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Status, Marriage, and Managers' Attitudes To Risk *

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Abstract

Relative wealth concerns can affect risk-taking behavior, as the payoff to a marginal dollar of wealth depends on the wealth of others. In particular, status concerns that arise endogenously due to competition in the marriage market can lead to greater risk-taking if the more desirable mates prefer wealthier suitors. We evaluate empirically the importance of this effect in a high-stakes setting by studying risk-taking of corporate CEOs. We find that single CEOs, who are more likely to exhibit status concerns, are associated with firms that exhibit higher stock return volatility and pursue more aggressive investment policies. This effect is weaker for older CEOs. Similarly to corporate CEOs, single mutual fund managers exhibit greater idiosyncratic risk in their portfolio returns. Similarly to the CEOs, mutual fund managers who are single exhibit greater idiosyncratic risk exposure than their married peers.

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1 Introduction

Relative wealth concerns impact financial decisions by altering individual's attitudes towards risk. In this paper we aim to establish an empirical link between status-seeking motives and risk preferences, focusing on decisions that involve large financial stakes and potentially broad-ranging impact beyond the welfare of the agent making those decisions. We study CEOs, whose attitudes to risk are likely to be reflected in corporate investment and financial policies (to the extent that CEO wealth is tied to their firms' financial performance through incentive pay or changes in the value of their human capital). If status concerns are particularly important for wealthier individuals, as argued by Becker, Murphy, and Werning (2005) and Roussanov (2010), focusing on a group of individuals who disproportionately represents the upper end of the wealth distribution should help detect the impact of such concerns on financial decisions.[1]

Following Cole, Mailath, and Postlewaite (2001), we consider a model where concern for relative position arises endogenously from competition for inelastically supplied goods - specifically, for mates in the marriage market. Standard arguments lead to positively assortative matching in marriage markets (e.g. Becker (1973)). In particular, higher wealth individuals are likely to be matched with mates who are highly desirable, in terms of their wealth or other relevant characteristics. If marginal benefit of an extra dollar of wealth - consisting both of its consumption value and status payoff (i.e., the quality of the marital match) - is large enough, the matching environment creates an incentive for agents to take more idiosyncratic risk than they would in the absence of the status contest. As long as

[1]Even if corporate executives constitute only a fraction of the top earners, as documented by Kaplan and Rauh (2010).

changing mates over time (e.g., through divorce) is costly, married individuals will exhibit weaker concern for relative wealth position, all else equal. Thus, our model predicts that single individuals, who are presumably expecting to compete for mates in the future, should have a greater tolerance for idiosyncratic risk than married ones, and consequently undertake riskier investments.

We test this prediction empirically using a standard sample of U.S. public firms, augmented with a new dataset on the marital status of CEOs that we compiled from a variety of public sources. We find that companies run by CEOs classified as single in our dataset exhibit higher levels of stock return volatility and pursue more aggressive investment policies than otherwise comparable firms, consistent with the hypothesis of greater risk-taking by single managers. As predicted by the model, the differences in volatilities largely represent varying exposures to idiosyncratic rather than systematic risk. The investment policies vary with marital status for capital expenditures, as well as R&D spending and acquisitions, which are commonly associated with risk-taking. The effect of marital status is weaker for older managers, which is consistent with the theory as they are less likely to be competing in the marriage market.

As an additional validation of our results we consider a sample of mutual fund managers and examine the portfolio returns of the funds that they manage. We find that single managers have somewhat less diversified investment portfolios, in the sense that the R^2 of the regressions of their portfolio returns on a host of factors that capture common variation asset returns are lower. This evidence supports our argument that marriage market matching effects risk attitudes through the relative wealth channel.

A large literature exists that assesses the effect of individual CEO characteristics on corporate financial policies (Bertrand and Schoar (2003), Malmendier and Tate (2005)). One of the important questions in this literature is whether managers can alter their firms' policies to better suit their personal objectives, or whether the observed differences in the behavior of firms run by different managers simply reflect the matching of executives and firms along the relevant (but difficult to observe for an econometrician) characteristics (e.g., more risk-tolerant CEOs work for riskier firms). While we cannot completely rule out the latter mechanism as an explanation of our results, we find it reasonably unlikely, as marital status is not a permanent characteristic of a CEO. Moreover, even if CEOs were always optimally matched to firms, so that their preferences are fully in line with shareholder interests, our findings would still show that riskier firms prefer single CEOs, who are more willing to engage in risky projects.

Apart from understanding manager and firm behavior as such, we are interested in shedding light on the role of status concerns by wealthy individuals who are likely to be marginal investors in asset markets. Status concerns have been proposed as explanations for gambling behavior (Robson (1992)), local bias in portfolios (Cole, Mailath, and Postlewaite (2001) and DeMarzo, Kaniel, and Kremer (2004)), and other forms of under-diversification, such as entrepreneurial risk-taking (Roussanov (2010)). Models of status differ in their predictions as to whether such concerns lead to greater tolerance for idiosyncratic or aggregate risk. In particular, models that feature "keeping up with the Joneses", as in Abel (1990), exhibit conformist, or herding, behavior (e.g. Gollier (2004), DeMarzo, Kaniel, and Kremer (2004)). In contrast, the prediction that competition for status leads to greater idiosyncratic risk-taking (whether resulting from marital sorting or not) is driven by the feature that the marginal benefit of an extra dollar of wealth is increasing in relative wealth ("getting ahead of the

Joneses" - Gregory (1980), Robson (1992), Becker, Murphy, and Werning (2005), Roussanov (2010)). Thus, analyzing the differences in attitudes towards *idiosyncratic* risk by varying the strength of status concerns can shed light on which class of reduced-form relative wealth preferences is empirically relevant, potentially yielding implications for asset pricing and risk sharing.

