How Does the Spirit of Capitalism Affect Stock Market Prices?

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Bakshi and Chen (1996b) suggest that the spirit of capitalism affects stock prices by increasing society's aversion to risk. In this article, I show that the way in which the spirit of capitalism impinges upon asset prices depends on the interaction of impatience, willingness to substitute over time, and ordinal preferences between consumption and status, in addition to risk aversion. I develop a general model that charts the channels through which the spirit of capitalism affects asset prices. An increase in the capitalist spirit may increase or decrease risk aversion, and may actually decrease the prices of risky assets.

> Man is dominated by the making of money, by acquisition as the ultimate purpose of his life. Economic acquisition is no longer subordinated to man as the means for the satisfaction of his material needs. This reversal of what we should call the natural relationship, so irrational from a naïve point of view, is evidently as definitely a leading principle of capitalism as it is foreign to all peoples not under the capitalistic influence. ——Max Weber, *The Protestant Ethic and the Spirit of Capitalism* (1948, p. 53)
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> If you weren't making $250,000 a year within five years, then you were either grossly stupid or grossly lazy. That was the word. By age thirty, $500,000—and that sum had the taint of the mediocre. By age forty you were either making a million a year or you were timid and incompetent. *Make it now!* That motto burned in every heart, like myocarditis.——Tom Wolfe, *The Bonfire of the Vanities* (1987, p. 59)

When an economic activity becomes so pervasive as to provide common grist for the mills of a great sociologist and a brilliant satirist, economists need to pay attention. If Weber (1948) and Wolfe (1987) are right, we must entertain the possibility that our society may value acquisition as an end in itself. A venerable tradition in economics has held this "spirit of capitalism" to be a driving force behind economic growth [Zou (1994)]. However, the events of the last decade dictate that we also consider the implications of the capitalist spirit for asset prices. Between 1989 and 1999, the real worth of American households increased by 50% [Poterba (2000)]. Over roughly the same period we have enjoyed a bull stock market of unprecedented duration

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and magnitude. Perhaps the desire to accumulate wealth as a way of acquiring status has contributed to the rise in stock prices.

But how exactly does the spirit of capitalism affect stock prices? Bakshi and Chen (1996b) have recently suggested an intuitively appealing explanation: If there is a spirit of capitalism, then wealth is an argument in the utility function, in addition to consumption. This has the effect of increasing risk aversion, so that people hedge against the risk of losing status by reducing their demands for risky assets.

By focusing on risk aversion alone, this interpretation only begins to describe the rich channels through which the spirit of capitalism affects asset prices. Nonstochastic models, such as Kurz (1968) and Zou (1994, 1995), suggest that including wealth as an argument in the utility function reduces the rate of time preference. This dampens consumption, and tends to increase asset prices. Furthermore, Bakshi and Chen restrict their analysis to time-separable preferences. This means that the "curvature parameter" of the utility function confounds risk aversion and willingness to substitute over time. To understand how the spirit of capitalism affects consumption and asset prices, we need to disentangle the effects of these disparate forces.

This article develops a general model that maps out alternative avenues through which the spirit of capitalism influences asset prices. I employ a class of preferences that is tractable, yet rich enough to distinguish between risk aversion, intertemporal substitution, and intraperiod substitution between consumption and status. I show that the spirit of capitalism impinges upon asset prices through two primary channels. First, the spirit of capitalism reduces the rate of time preference, which tends to raise asset prices. Second, it may increase or *decrease* the degree of risk aversion, which means that the demand for risky assets may increase or decrease as people become more status conscious. By altering the demands for financial assets, the spirit of capitalism then changes the variance of the investor's portfolio. However, as shown by Weil (1989), the response of consumption to a change in risk is governed by the intertemporal elasticity of substitution. Therefore the effect of the spirit of capitalism on consumption, and hence on asset prices, is determined by the interaction of both risk aversion and willingness to substitute over time.

The outline of the article is as follows. Section 1 describes the preferences of the individual consumer, a generalization of generalized isoelastic (GIE) preferences [Epstein (1988), Epstein and Zin (1989, 1991), Weil (1989, 1990), Svensson (1989), Duffie and Epstein (1992b)] defined over two "goods"—consumption and "status." Section 2 then embeds these preferences in a general, continuous-time asset pricing model in which prices follow a vector diffusion. The model nests two influential asset pricing models as special cases: when preferences are restricted to be time separable, it reduces to the model of Bakshi and Chen; when the consumer has recursive preferences but there is no spirit of capitalism, it reduces to the GIE model of

Epstein and Zin (1989, 1991). As in Bakshi and Chen, asset returns satisfy a three-factor capital asset pricing model (CAPM): the risk premium on a risky asset depends on the covariances of its rate of return with the growth rates of individual consumption, individual wealth, and an index of average wealth. Unlike Bakshi and Chen, however, the factor weights depend on the parameters governing the spirit of capitalism, risk aversion, *and* intertemporal substitution.

To clarify the intuition behind this result, Section 3 develops an example of asset pricing in an exchange economy [similar to Lucas (1978)]. Assuming that dividends follow an i.i.d. process, and that status is measured by individual wealth, it is possible to derive an explicit, present value formula for the price of the asset. This highlights the interplay between impatience, risk aversion, intertemporal substitution, and the spirit of capitalism, permitting a clean characterization of how the spirit of capitalism affects the price of the asset and the equilibrium risk premium. It is possible that an increase in the spirit of capitalism may actually *decrease* the price of the risky asset, provided that people are sufficiently risk averse and dislike substitution over time. Section 4 concludes with some suggestions for further research.

