DISCUSSION PAPERS IN ECONOMICS

The Spirit of Capitalism, Asset Returns, and the Business Cycle

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The Spirit of Capitalism, Asset Returns, and the Business Cycle

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Abstract

We evaluate whether the spirit of capitalism improves the ability of real business cycle (RBC) models to explain the main features of both asset returns and business cycles. In our model, the spirit of capitalism is embodied in the assumption that individuals have direct preferences for ¯nancial wealth. Our simulation results suggest that this assumption improves the RBC model's ability to explain the features of asset returns. This assumption, however, markedly deteriorates the model's ability to account for the features of the business cycle.

Equity premium; Direct preferences for wealth.

G12, E32

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in Boldrin, Christiano, and Fisher (2001). Although we are interested in asset prices, the allocation for these economies can be found as the solution to a planner's problem. This allocation is then used to uncover the required asset prices.

The planner chooses consumption, employment, and investment to maximize consumers' expected lifetime utility

$$E_0 \sum_{t=0}^{1} {}^{-t} u(c_t \text{ ¡ } Ãc_{t \text{ ¡ } 1}) \text{ ¡ } µn_t \text{ ;} \tag{2:1}$$

subject to

$$y_t = c_t + x_t; \tag{2:2}$$

$$y_t = z_t k_t^{®} n_t^{1 \text{ ¡ } ®}; \tag{2:3}$$

$$k_{t+1} = Á \left(\frac{x_t}{k_t} \right) k_t + (1 \text{ ¡ } ±)k_t; \tag{2:4}$$

$$\ln(z_t) = (1 \text{ ¡ } ½) \ln(z^{\text{¤}}) + ½ \ln(z_{t \text{ ¡ } 1}) + {}^{2}{}_t; \tag{2:5}$$

where E_t is the conditional expectation operator, c_t is consumption, n_t is employment, x_t is investment, y_t is output, k_t is the stock of capital, and z_t is the stochastic level of total factor productivity. The parameter $0 < {}^{-} < 1$ is the consumer's subjective discount factor, $Ã \text{ ¸ } 0$ is the measure of habit formation, $µ > 0$ is the measure of disutility from working, $0 < ® < 1$ is the share of capital, $0 < ± < 1$ is the rate of depreciation, and $0 < ½ < 1$ is the persistence of total factor productivity. Finally, ${}^{2}{}_t$ is an independently and identically distributed normal random

n labor Tc (i) Tj 3.36 0 TD 0 Tc (a) Tj (t) Tj 4.68 0 TD 0.036 Tc
Tj 6t Tf 0.036 Tc (i) Tj 3.38B TD 0.036 Tc (i) 1F

shock. In the Habit model, however, employment is chosen before r

The constraints (2.2){(2.5) and the conditions (2.6){(2.8) can be used to uncover the economy's allocation. This allocation can then be used to uncover asset prices. For asset prices, we follow Boldrin, Christiano, and Fisher (2001), and assume that investment is fully equity ¯nanced and de¯ne the risky return as the return on capital:

$$R^k_{t+1} = \left[\alpha y_{t+1}/k_{t+1} + p^k_{0;t+1} \right] / p^k_{1;t}; \tag{2:9}$$

where

$$p^k_{0;t+1} = \lambda_{t+1} \left[\alpha \frac{x_{t+1}}{k_{t+1}} + \phi \left(\frac{x_{t+1}}{k_{t+1}} \right) \frac{x_{t+1}}{k_{t+1}} + (1 - \delta) \right]; \tag{2:10}$$

$$p^k_{1;t} = \lambda_t: \tag{2:11}$$

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The data statistics come from two sour

e®ects on the ¯nancial statistics, and mainly results in further consumption smoothing (see Table 2).

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it slightly underpredicts the volatility of consumption and employment. Furthermore, as argued in Cogley and Nason (1995), the large predicted persistence of consumption and output are generated by the exogenous persistence of total factor productivity. Figure 1 shows the dynamic responses of output, consumption, employment, and investment to a

replicates the business cycle statistics. Interestingly, the failures to replicate the ¯nancial statistics appears independent of the value of the coe±cient of relative risk aversion. In contrast, the Habit formation model replicates the ¯nancial statistics, but fails to replicate the business cycle statistics.