Postlewaite (1998) advocates modeling status concerns as arising endogenously due to non-market interactions (such as marriage and other settings where allocations depend on matching) rather than hard-wired into preferences. While we pursue the same modeling approach here, one can also interpret our results as consistent with the view that both risk-taking and marriage market behavior are determined biologically and the link between the two is shaped by evolutionary forces. This interpretation would be consistent with the large experimental psychology literature that documents greater risk-taking by subjects confronted with situations suggestive of mating or competing for mates (at least among males - Baker and Maner (2008)). Household survey data also appears to indicate that for males a change in marital status from single to married is associated with a decrease in the portfolio share invested in stocks and similar risky assets (Love (2010)).

Evidence in the recent literature indicates that status concerns stemming from marriage market competition are also important for other dimensions of individual consumption and investment decisions. In particular, variation in sex ratios, which determine the intensity of competition among males and females, appears to induce variation in the propensity to invest in human and physical capital. Charles and Luoh (2010) exploit the differences in male incarceration rates in the U.S., while Wei and Zhang (2011) use gender imbalances across provinces of China and argue that they result in greater investment rates and economic growth, consistently with the predictions of endogenous status models such as Cole, Mailath, and Postlewaite (1992). Du and Wei (2010) and Du and Wei (2011) use a quantitative model to show that the unbalanced sex ratios in China could drive its current account surpluses and real exchange rates.

2 Model

In this section we present a stylized model of marriage market matching and investment in order to highlight the interaction between matching-induced status concerns and risk-taking.

2.1 Environment

There exists a continuum of agents equally split into two types - males and females. They both derive utility from a market good c and a non-market good s:

$$u(c, s) \;= s \log(1 + c)$$

Females are endowed with f_j units of the non-market good, distributed according to cdf H on $(0, \infty)$. At the beginning of the period, each male is endowed with $W_0 > 0$ units of a capital good that can be converted into the market good at the end of the period by investing it in a combination of two linear technologies: riskless storage at rate R^f and agent-specific risky investment which earns a random rate of return R^i, so that the market "wealth" of each male at the end of the period is

$$W^i = W_o\left(R^f + \theta^i(R^i - R^f)\right), \tag{1}$$

where θ^i is the share of initial wealth invested in the risky technology by (male) agent i, subject to the constraint that $W^i > 0$ (this constraint ensures that $c > 0$ and, consequently, utility is always increasing in the non-market good). Risky returns R^i are distributed independently and identically across agents with a cdf F on $A = [R_{\min}, \infty)$. Let the percentile rank of male i in the resulting equilibrium distribution of end-of-period wealth be denoted $G(W^i)$.[2]

A male and a female jointly consume each good, having matched in the end of the period, i.e., if a male i matches with a female j each of them receives utility $u(W^i, f_j)$. Since utility is increasing in both arguments for both males and females, and the two goods are complements, the only stable matching (in the sense of Roth and Sotomayor (1990)) is positively assortative (in W and f, respectively) so that the matched male i and female j have the same percentile rank in the respective distributions:

$$G\left(W^i\right) = H\left(f_j\right).$$

Therefore, the equilibrium allocations depend only on the relative status of the males after the realization of uncertainty about the investment projects, i.e., the equilibrium matching

[2]The assumption that only the males have access to an investment technology is meant to simplify exposition. One could instead consider a symmetric setting where both "males" and "females" face the same problem.

function producing a pairing

$$s^i = f_j$$

such that

$$s^i = H^{-1}\left(G\left(W^i\right)\right) = S\left(W^i\right).$$

Thus, at the beginning of the period, each male solves

$$\max_{\theta} E\left[S\left(W^i\right)\log\left(1+W^i\right)\right], \tag{2}$$

where W^i is subject to the resource constraint (1) above, and taking the equilibrium status function $S\left(W^i\right)$ as given.

2.2 Equilibrium

We focus on the symmetric equilibrium: a solution θ^i to the problem above such that $\theta^i = \bar{\theta}$ for all i. In the symmetric equilibrium, the status matching given by the equilibrium distribution of end-of-period wealth is a function of one's own choice θ^i and the choice of all other agents $\bar{\theta}$ (taken by agent i as given). In this symmetric equilibrium, the wealth distribution inherits the properties of the probability distribution of risky asset returns, since

$$G\left(W\right) = \Pr\left[W^i \leq W\right] = F\left(\frac{W/W_o - \left(1-\bar{\theta}\right)R^f}{\bar{\theta}}\right).$$

Assume that the status function $S\left(W^i\right)$ is continuously differentiable. Then the first-order condition for the individual investment problem is

$$E\left[R^{ix}\left(\frac{S\left(W^{i}\right)}{1+W^{i}}+\log\left(1+W^{i}\right)S'\left(W^{i}\right)\right)\right]=0,$$

where $R^{ix}=R^{i}-R^{f}$.

Consider as an alternative a model without interaction of investment and matching concerns, where marriage matches are assigned permanently and exogenously in period 0 and therefore s^{i} is orthogonal to W^{i}. Then the first-order condition for a "married" male is the standard Euler equation:

$$E\left[\frac{R^{ix}}{1+W^{i}}\right]=0 \tag{3}$$

We can write (2) as

$$\begin{aligned} 0 &= E\left[R^{ix}\left(\frac{S\left(W^{i}\right)}{1+W^{i}}\right)\right]+E\left[R^{ix}\log\left(1+W^{i}\right)S'\left(W^{i}\right)\right] \\ &= Cov\left(\frac{R^{ix}}{1+W^{i}},S\left(W^{i}\right)\right)+E\left[\frac{R^{ix}}{1+W^{i}}\right]E\left[S\left(W^{i}\right)\right] \\ &\quad +Cov\left(R^{ix}\log\left(1+W^{i}\right),S'\left(W^{i}\right)\right)+E\left[R^{ix}\log\left(1+W^{i}\right)\right]E\left[S'\left(W^{i}\right)\right], \end{aligned}$$

so that

$$E\left[\frac{R^{ix}}{1+W^{i}}\right]=-\frac{1}{E\left[S\left(W^{i}\right)\right]}\left[\begin{array}{c} Cov\left(\frac{R^{ix}}{1+W^{i}},S\left(W^{i}\right)\right)+Cov\left(R^{ix}\log\left(1+W^{i}\right),S'\left(W^{i}\right)\right) \\ +E\left[R^{ix}\log\left(1+W^{i}\right)\right]E\left[S'\left(W^{i}\right)\right] \end{array}\right]. \tag{4}$$