1. Preferences

My objective is to study how the spirit of capitalism interacts with risk aversion and tastes for intertemporal substitution to affect asset prices. To this end I adopt a class of preferences that is tractable, yet rich enough to capture these three distinct forces:

$$\begin{aligned}(1-\gamma)U_t \quad = \quad & \Big\{(1-e^{-\rho\Delta t})\left[C_t^a S_t^b\right]^\theta (\Delta t) \\ & \quad + e^{-\rho\Delta t}\left[E_t(1-\gamma)U_{t+\Delta t}\right]^{\frac{\theta}{1-\gamma}}\Big\}^{\frac{1-\gamma}{\theta}}.\end{aligned} \tag{1}$$

This is a form of generalized isoelastic (GIE) preferences, defined over the two "goods": consumption (C_t) and "status" (S_t). The aggregator function $X_t = C_t^a S_t^b (a + b < 1)$ is the *intraperiod* felicity function, which depends on current consumption and status. In Equation (1), γ is the coefficient of relative risk aversion for timeless gambles of X_t, $\varepsilon = 1/(1-\theta)$ is the elasticity of intertemporal substitution for riskless paths of X_t, and ρ is the rate of time preference. Consumption and portfolio choices are made at discrete intervals of length Δt; we will consider the consumer's behavior in the limit as $\Delta t \to 0$. This representation is not unique. As emphasized by Duffie and Epstein (1992b), there are many ordinally equivalent representations of recursive preferences that yield the same consumption and portfolio rules. I assume that Equation (1) takes the appropriate logarithmic forms in the limiting cases where $\gamma \to 1$ (log risk aversion) and $\varepsilon \to 1$ (log tastes for substitution over time).

The preferences in Equation (1) nest several familiar models. For example, if $a = 1$, $b = 0$, and $\varepsilon = 1/\gamma$, we recover the canonical example of isoelastic, time-separable preferences. If $b = 0$, but $\varepsilon \neq 1/\gamma$, there is still no spirit of capitalism, but the consumer has GIE preferences over consumption alone. In this case, the model reduces to a continuous-time version of Epstein and Zin (1989, 1991). Finally, if $b > 0$ and $\varepsilon = 1/\gamma$, there is a spirit of capitalism, but preferences are time separable. This is a slight generalization of the preferences used by Bakshi and Chen.[1]

It is important to understand that the curvature parameter $b > 0$ reflects more than just ordinal preferences between C_t and S_t at a point in time. As shown by Bakshi and Chen, it also affects risk aversion. We will see that the spirit of capitalism also alters the rate of time preference. Furthermore, the *way* in which the spirit of capitalism affects consumption and asset prices will depend on the willingness of consumers to substitute over time (ε), and on the degree of risk aversion (γ) with respect to the aggregator X_t.

To develop some intuition for how the spirit of capitalism affects risk aversion, it will be useful to explore the link between the spirit of capitalism (b) and risk aversion in an atemporal setting. Consider the time-separable version of the preferences in Equation (1), where $b > 0$ and $\varepsilon = 1/\gamma$:

$$\frac{\left[C_t^a S_t^b\right]^{1-\gamma}}{1-\gamma} = \frac{\left[C_t^{\frac{a}{a+b}} S_t^{\frac{b}{a+b}}\right]^{(a+b)(1-\gamma)}}{1-\gamma}. \tag{2}$$

Since there are two "goods," the meaning of "risk aversion" is not immediately evident. The literature on multivariate risk aversion [Debreu (1976), Kihlstrom and Mirman (1974, 1981)] addressed this problem. Since the utility function on the left-hand side of Equation (2) is homothetic, it can be expressed as a concave transformation $(\bullet)^{(a+b)(1-\gamma)}$ of the linearly homogeneous function in brackets. Intuitively, one utility function exhibits greater risk aversion than another if it is more concave than the other. The function in braces on the right-hand side of Equation (2) is the *least concave transformation* of the utility function [Debreu (1976)]. The curvature parameters attached to this function govern ordinal preferences over C_t and S_t, while

[1] In order to document the need to consider more general preferences, it is useful to compare the time-separable version of my preferences with the preferences used by Bakshi and Chen. If $b > 0$ and $\varepsilon = 1/\gamma$, then the per period utility function is given by Equation (2) in the text. In contrast, Bakshi and Chen's utility function is

$$\frac{C^{1-\gamma_{BC}} S_t^{-\lambda_{BC}}}{1-\gamma_{BC}}.$$

The "BC" subscripts indicate their preference parameters. Their utility function can be recovered from mine by setting $\gamma = \gamma_{BC}$, $a = 1$, and $b = -\lambda_{BC}/(1-\gamma_{BC})$. In their model the "effective degree of risk aversion is $\gamma_{BC} + \lambda_{BC}$, the intertemporal elasticity of substitution (with respect to the aggregator X_t) is implicitly $1/(\gamma_{BC} + \lambda_{BC})$, and the "effective" elasticity of substitution [defined in Equation (14)] is $1/\gamma_{BC}$. Bakshi and Chen's specification is limiting because it requires the sign of λ_{BC} to be restricted by the magnitude of γ_{BC}: In order for the marginal utility of status to be positive, it must be true that (1) if $\gamma_{BC} \geq 1$, then $\lambda_{BC} \geq 0$, but (2) if $\gamma_{BC} < 1$, then $\lambda_{BC} < 0$. In addition, their transversality condition (which is equivalent to their feasibility condition $C_t \geq 0$), requires $\gamma_{BC} + \lambda_{BC} \geq 1$. These restrictions imply that there is only one permissible range of parameter values, namely, $\gamma_{BC} \geq 1$ and $\lambda_{BC} > 0$. My specification of preferences avoids the need to restrict parameter space in this way.

the curvature of the transforming function captures aversion to risk. In other words, the appropriate measure of relative risk aversion for these preferences is not γ, but rather $R = 1 - (a + b)(1 - \gamma)$. I call R the *effective coefficient of relative risk aversion*. Note that it depends on the spirit of capitalism (b), as suggested by Bakshi and Chen. However, the *sign* of the effect of status on effective risk aversion depends on the magnitude of γ, the coefficient of relative risk aversion with respect to the aggregator, X_t. If $\gamma > 1$, an increase in the spirit of capitalism increases effective risk aversion. However, if $\gamma < 1$, an increase in the spirit of capitalism *reduces* effective risk aversion—a possibility precluded by the utility function in Bakshi and Chen.