3. Production Economies with Spirit-of-Capitalism

The Spirit of Capitalism model retains the production structure of the Habit formation model, but replaces the habit formation preferences by direct preferences for ¯nancial wealth. In doing so, our benchmark model is the absolute wealth is status framework of Bakshi and Chen (1996). For this model, we create a decentralized version that retains some features of the Habit model.

The decentralized equilibrium is solved as follows. Consumers choose consumption, employment, and asset holdings to maximize

$$E_0 \sum_{t=0}^{1} \beta^t \, u(c_t; s_t) - \mu n_t \tag{3:1}$$

subject to

$$c_t + p_t a_{t+1} + q_t b_{t+1} = w_t n_t + (p_t + d_t) a_t + b_t; \tag{3:2}$$

where s_t is the index of status, w_t is the wage rate, a_t and p_t are the quantity and price of the risky asset, d_t is dividends paid by the risky asset, and b_t and q_t are the quantity and price of the risk-free asset. The objective function (3.1) shows expected lifetime utility and the constraint (3.2) is the consumer's period budget.

As before, the period utility is linear in employment, and we only consider the case where employment is chosen before realization of the technology shock. The functional form for the subutility function $u(c; s)$ follows Bakshi and Chen (1998):

$$u(c_t; s_t) = c_t^{1-\gamma} s_t^{\gamma} / (1 - \gamma);$$

The economy is closed by the following market clearing conditions. The asset market clearing conditions are

$$a_t = 1. \tag{3.18}$$

$$b_t = 0. \tag{3.19}$$

The goods market clearing condition is

$$y_t = c_t + x_t. \tag{3.20}$$

The budget constraints (3.2) and conditions (3.4)–(3.6), the firm's constraints (3.12)–(3.14) and conditions (3.15)–(3.17), the definition of status (3.3), and market clearing conditions (3.18)–(3.20) are used to compute the economy's allocation. This allocation is then used to compute asset prices. As before, we define the risky return as the return on capital:

$$R^k_{t+1} = \left(\alpha y_{t+1}/k_{t+1} + p^k_{0,t+1}\right)/p^k_{1,t}, \tag{3.21}$$

where

$$p^k_{0,t+1} = \eta_{t+1} \left(\phi\left(\frac{x_{t+1}}{k_{t+1}}\right) - \phi'\left(\frac{x_{t+1}}{k_{t+1}}\right) \right)$$

+t

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where $\varsigma_t = \ln(\varsigma_t/\varsigma)$. We approximate the expectational in terms (3.24) as

$$E_t \exp(\varsigma_{t+1}) = \exp\left[E_t \varsigma_{t+1} + (1/2)E_t \left[\varsigma_{t+1} - E_t[\varsigma_{t+1}]\right]^2\right]. \qquad (3.25)$$

As in the previous models, we set $\beta = 0.36$, $\delta = 0.021$, $\alpha = 0.23$, $\rho = 0.979$, and $\sigma = 0.0072$. We set μ to ensure that employment $n = 1$ in the steady state, and set ω_1 and ω_2 to ensure that $A(\delta) = \delta$ and $A'(\delta) = 1$. Bakshi and Chen (1996) provide estimates of γ and η for $\bar{\beta} = 1$. The unrestricted estimates of γ vary between 2.27 and 3.08, while those of η vary between 0.75 and 1.27. As a benchmark, we retain $\bar{\beta} = 0.99999$ and $\gamma = 2$, and set $\eta = 1.27$.

The simulation results are presented in Tables 1 and 2. The simulated statistics for the Spirit of Capitalism model are computed as before.

First, the benchmark Spirit of Capitalism model fails to replicate the financial statistics. The model predicts a negative risk-free rate. Note that, far from a failure, the underprediction of the risk-free rate can be interpreted as the ability to resolve the risk-free rate puzzle.

employment. Finally, it also incorrect

the capital stock.

To see this, the third experiment removes the investment adjustment costs (i.e. we let » ! 1, $!_1 = 1$, and $!_2 = 0$). The results of this experiment appear as \High »" in the tables. Eliminating the adjustment cost makes the predictions of the Spirit of Capitalism model closer to those of the standard RBC model. It corrects the anomalous volatility of both consumption, raises the volatility of investment, and corrects other anomalous business cycle statistics. Unfortunately, it also eliminates the equity premium and seriously reduces the volatility of both risk-free and risky rates.