Suppose the status function is linear:

$$s^i = S\left(W^i\right) = \alpha W^i,$$

so that $S'(W^i) = \alpha$ is a (positive) constant and $Cov\left(R^{ix}\log\left(1+W^i\right), S'(W^i)\right) = 0$. Then (4) implies

$$E\left[\frac{R^{ix}}{1+W^i}\right] = -\frac{1}{E\left[S\left(W^i\right)\right]}\left[Cov\left(\frac{R^{ix}}{1+W^i}, S\left(W^i\right)\right) + E\left[R^{ix}\log\left(1+W^i\right)\right]E\left[S'\left(W^i\right)\right]\right]$$

Consequently, $E\left[\frac{R^{ix}}{1+W^i}\right] < 0$ for single males, implying that they invest more in the idiosyncratic risky project R^i than those who are married.

Under what conditions is the status function linear? The following simple examples provide sufficient conditions:

1. female good is distributed uniformly on $[f_{\min}, f_{\max}]$ and the equilibrium distribution of wealth is uniform (which is the case if R^{ix} is uniformly distributed on $[R_{\min}, R_{\max}]$);

2. the distribution of the female non-market good coincides with the equilibrium distribution of male wealth, $H(x) = G(x)$ for all x; this situation is relevant also if the problem is completely symmetric, i.e. the females face an investment problem identical to that faced by the males.

What if S is not linear? Then the sign of $Cov\left(R^{ix}\log\left(1+W^i\right), G'(W^i)\right)$ is ambiguous and depends on the shape of the status/matching function S which, in turn, depends on the equilibrium distribution of wealth G. In particular, if S is convex, the latter covariance is negative and the same conclusion as above holds, but if S is concave the conclusion is ambiguous and potentially depends on the specific parameterization of the model.

The feature of the model that yields the prediction of greater risk-taking by single managers under a broad set of conditions is the complementarity between the male and the female good, i.e., the fact that $u_{cs} > 0$. This feature is intuitive: a higher quality spouse raises one's marginal utility of consumption. For example, a spouse with a higher level of "sophistication" may influence one's tastes in a direction that demands purchase of more expensive consumption goods. However, the assumption of complementarity is not crucial. For example, Cole, Mailath, and Postlewaite (2001) consider a setting in which utility is separable in the market and non-market good and show that if the status/matching payoff is convex in market wealth the same result as here obtains (i.e., agents take more idiosyncratic risk than in the absence of matching). However, if utility is sufficiently concave over the non-market good, the opposite prediction obtains - the agents "herd" towards common projects (Roussanov (2008) describes the conditions under which these predictions hold in detail).

3 Data

3.1 CEO Characteristics

We collect the names, biographical information, and compensation of all CEOs covered by ExecuComp in the 1993-2008 period. We then research their marital and family status using a variety of public sources, such as the *Marquis Who's Is Who in Finance and Industry*, the SEC insider filings, and various media mentions. The ultimate goal of this effort is to establish whether a particular CEO was married or single during his tenure. Our approach is to start with the assumption that all CEOs are single, and then change their status if we find information indicating the opposite. Given that we can find the actual marriage dates only for an extremely small minority of CEOs, any CEO who is ever mentioned as being married is coded as married throughout his or her tenure. This means that some CEOs who divorced or lost their spouses will be wrongly counted as married. However, there also exists an offsetting bias. Since we require evidence to classify a CEO as married, those CEOs who are not prominent enough to warrant mention in our sources (or those who are very private with regards to their personal information) will appear in the data as single even if they are actually married. While we try to perform a comprehensive search for all CEOs, it is inevitable that we will miss some. Furthermore, some CEOs may be involved in marriage-like relationships but not formally married, and their status for our purposes should be classified as married but will not be.

The net effect of these biases cannot be determined with much certainty, but we are hopeful our data is not too unrepresentative. Table 1 shows that in terms of CEO-year observations married CEOs account for 83% of our sample. According to the U.S. Census data, 70% of men in the 35-59 age range were married in 2000. This group represents most of the CEOs in our sample, so it would appear that we overestimate the number of currently married CEOs. But CEOs are also much wealthier than typical Americans, and wealth is positively correlated with the probability of being married. Moreover, a substantial number of our CEOs are older than 60, and the marriage rate is higher in that age group (75% for men). Some rough, back-of-the-envelope calculations suggest that the marriage rate in our sample may be quite close to the true CEO marriage rate.

While there is a number of CEOs who are divorced in our sample, we do not explicitly consider divorced CEOs ‘single’, as it is not obvious from the perspective of our model that we should. Divorce is not an exogenous shock that simply changes an individual’s marital status. It is actually a result of a decision by one (or both) spouses that takes into account the value of re-entering the marriage market. In particular, the CEO's decision prior to divorce may take into account the matching considerations arising from a potential re-marriage. For example, if a CEO's wealth has increased enough since marriage, the prospect of improving the marital match may increase risk-taking prior (and potentially leading) to divorce. On the other hand, even if divorce is costly, if a CEO's wealth falls enough the spouse may prefer to terminate the marriage and seek a better match in the re-marriage market, which will reduce the CEO's risk tolerance after marrying.