What determines status? Bakshi and Chen assume that it depends on the consumer's absolute wealth, W_t, and a *social wealth index*, V_t, which represents the wealth of a typical person in the economy. Status is thus described by a function $S_t = f(W_t, V_t)$, where $f_W > 0$ and $f_V \leq 0$. I will focus on two, simple forms of the status function, as in Bakshi and Chen:

1. Wealth is status, $S_t = W_t$.
2. Relative wealth is status, $S_t = W_t/V_t$.

To keep the model tractable, I follow Bakshi and Chen in imposing the following restrictions on the social wealth index: (1) The individual is too small to affect the social wealth index, so that V_t is exogenous to the consumer; (2) all consumers share the same social wealth index; (3) V_t follows a diffusion process:

$$\frac{\Delta V_t}{V_t} = \frac{V_{t+\Delta t} - V_t}{V_t} = \mu_{v,t}\Delta t + \sigma_{v,t}\Delta\omega_{v,t}, \tag{3}$$

where $\mu_{v,t}$ and $\sigma_{v,t}$ are the mean and standard deviation of the growth rate of V_t, and $\omega_{v,t}$ is a Wiener process. Restriction (1) allows us to sidestep the difficult question of how the social welfare index is determined in general equilibrium. Restriction (2) is needed for aggregation. Restriction (3) permits the consumption/portfolio problem to be solved using standard methods.

2. Asset Prices and the Spirit of Capitalism

Suppose that our representative consumer can invest in a riskless asset and N risky assets. The risk-free rate of return is r_0, and the cum dividend price of asset j at time t is $P_{j,t}$, $j = 1, \ldots, N$. Following Merton (1971), Grossman and Shiller (1982), and Bakshi and Chen (1996a, b), I assume that the asset prices follow a vector diffusion

$$\frac{\Delta P_{j,t}}{P_{j,t}} = \frac{P_{j,t+\Delta t} - P_{jt}}{P_{j,t}} = \mu_{j,t}\Delta t + \sigma_{j,t}\Delta\omega_{j,t}, \qquad j = 1, \ldots, N. \tag{4}$$

where $\mu_{j,t}$ and $\sigma_{j,t}$ are the expected value and standard deviation of the rate of return to asset j at time t, and $\omega_{j,t}$ is a Wiener process.

Let $\alpha_{j,t}$, $(j = 0, 1, \ldots, N)$ be the proportion of wealth invested in asset j at time t (the riskless asset is asset "zero"). Given initial wealth W_0, the consumer's budget constraint at each time $t > 0$ is then

$$W_{t+1} = (W_t - C_t \Delta t)\left[1 + \sum_{j=1}^{N} \alpha_{j,t}(\mu_{j,t} - r_0)\Delta t + \sum_{j=1}^{N} \alpha_{j,t}\sigma_{j,t}\Delta\omega_{j,t}\right]. \quad (5)$$

The consumer lives forever, and perceives status as relative wealth, $S_t = W_t/V_t$. She chooses consumption and portfolio policies $\{C_t, \alpha_{j,t}; t \in (0, \infty), j = 0, 1, \ldots, N\}$ to maximize the utility function in Equation (1), subject to the sequence of budget constraints in Equation (5). Denote the optimal policies by C_t^*, and $\alpha_{j,t}^*$, $t \in (0, \infty)$, $j = 0, 1, \ldots, N$.

The implications of the spirit of capitalism for asset pricing can be summarized in the following proposition:

Proposition 1. *In the continuous-time limit, as $\Delta t \to 0$, the equilibrium risk premium attached to asset j is*

$$\begin{aligned}\mu_{j,t} - r_0 = {} & \left[\frac{\varepsilon + (1-\varepsilon)a}{\varepsilon - 1}\right](1-\gamma)\sigma_{j,c} \\ & + \left[\frac{\varepsilon\gamma - 1}{\varepsilon - 1} - b(1-\gamma)\right]\sigma_{j,w} + b(1-\gamma)\sigma_{j,v},\end{aligned} \quad (6)$$

where $\sigma_{j,c} = \operatorname{cov}(dP_{j,t}/P_{j,t}, dC_t^*/C_t^*)$, $\sigma_{j,w} = \operatorname{cov}(dP_{j,t}/P_{j,t}, dW_t^*/W_t^*)$, and $\sigma_{j,v} = \operatorname{cov}(dP_{j,t}/P_{j,t}, dV_t/V_t)$ are the conditional covariances of the rate of return of asset j with the growth rates of consumption, wealth, and the social wealth index, respectively.

Sketch of proof. Following Epstein and Zin (1991), it can be shown that the discrete-time Euler equation is

$$\begin{aligned} & E\left(\frac{C_{t+\Delta t}}{C_t}\right)^{\left(a-\frac{1}{\theta}\right)(1-\gamma)} \left(\frac{W_{t+\Delta t}}{W_t}\right)^{b(1-\gamma)+\frac{1-\gamma}{\theta}-1} \left(\frac{V_{t+\Delta t}}{V_t}\right)^{-b(1-\gamma)} \\ & \quad \times \left[1 + \frac{bC_{t+\Delta t}}{aW_{t+\Delta t}}\Delta t\right]^{\frac{1-\gamma}{\theta}} \left(\frac{\Delta P_{j,t}}{P_{j,t}} - r_0\Delta t\right) = 0, \forall j. \end{aligned} \quad (7)$$

Proposition 1 then follows by applying a limiting argument similar to Grossman and Shiller (1982) and Bakshi and Chen (1996a, b): Take a first-order Taylor series expansion of Equation (7) around C_t, W_t, and V_t. Using the processes in Equations (3), (4), and (5), take the limit as $\Delta t \to 0$, and apply the Ito multiplication rules. Rearranging the resulting expression yields Equation (6). Equation (7) subsumes Equation (16) of Epstein and Zin, and Equations (39) and (40) of Bakshi and Chen as special cases.

