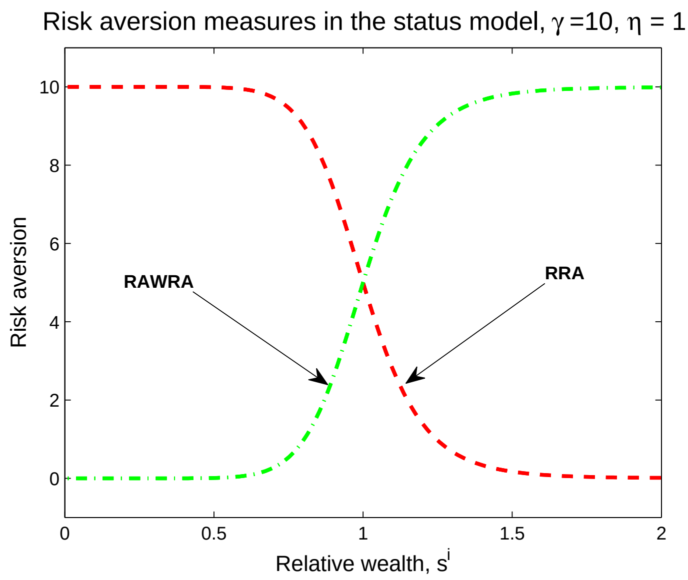

Figure 1. **Risk aversion measures.** This figure depicts coefficients of relative risk aversion (RRA) and relative aversion to aggregate wealth risk (RAWRA) as a function of relative wealth, $s^i = \frac{W^i}{\bar{W}}$, in a one-period version of the Social Status model with consumption utility curvature $\gamma = 10$ and status utility weight $\eta = 1$.