If we only wrongly characterized the marriage status of some CEOs, this would not constitute a problem for our analysis, as long as this effect was uncorrelated with anything else. The problem is that this is probably not true for CEOs who are married, with no public information documenting their status. Such CEOs are likely to be less prominent than their peers and could potentially be associated with younger, riskier firms. This effect may explain risk-taking attitudes of managers we classify as 'single', without any actual effect of marital status. For example, Malmendier and Tate (2009) find that "superstar" CEOs exhibit different behaviors than their less prominent counterparts. This may represent a serious problem for our analysis, which we address in several ways.[3]

First, in our regressions we use as controls observable measures that are likely to be correlated with both the degree of prominence of a company and its riskiness, such as firm size, market-to-book ratio, and age. Second, we control for the effect of prominence on our classification of CEOs as married or single explicitly by constructing measures of frequency

[3]Such "superstar status" itself could be viewed as a type of status payoff that could induce risk-taking - Shemesh (2010) presents some evidence that achieving such status leads CEOs to reduce subsequent risk-taking.

of CEO and company media mentions. Specifically, we use *Factiva Dow Jones* database to count the number of news stories mentioning the CEO and/or the company associated with each of our observations during our sample period. We use these measures to control for the effect of prominence on risk-taking in our analysis. While these controls do appear to capture some variation in firm risk, their inclusion does not affect our results.

3.2 Other variables

We augment our CEO dataset with data from COMPUSTAT and CRSP, which we use to construct measures of corporate risk-taking and the necessary control variables. The various variables we use are defined below (all numbers except ratios are in millions).

Total investment ($Investment$) is capital expenditures ($CapEx$) plus acquisitions minus asset sales (*Net Acquisitions*) plus R&D expenditure (*R&D*) plus advertising expenditure (*Advert.*), scaled by net PP&E. This is a more comprehensive measure than used in most of the literature, but we believe R&D and advertising expenditures should be counted as investment for our purposes, as they do reflect a firm's risk-taking (Guay (1999) uses R&D expenditure as a proxy for CEO risk-taking). We also consider the individual components of investment separately (scaled by PP&E). Total volatility is computed as the annual volatility of a firm's monthly stock returns over the previous year. Idiosyncratic volatility is calculated as the annual volatility of the residuals of the firm's stock returns regressed on the value-weighted market return.

Firm size ($\log A$) is the log of its total assets. Book equity (BE) equals stockholders' equity; if that item is missing in COMPUSTAT, then it is common equity plus preferred equity; and if those items are unavailable as well, then it is total assets minus total liabilities.

Market-to-book ratio (M/B) is the ratio of the market value of assets relative to their book value, where the market value of assets is the total value of assets minus book value of equity plus market value of equity. Cash flow (CF) equals earnings before extraordinary items plus depreciation & amortization, scaled by net property, plant & equipment. Book leverage ($Leverage$) equals the sum of long-term and current debt divided by the sum of long-term debt, current debt, and book equity. Firm age is computed with respect to the first year it appears in COMPUSTAT.

We also use information available in ExecuComp on the relevant characteristics of managers. CEO wealth ($\log wealth$) is the log of CEO's total holdings of own company stock and options, which we use as a proxy for total CEO wealth. Age and $Tenure$ are the CEO's age and his tenure with the firm, as of the current year. The *Factiva*-based measures of CEO and firm prominence are each defined as the logarithm of the total number of their media mentions in our sample period. For CEOs, we only count news stories that are explicitly related to the firm they run, in order to avoid greatly exaggerating the prominence of CEOs with common names.

4 Empirical Results

4.1 Overview

Table 1 presents the main summary statistics for our data, grouping firms based on the marital status of their CEOs. They confirm that our classification produces intuitive results: "married" CEOs are on average somewhat older and, consistent with the theory that relates marital market competition with wealth, richer (insofar as we can proxy their wealth with the value of their holdings of the company's stock and options). This first look at the data also supports our main hypothesis: firms managed by CEOs whom we classify as single display markedly different characteristics. Such firms have higher investment and experience higher return volatility, both of which measures should be related to the amount of risk associated with a firm. The differences are highly significant, both economically and statistically. Return volatility of single CEO firms is 24% higher, and a t-test for the difference produces a t-stat of about 14. Investment is 69% higher for such firms relative to those run by married CEOs, with a t-stat of 13 for the difference.

These differences appear to be quite dramatic, but single CEO-run firms are also on average smaller, younger, and potentially faster-growing, as indicated by their higher market to book ratios. Since both small and growth firms tend to invest more and have more volatile returns, it is important to control for these characteristics. We therefore run a variety of regression specifications with investment and return volatility as independent variables. All our regression include industry (based on the Fama-French 49-industry classification) and time fixed effects. Standard errors are clustered by firm. We exclude financial firms, as is standard in the literature, since for these firms the accounting measures of investment are likely to be poor proxies for risk-taking. Our results are stronger with their inclusion.

4.2 Firm Investment

Tables 2, 3 and 4 present regression results for firm investment (total investment, net acquisitions, and *R&D* plus advertising expenditure, respectively). Tables 5 and 6 present regression-based results for total and idiosyncratic volatility of stock returns, respectively. The coefficient of interest is the dummy variable *Single*, which equals one if the CEO is not married and zero otherwise.

Column 1 of Table 2 shows that the coefficient is positive and statistically significant (t-stat=2.35). In this specification, we control just for different firm characteristics that are known to be correlated with investment. The coefficients on these controls are all the same as documented in previous work. Firms with high cash flows, growth firms, small firms, firms with low leverage, and firms with high past investment tend to invest more. These are well-known correlations, and the fact they hold in our sample reassures us that it is not much different than those used in other studies.

Since married and single CEOs also have different personal characteristics, in the next column we add controls for CEO characteristics, such as age and tenure, and the interactions between those characteristics and the single status dummy variable. Both age and tenure are significantly negatively related to investment. This means we need to control for such characteristics, as they are also correlated with the probability of being married. For example, older CEOs may invest more cautiously and are more likely to be married, which would confound the effect of marital status if appropriate controls are not included.

The inclusion of these variables reduces the *Single* coefficient somewhat, but it remains statistically significant (t-stat=1.71). And its magnitude indicates a large effect: a firm with a single 45-year old CEO with a tenure of five years will have investment that is on average 0.26 higher than that of the same firm with a married CEO, while the sample mean for firms with married CEOs is 0.90. In other words, investment of such firms is 29% higher, which is a very substantial economic difference.