Proposition 1 asserts that, in general, the risk premium on each asset depends on the covariance of its rate of return with (1) the growth of consumption, (2) the growth of wealth, and (3) the growth of the social wealth index. This is similar to the three-factor capital asset pricing model in Bakshi and Chen. Unlike their model, however, the factor weights here depend not only on ordinal preferences over consumption and status (a and b), but also on risk aversion (γ) and the willingness to substitute over time (ε).

If there is no spirit of capitalism ($a = 1, b = 0$) and preferences are time separable ($\gamma = 1/\varepsilon$), then we recover the standard consumption-based asset pricing model, where the excess return depends only on the covariance of the rate of return of the asset with consumption growth.

If there is no spirit of capitalism ($a = 1, b = 0$), but people care about the timing of uncertainty ($\gamma \neq 1/\varepsilon$), then people have GIE preferences over consumption alone. This yields the two-factor model of Epstein and Zin [1991, Section II.C, especially Equation (2)]:

$$\mu_{j,t} - r_0 = \frac{1-\gamma}{\varepsilon - 1}\sigma_{j,c} + \frac{\varepsilon\gamma - 1}{\varepsilon - 1}\sigma_{j,w}. \tag{8}$$

Conversely, if there is a spirit of capitalism ($b \neq 0$) but preferences are time separable, then we arrive (*mutatis mutandis*) at a version of Proposition 1 of Bakshi and Chen [their Equation (12)]:

$$\mu_{j,t} - r_0 = [1 - a(1-\gamma)]\sigma_{j,c} - b(1-\gamma)\sigma_{j,w} + b(1-\gamma)\sigma_{j,v}. \tag{9}$$

Both Epstein and Zin and Bakshi and Chen predict that the risk premium should depend on the covariance of the asset with wealth; for the former, this occurs because of preferences about the timing of uncertainty (whether $\gamma = 1/\varepsilon$), for the latter, because of the spirit of capitalism ($b > 0$). Proposition 1 suggests that, in general, both intertemporal substitution (ε) and the spirit of capitalism should determine the factor weight attached to the covariance of the asset with wealth, $\sigma_{j,v}$. Notice, in particular, that, according to Equation (6), an increase in the spirit of capitalism may increase or decrease the risk premium, depending on the magnitude of risk aversion (γ). Notice also that a sufficient condition for the static CAPM to hold—that is, for the risk premium to depend only on the covariance of the asset with the market return (here, with wealth)—is that consumers have logarithmic risk preferences ($\gamma = 1$). This is true regardless of preferences for the timing of consumption or status.

3. Asset Pricing in an I.I.D. Economy

To clarify the ways in which the spirit of capitalism affects asset prices, it will be useful to consider an example of a simple i.i.d. economy. Consider the following continuous-time version of Lucas' (1978) model of asset pricing in an endowment economy. There is a single, inelastically supplied, risky asset (a stock). The stock pays dividends D_t, which evolve according to a geometric Brownian motion:

$$\frac{dD_t}{D_t} = v\,dt + \sigma d\omega_t, \tag{10}$$

where ν is the instantaneous drift of the growth rate of dividends, σ is its constant standard deviation, and ω_t is a standard Wiener process.

Let P_t be the ex dividend price of the asset at time t. Suppose that, as we will verify later, the equilibrium price also follows a geometric Brownian motion. The rate of return, cum dividend, is then

$$\frac{dP_t}{P_t} + \frac{D_t}{P_t}\,dt = \mu_t\,dt + \sigma_p d\omega_{p,t}, \tag{11}$$

where $\mu_t = \pi + D_t/P_t$, π and σ_p are the constant drift and standard deviation of capital gains, and $\omega_{p,t}$ is a standard Wiener process. In equilibrium, the dividend-price ratio will be a constant, so that the expected rate of return, cum dividend, will also be a constant, $\mu_t = \mu$.

In addition to the risky asset, the representative consumer can also invest in a riskless asset that yields a constant rate of return r_0. If α_t is the proportion of wealth held in the risky asset, then her budget constraint is

$$dW_t = \{[(1-\alpha_t)r_0 + \alpha_t\mu]W_t - C_t\}\,dt + \alpha_t\sigma_p W_t\omega_{p,t}. \tag{12}$$

The consumer has a continuous-time version of the preferences described in Equation (1). The status function takes its simplest form: wealth is status, $W_t = S_t$.

3.1 Consumption, portfolio choice, and the spirit of capitalism

The consumer chooses policies C_t and α_t to maximize lifetime utility, subject to Equation (12). Before describing the solution to this problem, it will be useful to define some new notation. Recall that the *effective coefficient of relative risk aversion* is

$$R = 1 - (a+b)(1-\gamma). \tag{13}$$

In the same spirit, define the *effective elasticity of intertemporal substitution* by

$$E = \frac{\varepsilon}{\varepsilon + (1-\varepsilon)a}. \tag{14}$$

Finally, let the *effective rate of time preference* be

$$H = \frac{a\rho}{a+b}. \tag{15}$$

Consider how changes in the spirit of capitalism affect these "effective" parameters. As noted before, an increase in b may increase or decrease effective risk aversion, depending on the magnitude of $\gamma: \partial R/\partial b = \gamma - 1$. It has no effect on effective tastes for intertemporal substitution, since E is independent of b (although it does depend on ordinal preferences for consumption, a). However, it unambiguously reduces the effective rate of time preference, $\partial H/\partial b < 0$.