Interestingly, the interaction coefficient between *Single* and *Age* is negative. This is consistent with the basic motivation underlying our study. If single CEOs indeed choose to invest more because they are less risk-averse due to their competing in the marriage market, we would expect this tendency to be less pronounced for older CEOs. The effect of *Age* on risk-taking measures is negative - older CEOs tend to be more conservative, which is also consistent with the relevance of positional concerns declining with age.[4] Importantly, this interaction of age and marital status suggests that the driving force behind our results is not due purely to a selection effect, whereby CEOs who prefer to stay single are fundamentally different (e.g., in terms of their risk attitudes) from those who marry. If that were the case, then the effect of marital status would be less likely to decrease with age.

In column 3, we introduce our controls for CEO and firm prominence. The coefficient on CEO prominence is large and significant (t-stat=3.83), which is consistent with previous work. Our main finding that single CEOs invest more remains unaltered. In fact, it turns out that the effect of prominence, if anything, works against us, since it is the CEOs of riskier firms that appear to have higher rates of media mentions, and are therefore less likely to be mistakenly classified as single. Consequently, the *Single* coefficient actually becomes even larger, with a higher statistical significance.

In column 4, we add institutional holdings of company stock, obtained from Thomson Reuters database of 13f filings, as a control. We use them as a proxy for the quality of a firm's corporate governance, under the assumption that firms with higher institutional ownership will be more responsive to shareholders. Our results remain the same with this control.

Our results do not change if we add controls for firm region, or if we use a different industry classification scheme.[5] They also are stronger if we focus just on R&D and advertising

[4]Levi, Li, and Zhang (2010) document more aggressive deal-making behavior among younger CEOs and argue that it is driven by their higher testosterone levels.

[5]Those results are available upon request.

expenditures (Table 4), which arguably capture firm risk-taking more accurately, as they are commonly perceived as representing especially risky activities. The results are somewhat weaker for Net Acquisitions (table 3), likely due to the fact that a lot of smaller firms with single managers do not make acquisitions.

As mentioned before, we are not taking a stand in this paper on whether CEOs alter firm decisions to meet their own objectives or are just matched to firms along all their relevant characteristics. In order to explore how much of a role CEO-firm matching plays, in the last column we omit any firm characteristics from our regressions. Consequently, we are comparing single and married CEOs just controlling for their personal characteristics. Under that specification, the *Single* coefficient for Total Investment grows dramatically to 0.45 (from 0.09), with a t-stat of 5.23, and even the coefficient for Net Acquisitions is statistically significant with a t-stat of 2.59 (table 3). These findings suggest that riskier firms strongly prefer single CEOs, perhaps because they are more willing to accept risks. However, even if we control for this selection effect (in columns 1-4), single CEOs still assume greater risks than married ones. Results in column 4 are probably the most conservative estimate of the difference between married and single CEOs, whereas those in column 5 represent the most aggressive estimate.

4.3 Stock Return Volatility

In Table 5, we repeat the same analysis for total stock return volatility, and find that firms run by single CEOs exhibit more volatile returns. This difference is statistically (t-stat=2.30 in Column 4) and economically meaningful, suggesting about a 3% difference. If we exclude controls for firm characteristics, the results become much stronger: return volatility of firms run by single CEOs is 16% higher, and the t-stat for the difference is 7.83. As with firm investment, it seems that single CEOs are more commonly matched with riskier firms, but undertake more risks even when we control for this tendency. Our findings hold (and are actually stronger) for idiosyncratic volatility, consistent with the model's predictions that center on idiosyncratic rather than systematic risk. These findings are presented in Table 6.

4.4 Discussion

In sum, our results support the hypothesis that single CEOs assume more idiosyncratic risk than married ones. This is consistent with our model of CEO status-seeking that is motivated by the desire to find a suitable marriage partner and resulting competition in the marriage market.

Of course, it is possible that single managers exhibit different risk-taking behavior from married managers even absent status concerns. People who are single at a given age may be inherently more risk-tolerant than those that are married by the same age. It would be possible to distinguish this scenario from our theory by exploiting changes in managers' marital status over time. Unfortunately, this would require a large number of CEOs whose marital status changes during their tenure, which is rare in our sample. Moreover, we would need to have precise dates of these marital transitions, which are difficult to obtain. Based on a sample of 100 marriages during the CEOs' tenure that we were able to document in our sample, we find that transition from single to married is associated with a decrease in corporate risk-taking (as measured by either total or idiosyncratic stock return volatility). However, the effect is not statistically significant and thus we cannot convincingly rule out the hypothesis of innate heterogeneity.

Another possibility is that marriage changes the utility of wealth by introducing spousal preferences into the CEO's objective function. For example, a CEO who has to support a spouse and children may have a higher required level of consumption expenditure and therefore income. This would make married CEOs effectively more risk-averse than single ones for reasons that have nothing to do with status. However, under rational expectations the possibility of getting married in the future should affect one's decisions even prior to getting married, and therefore it is ambiguous whether there marriage itself would have an effect on CEO risk taking. Furthermore, it seems likely that most, if not all, CEOs are wealthy enough for such concerns to be of second-order importance. On the other hand, as our model suggests, the impact of status concerns is particularly pronounced at the upper tail of the wealth distribution.

5 Extensions

5.1 Mutual Fund Managers

Our predictions regarding managers' risk-taking concern idiosyncratic risk, but testing this prediction cleanly in the corporate setting is difficult, since we do not observe directly the riskiness of projects that managers can undertake. However, this distinction can be made in a different, albeit related setting: that of money managers. In particular, mutual fund managers have a choice of investments varying in their exposures to systematic risk factors. Observing fund portfolio returns at a sufficiently high frequency allows for precise estimation of these risk exposures and therefore of idiosyncratic risk-taking.

We extend our analysis to a sample of mutual fund managers. We construct this sample by merging the Morningstar survivor bias-free mutual fund manager dataset with the CRSP mutual fund dataset using fund tickers (where available) and/or fund names. We then search for fund managers biographies in *Marquis Who's Is Who* and *NNDB*. The resulting sample covers 1042 managers, of whom 758 are classified as "Married" based on the above biographical sources.

In order to measure the idiosyncratic risk exposures, we estimate the R^2 from the regressions of fund portfolio excess returns on a set of systematic risk factors for each fund-manager pair (multiple share classes of a fund that share the same underlying portfolio are counted once). We compute averages of these R^2 measures across married and single managers and compare them using the Wilcoxon test statistic for difference between means of two samples (this test does not account for the fact that the R^2 themselves are estimated). The sets of risk factors that we use to quantify systematic risk exposures are: the CRSP value-weighted market return (CAPM); the market return plus the two term structure factors - the returns on 1-year and 30-year U.S. government bonds (CAPM + Term structure); the Fama and French (1992) and Carhart (1997) four-factor model plus the term structure factors; the above plus the two corporate bond benchmarks - the returns on Lehman/Barclay's investment grade and speculative grade bond indexes; and all of the above factors plus the two currency factors of Lustig, Roussanov, and Verdelhan (2009) - the U.S. dollar factor and the carry factor.

Table 7 displays the results of these tests. In all of the specifications the average R^2 is greater for the married managers than for single ones, consistent with the prediction that single managers are willing to bear more idiosyncratic risk. While the differences are small, ranging between 2 and 3 percentage points (in the units of R^2), they are statistically significant for all of the specifications except for the simplest (CAPM).

These findings are consistent with the model's prediction that single managers have higher tolerance for idiosyncratic risk, but not necessarily total risk. In fact, there is little evidence of systematic differences in total volatility of portfolio returns between the two types of managers. In unreported results, we find similar evidence of portfolio under-diversification at the household level using the 2001 Survey of Consumer Finances, where single individuals have a greater share of their wealth invested in an average individual stock than married couples, while there is less evidence of great risk taking as such. All of these results suggest that the effect of marital status on risk attitudes is not simply driven by pure differences in risk aversion, either inherent or induced by life-cycle considerations, such as consumption commitments, etc., and is more likely to be due to relative wealth concerns due to competition in the marriage market.

6 Conclusion

There is substantial evidence in economics that interpersonal comparisons are important for individual subjective well-being (e.g. Luttmer (2005), Dynan and Ravina (2007)) and that such comparisons effect consumption choices (Charles, Hurst, and Roussanov (2009)). Less is known empirically about the impact of relative wealth concerns on the risk attitudes. In this paper we consider the implications of models in which status concerns arise endogenously as a result of competition in markets where allocations are not mediated by prices, such as the marriage market. In our model, complementarity between wealth and spouse quality induces single individuals to take on idiosyncratic risk in hopes of securing a desirable mate. In particular, the model predicts that single individuals take more risk than married ones.

We use risk-taking by corporate CEOs as a setting for testing the model's predictions. We find that single CEOs invest more aggressively (in capital expenditures, R&D, advertising, and acquisitions) and their companies exhibit higher stock return volatility (controlling for a variety of personal and firm characteristics). These effects are not only statistically significant, but also economically important. Extending our analysis to other high-stakes settings where risk-taking decisions are observable - e.g. mutual fund managers - provides an additional test of our hypothesis and further insights into the role of status concerns in risk taking.

In sum, our evidence supports the view that status concerns are important for financial decisions, and that the dominant effect of such concerns is in the direction of increasing idiosyncratic risk exposure (rather than, for example, herding). These findings have potentially rich implications in both corporate finance and asset pricing.

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Table 1: Summary Statistics

Panel A. Risk-taking measures

	Investment	*CapEx*	*R&D*	*Advertising*	*NetAcquisitions*	*Vol*	*Id.Vol*
				Married CEOs			
Mean	0.90	0.27	0.25	0.08	0.24	0.37	0.34
Median	0.36	0.19	0	0	0	0.31	0.28
Min	-0.02	0.01	0	0	-0.31	0.00	0.02
Max	11.94	1.78	4.59	1.70	6.71	3.72	3.70
N	21876	21876	21876	21876	21876	20433	20418
				Single CEOs			
Mean	1.52	0.32	0.58	0.12	0.38	0.45	0.42
Median	0.48	0.22	0	0	0	0.37	0.34
Min	0	0	0	0	-0.29	0.07	0.05
Max	20.45	2.12	9.27	4.10	9.66	9.51	9.75
N	4224	4224	4224	4224	4224	3786	3785

Panel B. Control variables

	$\log A$	M/B	CF	Leverage	Age	$Tenure$	$\log wealth$
				Married CEOs			
Mean	7.52	1.94	0.54	0.36	54.97	5.05	9.67
Median	7.39	1.46	0.39	0.35	55.00	4.00	9.71
Min	0.07	0.79	-5.30	0	28.00	0	-1.29
Max	14.45	8.96	8.81	1.29	91.00	51.00	19.84
N	21856	21876	21876	21876	20885	21876	16479
				Single CEOs			
Mean	6.48	2.14	0.31	0.30	52.64	4.51	8.89
Median	6.39	1.56	0.37	0.25	53	3	9.08
Min	-1.91	0.69	-12.20	0.27	27	0	-6.21
Max	11.71	10.82	18.03	1.62	78	34	16.65
N	4220	4224	4224	4224	3960	4224	2929