Using this notation, the optimal portfolio and consumption policies are[2]

$$\alpha_t^* = \frac{\mu - r_0}{R\sigma_p^2}, \tag{16}$$

$$C_t^* = \left\{EH + (1 - E)\left[r_0 + \frac{(\mu - r_0)^2}{2R\sigma_p^2}\right]\right\}W_t. \tag{17}$$

These policies take the same form as the optimal policies in models with GIE preferences but without a spirit of capitalism, such as Svensson (1989), Obstfeld (1994), and Smith (1996a, b, 1999). In other words, *a model with recursive preferences and a spirit of capitalism is observationally equivalent to a model with recursive preferences and no spirit of capitalism, but where the rate of time preference, the degree of risk aversion, and the elasticity of substitution take the "effective" values defined above.*[3] The spirit of capitalism affects portfolio and consumption behavior through these "effective" parameters.

Consider first the portfolio demand function in Equation (16). Note that α_t^* is independent of the effective intertemporal elasticity of substitution E. Hence, as pointed out by Weil (1989) and Kocherlakota (1996), it is risk aversion, not intertemporal substitution, that determines the demand for the risky asset. This implies that the effect of the spirit of capitalism on portfolio demand depends solely on whether it increases or decreases effective risk aversion:

$$\frac{\partial \alpha_t^*}{\partial b} = -\frac{\alpha_t^*}{R}\frac{\partial R}{\partial b}. \tag{18}$$

If $\gamma > 1, \partial\alpha_t^*/\partial b < 0$. This is the intuitively appealing case studied by Bakshi and Chen (1996b), where an increase in the capitalist spirit increases aversion to risk and hence reduces demand for the risky asset. However, if $\gamma < 1, \partial\alpha_t^*/\partial b > 0$: an increase in the capitalist spirit will actually *increase* the demand for the risky asset. This case is precluded by Bakshi and Chen's

[2] The derivation, which closely follows Svensson (1989), is available on request. In addition to the feasibility condition, $C_t \geq 0$, the optimal policies must also satisfy a transversality condition. If preferences are time-separable, ($\varepsilon = 1/\gamma$), these policies reduce to the familiar solutions in Merton's (1969, 1971) classic articles, and the feasibility and transversality conditions are identical. See Smith (1996a) for details.

[3] This is similar to Kocherlakota's (1990) result that GIE preferences are observationally equivalent to time-separable preferences in an i.i.d. economy.

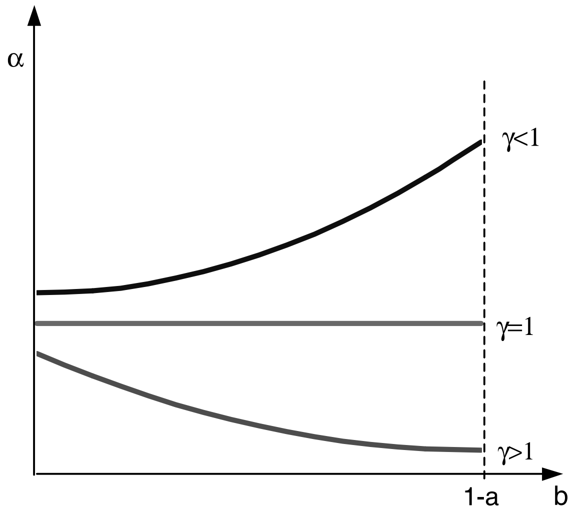

Figure 1
Portfolio demand

preferences. If $\gamma = 1$ (log risk preferences), the demand for the risky asset is unaffected by the spirit of capitalism. Figure 1 depicts these possibilities. Notice that, unless $\gamma = 1, \alpha_t^*$ is always a convex function of b.

Consider next the consumption function in Equation (17). Consumption is linear in wealth. The expression $(\mu - r_0)^2/2R\sigma_p^2$ is the variance of the optimal portfolio, which measures the risk borne by the consumer. Note that consumption may increase or decrease with uncertainty, depending on whether the effective elasticity of intertemporal substitution (E) is greater than one. In other words, it is intertemporal substitution, rather than risk aversion, that governs the direction of the response of consumption to changes in risk [Weil (1989)].

How does the spirit of capitalism affect consumption?

$$\begin{aligned}\frac{\partial C_t^*}{\partial b} &= EW_t\frac{\partial H}{\partial b} + (E-1)W_t\alpha_t^{*2}\frac{\sigma_p^2}{2}\frac{\partial R}{\partial b}\\ &= \frac{aW_t}{\varepsilon + (1-\varepsilon)a}\left\{-\frac{\varepsilon\rho}{(a+b)2} + (1-\varepsilon)(1-\gamma)\right.\\ &\qquad\left.\times\frac{(\mu - r_0)^2}{2[1-(1-\gamma)(a+b)]^2\sigma_p^2}\right\}. \end{aligned} \tag{19}$$

The first term in Equation (19) describes the decrease in consumption caused by an increase in impatience: as b increases, the effective rate of time preference H decreases, $\partial H/\partial b < 0$; furthermore, it decreases at an increasing rate.

The magnitude of the decrease in consumption is governed by the effective elasticity of intertemporal substitution, E.

The second term in Equation (19) measures the effect on consumption of the change in portfolio demand, and hence of portfolio risk, induced by a change in the spirit of capitalism. The sign of this expression depends upon the *product* $(1-\varepsilon)(1-\gamma)$. In other words, the way in which the spirit of capitalism alters consumption behavior is governed by the interaction of risk aversion and willingness to substitute over time. If either $\varepsilon > 1$ and $\gamma < 1$, or if $\varepsilon > 1$ and $\gamma < 1$, then this term is negative. Consumption then unambiguously decreases with the desire for status. However, if either $\varepsilon > 1$ and $\gamma > 1$, or if $\varepsilon < 1$ and $\gamma < 1$, then this term is positive. If it is large enough, the possibility arises that it may dominate the first term (impatience), so that consumption might actually *increase* with the desire for status.