Table 2: Regression Results for Total Investment

	1	2	3	4	5
$Intercept$	1.83	2.16	2.08	1.99	2.72
	(13.70)	(13.07)	(12.88)	(11.92)	(14.08)
CF_t	0.09	0.10	0.10	0.09	
	(5.55)	(5.94)	(5.88)	(5.88)	
M_{t-1}/B_{t-1}	0.12	0.11	0.11	0.11	
	(7.89)	(7.68)	(7.36)	(7.35)	
$logA_{t-1}$	-0.13	-0.13	-0.15	-0.15	
	(-11.84)	(-11.85)	(-11.33)	(-11.75)	
$Leverage_t$	0.20	0.19	0.20	0.20	
	(3.52)	(3.33)	(3.50)	(3.51)	
$Investment_{t-1}$	0.48	0.48	0.47	0.47	
	(18.10)	(19.10)	(19.04)	(18.98)	
$FirmAge$	-0.00	-0.00	-0.00	-0.00	
	(-3.07)	(-2.42)	(-2.35)	(-2.27)	
$Single$	0.09	0.07	0.09	0.09	0.45
	(2.35)	(1.71)	(2.25)	(2.18)	(5.23)
Age		-0.00	-0.00	-0.00	-0.03
		(-2.78)	(-2.11)	(-2.07)	(-9.77)
$Age \times Single$		-0.02	-0.02	-0.02	-0.04
		(-2.61)	(-2.63)	(-2.64)	(-2.93)
$Tenure$		-0.01	-0.01	-0.01	-0.01
		(-3.73)	(-3.92)	(-3.87)	(-1.26)
$Tenure \times Single$		0.02	0.02	0.02	0.04
		(1.44)	(1.37)	(1.39)	(1.47)
$CEOProminence$			0.04	0.04	-0.00
			(3.83)	(3.84)	(-0.19)
$FirmProminence$			0.00	0.00	
			(0.41)	(0.42)	
$Inst$				0.13	
				(1.85)	
$Inst \times Single$				0.02	
				(0.10)	
R^2	0.45	0.44	0.44	0.44	0.04

Notes: All regressions include year and industry (based on Fama-French 49 industries) fixed effects. The t-statistics in the parentheses are based on the robust standard errors clustered by firm.

Table 3: Regression Results for Net Acquisitions

	1	2	3	4	5
Intercept	0.72	0.79	0.78	0.66	0.67
	(11.72)	(9.79)	(9.54)	(7.70)	(7.70)
CF	0.07	0.07	0.07	0.07	
	(10.62)	(10.21)	(10.19)	(10.14)	
M_{t-1}/B_{t-1}	0.02	0.02	0.01	0.01	
	(2.37)	(2.34)	(2.17)	(2.18)	
$logA_{t-1}$	-0.05	-0.05	-0.05	-0.05	
	(-8.39)	(-8.57)	(-8.13)	(-8.57)	
Leverage	0.24	0.25	0.25	0.25	
	(7.44)	(7.41)	(7.40)	(7.42)	
$NetAcq_{t-1}$	0.24	0.24	0.24	0.24	
	(13.33)	(13.14)	(13.15)	(13.07)	
FirmAge	-0.00	-0.00	-0.00	-0.00	
	(-3.11)	(-2.72)	(-2.68)	(-2.53)	
Single	0.03	0.03	0.04	0.04	0.09
	(1.42)	(1.35)	(1.48)	(1.45)	(2.59)
Age		-0.00	-0.00	-0.00	-0.00
		(-0.62)	(-0.41)	(-0.31)	(-3.74)
$Age \times Single$		-0.01	-0.01	-0.01	-0.01
		(-1.75)	(-1.75)	(-1.76)	(-2.28)
Tenure		-0.00	-0.00	-0.00	-0.00
		(-2.11)	(-2.16)	(-2.16)	(-1.26)
$Tenure \times Single$		0.01	0.01	0.01	0.02
		(1.66)	(1.64)	(1.65)	(1.84)
CEOProminence			0.01	0.01	-0.01
			(1.50)	(1.52)	(-2.59)
FirmProminence			-0.00	-0.00	
			(-0.22)	(-0.18)	
Inst				0.18	
				(5.05)	
$Inst \times Single$				-0.06	
				(-0.56)	
R^2	0.15	0.15	0.15	0.15	0.01

Notes: All regressions include year and industry (based on Fama-French 49 industries) fixed effects. The t-statistics in the parentheses are based on the robust standard errors clustered by firm.

Table 4: Regression Results for R&D and Advertising

	1	2	3	4	5
Intercept	0.41	0.49	0.47	0.47	1.22
	(7.27)	(7.49)	(7.41)	(7.16)	(10.91)
CF_t	0.01	0.01	0.01	0.01	
	(1.59)	(1.68)	(1.64)	(1.64)	
M_{t-1}/B_{t-1}	0.02	0.01	0.01	0.01	
	(2.79)	(2.40)	(2.15)	(2.14)	
$logA_{t-1}$	-0.03	-0.03	-0.03	-0.03	
	(-6.74)	(-6.82)	(-6.74)	(-6.86)	
$Leverage_t$	-0.02	-0.03	-0.02	-0.02	
	(-1.12)	(-1.42)	(-1.30)	(-1.30)	
$R\&D + Adv_{t-1}$	0.81	0.80	0.80	0.80	
	(39.61)	(38.80)	(38.55)	(38.58)	
FirmAge	-0.00	0.00	0.00	0.00	
	(-0.59)	(0.02)	(0.10)	(0.12)	
Single	0.03	0.02	0.03	0.03	0.32
	(2.60)	(1.93)	(2.40)	(2.23)	(5.67)
Age		-0.00	-0.00	-0.00	-0.02
		(-1.97)	(-1.39)	(-1.39)	(-8.70)
$Age \times Single$		-0.01	-0.01	-0.01	-0.02
		(-1.88)	(-1.89)	(-1.88)	(-2.48)
Tenure		-0.00	-0.00	-0.00	-0.00
		(-2.60)	(-2.77)	(-2.69)	(-1.14)
$Tenure \times Single$		0.00	0.00	0.00	0.01
		(0.54)	(0.48)	(0.45)	(0.71)
CEOProminence			0.01	0.01	0.02
			(3.23)	(3.23)	(2.15)
FirmProminence			0.00	0.00	
			(0.20)	(0.19)	
Inst				-0.00	
				(-0.01)	
$Inst \times Single$				0.03	
				(0.38)	
R^2	0.76	0.76	0.76	0.76	0.05

Notes: All regressions include year and industry (based on Fama-French 49 industries) fixed effects. The t-statistics in the parentheses are based on the robust standard errors clustered by firm.

Table 5: Regression Results for Return Volatility

	1	2	3	4	5
$Intercept$	0.43	0.48	0.48	0.51	0.62
	(13.79)	(12.94)	(13.11)	(12.83)	(25.61)
CF_t	-0.01	-0.01	-0.01	-0.00	
	(-6.43)	(-5.69)	(-5.75)	(-5.78)	
M_{t-1}/B_{t-1}	0.01	0.00	0.00	0.00	
	(3.94)	(3.20)	(3.02)	(3.07)	
$logA_{t-1}$	-0.02	-0.02	-0.02	-0.02	
	(-10.98)	(-10.55)	(-9.77)	(-9.89)	
$Leverage_t$	0.08	0.07	0.07	0.07	
	(8.71)	(7.97)	(7.98)	(8.00)	
Vol_{t-1}	0.41	0.41	0.40	0.40	
	(9.52)	(8.89)	(8.85)	(8.66)	
$FirmAge$	-0.00	-0.00	-0.00	-0.00	
	(-6.68)	(-6.43)	(-6.38)	(-6.44)	
$Single$	0.01	0.01	0.01	0.01	0.07
	(2.64)	(1.76)	(2.05)	(2.30)	(7.83)
Age		-0.00	-0.00	-0.00	-0.00
		(-4.11)	(-3.78)	(-3.84)	(-11.46)
$Age \times Single$		-0.00	-0.00	-0.00	-0.00
		(-1.46)	(-1.45)	(-1.53)	(-1.19)
$Tenure$		-0.00	-0.00	-0.00	-0.00
		(-1.88)	(-1.99)	(-2.30)	(-1.02)
$Tenure \times Single$		0.00	0.00	0.00	-0.00
		(0.69)	(0.61)	(0.84)	(-0.20)
$CEOProminence$			0.00	0.00	-0.01
			(3.11)	(3.15)	(-4.56)
$FirmProminence$			-0.00	-0.00	
			(-0.96)	(-0.97)	
$Inst$				-0.03	
				(-3.79)	
$Inst \times Single$				-0.06	
				(-1.95)	
R^2	0.48	0.48	0.48	0.48	0.20

Notes: All regressions include year and industry (based on Fama-French 49 industries) fixed effects. The t-statistics in the parentheses are based on the robust standard errors clustered by firm.

Table 6: Regression Results for Idiosyncratic Volatility

	1	2	3	4	5
Intercept	0.47	0.52	0.51	0.55	0.58
	(15.49)	(14.47)	(14.67)	(14.36)	(25.98)
CF_t	-0.00	-0.00	-0.00	-0.00	
	(-5.49)	(-4.82)	(-4.89)	(-4.86)	
M_{t-1}/B_{t-1}	0.00	0.00	0.00	0.00	
	(0.89)	(0.23)	(0.01)	(0.05)	
$logA_{t-1}$	-0.03	-0.03	-0.03	-0.03	
	(-12.69)	(-12.33)	(-11.51)	(-11.72)	
$Leverage_t$	0.08	0.08	0.08	0.08	
	(9.64)	(8.99)	(9.01)	(9.10)	
$IdVol_{t-1}$	0.35	0.34	0.34	0.34	
	(8.20)	(7.64)	(7.61)	(7.36)	
FirmAge	-0.00	-0.00	-0.00	-0.00	
	(-6.85)	(-6.63)	(-6.57)	(-6.70)	
Single	0.01	0.01	0.01	0.01	0.06
	(2.67)	(1.93)	(2.24)	(2.55)	(8.09)
Age		-0.00	-0.00	-0.00	-0.00
		(-3.93)	(-3.55)	(-3.65)	(-11.37)
$Age \times Single$		-0.00	-0.00	-0.00	-0.00
		(-1.28)	(-1.27)	(-1.37)	(-0.96)
Tenure		-0.00	-0.00	-0.00	-0.00
		(-1.61)	(-1.73)	(-2.17)	(-0.82)
$Tenure \times Single$		0.00	0.00	0.00	-0.00
		(0.13)	(0.04)	(0.35)	(-0.46)
CEOProminence			0.00	0.00	-0.01
			(3.30)	(3.36)	(-6.18)
FirmProminence			-0.00	-0.00	
			(-0.91)	(-0.93)	
Inst				-0.05	
				(-5.27)	
$Inst \times Single$				-0.08	
				(-2.25)	
R^2	0.44	0.44	0.44	0.45	0.19

Notes: All regressions include year and industry (based on Fama-French 49 industries) fixed effects. The t-statistics in the parentheses are based on the robust standard errors clustered by firm.

Table 7: Systematic Risk Exposure - Mutual Fund Managers

Factors	Single	Married	Difference
CAPM	72.10	74.19	-2.09
Wilcoxon			[-1.85]
p-value			[0.06]
CAPM + Term Structure	73.92	77.06	-3.14
Wilcoxon			[-2.61]
p-value			[0.01]
+ HML + SMB + UMD	81.19	84.33	-3.13
Wilcoxon			[-2.51]
p-value			[0.01]
+ Credit (Investment grade & High-yield)	82.69	85.10	-2.40
Wilcoxon			[-2.50]
p-value			[0.01]
+ FX (USD & Carry)	83.57	85.67	-2.10
Wilcoxon			[-2.52]
p-value			[0.01]
N	284	758	

Notes: The systematic risk exposure is measured as the average R^2 (in percent) of a regression of fund portfolio returns on a set of systematic risk factors; the Wilcoxon test statistics for difference in means and corresponding p-values are reported in brackets.