Figure 2 depicts consumption as a function of the strength of the spirit of capitalism, b, for the four possible combinations of parameter values of γ and ε.[4] Notice that consumption may increase with the spirit of capitalism when $\varepsilon < 1$ and $\gamma < 1$ (Figure 2.c). To understand why this occurs, first consider the "standard" calibration of preferences, implicitly considered by Bakshi and Chen, where $\varepsilon < 1$ and $\gamma > 1$ (Figure 2.a). In this case, an increase in b increases effective risk aversion, decreasing demand for the risky asset at an increasing rate (see Figure 1). This reduces the variance of the optimal portfolio. Since $\varepsilon < 1$, the decrease in risk reduces consumption, at an increasing rate. Thus the "risk" effect reinforces the "impatience" effect: together, they make consumption a globally decreasing, convex function of the spirit of capitalism.

Now suppose that $\varepsilon < 1$ and $\gamma < 1$. An increase in b decreases effective risk aversion, which increases demand for the risky asset, raising the variance of the optimal portfolio. Since $\varepsilon < 1$, however, the increase in risk tends to make consumption increase. The "risk" effect is now directly opposed to the "impatience" effect, which makes consumption decrease at an increasing rate. There are three possible outcomes. If the underlying risk (σ_p^2) is sufficiently large—so that the variance of the optimal portfolio, $(\mu - r_0)^2/2R\sigma_p^2$, is sufficiently small—then consumption will still drop monotonically with b, as in Figure 2.a. If the underlying risk is sufficiently small, however, then consumption will initially fall as b increases, but ultimately will increase. This possibility is depicted with the U-shaped curve in Figure 2.c. Finally, if the underlying risk is very low when $\varepsilon < 1$ and $\gamma < 1$, then consumption will increase monotonically with b (not shown).

[4] Analytical derivations of the graphs for both the consumption function and assert price are available on request. I ignore the trivial cases of log risk preferences ($\gamma = 1$) and log preferences for intertemporal substitution ($\varepsilon = 1$), where consumption is independent of risk.

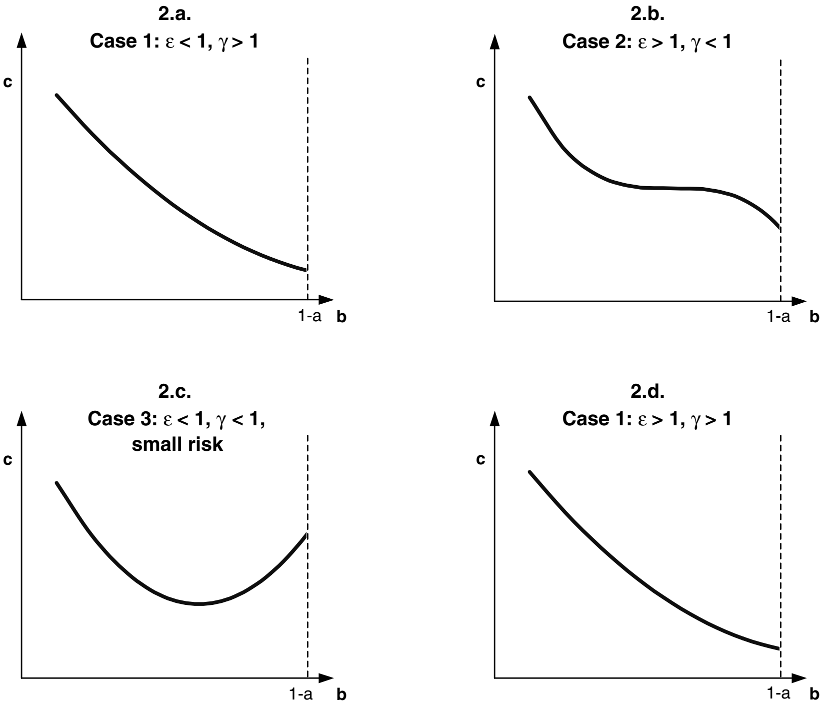

Figure 2
Consumption

3.2 Asset prices and the spirit of capitalism

Now we are equipped to analyze how the spirit of capitalism affects asset prices. Equilibrium is defined by a pricing function $P_t = F(D_t), t \in [0, \infty)$ and an interest rate r, such that (1) the representative agent follows the optimal policies C_t^* and α_t^*, given $F(D_t)$ and r; (2) all dividends are consumed, $C_t^* = D_t$; and (3) the riskless asset is in zero net supply, $\alpha_t^* = 1$.

It can be shown that the pricing function $F(D_t)$ satisfies the following, second-order differential equation:[5]

$$\frac{D_t}{F} = EH + (1-E)\left[\frac{dF}{dD_t}\frac{D_t v}{F} + \frac{d^2F}{dD_t^2}\frac{D_t^2\sigma^2}{2D_t} - \frac{D_t}{F(D_t)} - R\left[\frac{dF}{dD_t}\frac{D_t}{F}\right]^2\frac{\sigma^2}{2}\right]. \qquad (20)$$

[5] Substitute the optimal policies in Equations (16) and (17) into the equilibrium conditions. Apply Ito's lemma to the pricing function and use the dividend process of Equation (10) to calculate mean and variance of the rate of return. Substituting these back into the equilibrium conditions yields Equation (20).

Given the proportionality of consumption to wealth in Equation (16), it is natural to conjecture that the price is proportional to dividends, $P_t = AD_t$. Substituting this conjecture into Equation (20) reveals that the pricing function is[6]

$$P_t = \frac{E}{EH + (1-E)\left[\nu - R\frac{\sigma^2}{2}\right]} D_t. \tag{21}$$

This pricing formula has an intuitive interpretation. Define the *certainty-equivalent dividend* at time $s \geq t$ as the riskless dividend flow $Y_{s,t}$ required at time s to attain the same expected utility, conditional upon information available at time t, as the risky dividend flow D_s:

$$Y_{s,t} = \left[E_t D_s^{1-R}\right]^{\frac{1}{1-R}}. \tag{22}$$

Evaluating the expectation in Equation (22) and integrating reveals that the price in Equation (21) is equivalent to

$$P_t = \int_0^\infty e^{-H(s-t)} Y_{s,t}^{-\frac{1}{E}} ds. \tag{23}$$

The price of the asset is equal to the present value of the certainty equivalent dividend process. The "state pricing process," $e^{-H(s-t)} Y_{s,t}^{-1/E}$, depends only on the effective intertemporal elasticity of substitution E and the effective rate of time preference, and not on risk aversion. Intuitively the price can be thought of as being determined in two steps: First, the consumer determines the certainty equivalent dividend process, which has the risk-adjusted growth rate of $\nu - R\sigma^2/2$ (assumed to be positive). Second, she calculates the present value of this riskless stream, taking into consideration only her impatience and her preferences for substitution over time. Thus, although the magnitude of the effect of σ^2 on price is influenced by risk aversion R, the sign depends on intertemporal substitution, E. Duffie and Epstein (1992a) derive a similar result for a model with recursive preferences but no spirit of capitalism. Lucas (1978) and Rubinstein (1976) derived discrete-time versions of this asset pricing formula for time-separable preferences, while Huang (1987) and Duffie and Zame (1989) derived continuous-time versions for timeseparable preferences.

How does the spirit of capitalism affect the price of the asset? Equation (21) provides the answer. An increase in the spirit of capitalism (b) reduces the effective rate of time preference H, reducing consumption and increasing demand for the risky asset. This tends to raise the price of the risky asset. As we have seen, however, an increase in the spirit of capitalism also changes

[6] I ignore bubble solutions. Notice that since price is proportional to dividends, the price is a geometric Brownian motion, as conjectured in Equation (11).

the effective degree of risk aversion R. This may increase or decrease consumption demand, depending on the sign of the product $(1-\varepsilon)(1-\gamma)$. If consumption decreases, the demand for the risky asset will increase, augmenting the upward pressure on the asset caused by the decrease in the effective rate of time preference. However, if consumption increases, this effect will tend to push the price of the asset down. This leads to

Proposition 2. *If* $(1-\varepsilon)(1-\gamma) < 0$*, then an increase in the spirit of capitalism will increase the price of the risky asset. However, if* $(1-\varepsilon)(1-\gamma) > 0$*, then it is possible for an increase in the spirit of capitalism to reduce the price of the risky asset.*

Figure 3 depicts the price of the asset P as a function of the intensity of the spirit of capitalism b, given different combinations of γ and ε. Consider each case in turn:

Case 1: $\varepsilon < 1$ and $\gamma > 1$. An increase in b always makes the consumer more impatient, which tends to increase the price of the asset, at a *decreasing* rate. Furthermore, in this case, an increase in b raises risk aversion. Since $\varepsilon < 1$, this causes consumption to fall, which also raises the price of the asset at an *increasing* rate. Thus the price is monotonically increasing in b. However, the concavity of the "impatience" effect works against the convexity of the "risk" effect: for small values of b, the price increases at a decreasing rate as b increases, but at larger values of b, the price may increase at an increasing rate. This is depicted in Figure 3.a.

Case 2: $\varepsilon > 1$ and $\gamma < 1$. In this case, an increase in b lowers risk aversion. Since $\varepsilon > 1$, however, this reduces consumption. Thus the "risk" effect still tends to make the price increase at an increasing rate as b increases. As in case 1, the price is monotonically increasing in b. Unlike case 1, however, the convexity of the "risk" effect dominates the concavity of the "impatience" effect, so that the price always increases at an increasing rate. This is depicted in Figure 3.b.

Case 3: $\varepsilon < 1$ and $\gamma < 1$. An increase in b lowers risk aversion, as in case 2. Since $\varepsilon < 1$, however, this causes consumption to increase. The "risk" effect therefore tends to make the price *decrease*, at an increasing rate. As always, the "impatience" effect tends to make the price increase, at a decreasing rate. The "impatience" and "risk" effects now push in opposite directions. For small values of b, the "impatience" effect dominates, but as b increases the "risk" effect becomes more powerful. Thus the price initially rises with b, reaches a maximum at $\hat{b}$ and then falls. If risk is low enough, so that $\hat{b} > 1-a$, then the price function is increasing and strictly concave in b over the relevant range of parameters. If risk is higher, however, so that $\hat{b} < 1-a$ then the price will decrease over the range $\hat{b} < b < 1-a$. Figure 3c depicts these possibilities.

Case 4: $\varepsilon > 1$ and $\gamma > 1$. An increase in b raises risk aversion, as in case 1. However, since $\varepsilon > 1$, this makes consumption *decrease*. As in

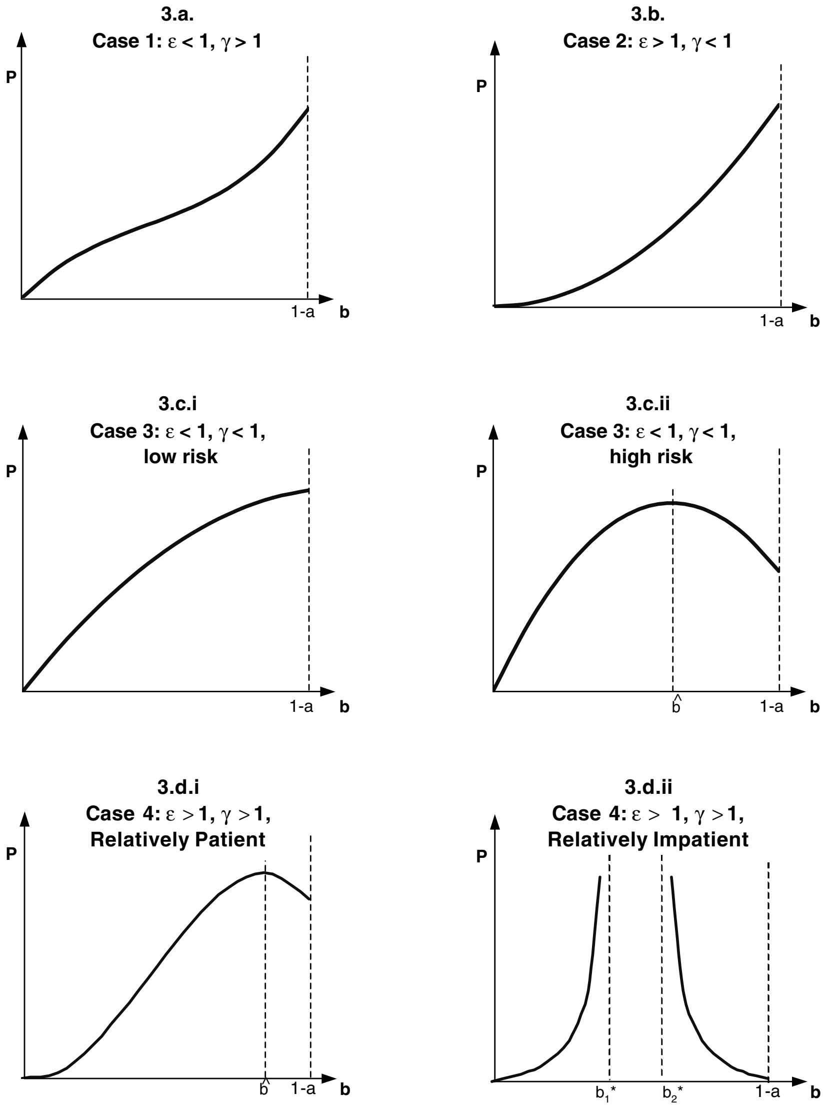

Figure 3
The stock price

case 3, the "risk" effect counteracts the "impatience" effect. Now, however, there are two distinct possibilities.

On the one hand, if the consumer is sufficiently patient, the price will initially increase with b, reach a maximum at $\hat{b}$, and then fall. In this case, the behavior of the price is qualitatively similar to that in case 3: price will decrease with b on the interval $\hat{b} < b < 1-a$. This is depicted in Figure 3.d.i.

On the other hand, if the consumer is not sufficiently patient, then there are three, dramatically different types of equilibria. These are depicted in Figure 3d.ii. First, if b is sufficiently small $(0 < b_1^*)$ then the price increases at an increasing rate as b increases. Second, if $b_1^* < b < b_2^*$, then the price of the asset drops to zero. Finally, if $b > b_2^*$, then the price falls at an increasing rate as b increases. If parameter space is restricted so that $b_2^* < 1 - a$, then the price will increase monotonically with b over the region $0 < b < b_1^*$. However, if we allow the possibility that $b_2^* < 1 - a$, then the price will increase over the region $0 < b < b_1^*$, but will decrease over the region $b_2^* < b < 1 - a$.

Heuristically, Proposition 1 says that an increase in the spirit of capitalism will normally increase the prices of risky assets. However, if (1) people are not too risk averse and dislike substitution over time (or conversely, if they are highly risk averse and do like to substitute over time), (2) the underlying risk of the asset is fairly large, and (3) the capitalist spirit is already fairly strong, then an increase in the spirit of capitalism will actually *decrease* the prices of risky assets.

We can also relate the spirit of capitalism to the risk premium attached to the risky asset. Using the pricing function of Equation (21) to evaluate the variance of the rate of return, and substituting this back into the asset market equilibrium condition, $\alpha_t^* = 1$, we obtain[7]

$$\mu - r_0 = R\sigma^2 = [1 - (a + b)(1 - \gamma)]\sigma^2. \tag{24}$$

This yields

Proposition 3. *An increase in the spirit of capitalism will increase (decrease) the risk premium if $\gamma > 1 (\gamma < 1)$. If consumers have logarithmic risk preferences with respect to the aggregator ($\gamma = 1$) the spirit of capitalism has no effect on the equity premium at all.*

Although both risk aversion and willingness to substitute over time determine the effect of the spirit of capitalism on the price of the asset, risk aversion alone determines its effect on the risk premium.

4. Conclusion

This article explores how the spirit of capitalism affects consumption and asset prices. Ordinal preferences for consumption and status alter not only the effective degree of risk aversion, but also the effective rate of time preference and the effective elasticity of intertemporal substitution. The effect of status on asset prices depends on the interaction of all of these factors.

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[7] This is a special case of the general result in Proposition 1 [Equation (6)], where the terms involving the social wealth index are suppressed. Here consumption growth and wealth accumulation are perfectly correlated, so that both $\mathrm{cov}(dP_j/P_j, dC_t/C_t)$ and $\mathrm{cov}(dP_j/P_j, dC_t/C_t)$ are equal to σ^2.

Two extensions suggest themselves. First, the model needs to be tested empirically. Using time-separable preferences and a spirit of capitalism, Bakshi and Chen show that the discrete-time Euler equation depends on the growth rate of wealth, in addition to the growth rate of consumption. Using GIE preferences and no spirit of capitalism, Epstein and Zin (1991) also derive an Euler equation that depends on the growth rate of wealth. As Bakshi and Chen (1996b, p. 153) observe, it is reasonable to presume that concern about wealth-induced status and concern about the timing of the resolution of uncertainty may exist simultaneously. The general, discrete-time Euler equation [Equation (7)] nests both of these models as special cases. Subjecting it to the battery of tests applied by Bakshi and Chen should reveal the relative importance of these two forces in determining asset prices. Recursive preferences and the spirit of capitalism each do a better job individually in explaining the observed behavior of asset prices than does the standard, time-separable model. Putting these models together may do better yet. It would be particularly interesting to see if these empirical tests exhibit any structural breaks over the last decade. Is it possible that the shere magnitude of the recent growth in wealth has amplified the effects of the spirit of capitalism on stock prices? Or is it possible that the generation satirized in *The Bonfire of the Vanities* [Wolfe (1987)] embodied a recrudescence of the capitalist spirit that spawned the current bull market?

Second, this framework can also be used to reexamine the issue, recently raised by Zou (1994, 1995), of how the spirit of capitalism affects growth. In Smith (1999), I address this question by incorporating the preferences used here into a stochastic, endogenous growth model.

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