The fourth experiment simply lowers the extent to which consumers care about status. Note that this also lowers the e®ective degree of risk aversion. For this experiment, we set ´ = 0:75 | the lower estimate in Bakshi and Chen (1998). The results appear as \Low ´" in the tables. As expected, lowering the extent to which consumers care about status reduces the volatility of both the risk-free and risky rates, and also lowers the equity premium. In addition, it reduces the volatility of consumption, but not su±ciently. Otherwise, it has little e®ects on the business cycle statistics.

The ¯nal experiment studies the anomalous behavior of employment and its e®ect on the autocorrelation of output. As in the Habit model, we implement a case where consumers supply labor inelastically. To do so, we set $\mu = 0$ and impose that $n_t = 1$. This experiment appears under \Inelastic Labor" in the tables. Making labor inelastic has only a small e®ect on the ¯nancial statistics. Obviously, it imposes a zero volatility of employment and a zero correlation with output. It corrects the anomalous negative autocorrelations of consumption and output, but still produces a large volatility of consumption and a small volatility of investment.

Overall, these results indicate that the absolute wealth is status framework of the Spirit of Capitalism model may solve the risk-free rate puzzle and considera.s s e p -

statistics.

4. Conclusion

In this paper, we evaluate whether the spirit of capitalism improves the ability of standard RBC models to exp

Appendix A

In this appendix, we show that $R^e_{t+1} = R^k_{t+1}$ in all models considered.

First, we de¯ne the ¯rm's dividends as $d_t = y_t ¡ w_t n_t ¡ x_t = ®y_t ¡ x_t$, since $w_t n_t = (1 ¡ ®)y_t$. Second, we apply a forward substitution on the equity price $p_t = E_t\,(p_{t+1} + d_{t+1})=R^e_{t+1}$ to obtain

$$p_t = E_t\left[\frac{1}{R^e_{t+1}}d_{t+1} + \frac{1}{R^e_{t+1}}\frac{1}{R^e_{t+2}}d_{t+2} + \frac{1}{R^e_{t+1}}\frac{1}{R^e_{t+2}}\frac{1}{R^e_{t+3}}d_{t+3} + :::\right] : \qquad (A:1)$$

Third, we rewrite the ¯rm's ¯rst-order condition for investment

$$^1_t = E_t\left[\frac{1}{R^e_{t+1}}\left(®\frac{y_{t+1}}{k_{t+1}} + {}^1_{t+1}\,Á_{t+1} ¡ Á^0_{t+1}\frac{x_{t+1}}{k_{t+1}} + (1 ¡ ±)\right)\right] \qquad (A:2)$$

as

$$E_t\,d_{t+1}=R^e_{t+1} = {}^1_t k_{t+1} ¡ E_t\left[{}^1_{t+1}(1) 3A\right]k^{}_{t+2}=R^e_{t+1}\ ; \qquad (A:3)$$

where $^1_t = 1=Á^0_{t+1}$

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Table 1. Financial Statistics

	Averages		Volatility		Ratio
	$E(r^f)$	$E(r^k - r^f)$	σ_{r^f}	σ_{r^k}	$E(r^k - r^f)/\sigma_{r^k}$
Data	1.19	6.63	5.27	19.40	0.34
RBC Model					
Benchmark	4.10	0.01	0.32	0.34	0.04
High °	4.09	0.02	0.26	0.27	0.07
Habit Model					
Benchmark	2.75	7.10	30.05	49.82	0.14
Inelastic Labor	-0.87	5.63	7.96	32.74	0.17
Spirit of Capitalism Model					
Benchmark	-3.97	0.38	5.09	10.15	0.04
Low ¯	1.19	0.11	2.67	5.69	0.02
High °	-0.45	1.59	14.34	23.60	0.07
High »	-4.11	-0.01	0.12	0.13	-0.02
Low ´	-3.45	0.33	4.54	9.44	0.04
Inelastic Labor	-3.99	0.29	5.26	9.21	0.03

Note: Entries under Averages, Volatility, and Ratio refer to the unconditional mean of a variable, the standard deviation of a variable, and the ratio of the unconditional mean of a variable to a standard deviation of a variable. The variables are the annualized percentage risk-free rate r^f, the annualized percentage risky rate r^k, as well as the di®erence between the two. The Data statistics are taken from Boldrin, Christiano, and Fisher (2001). The Model statistics are computed as the averages over 1000 repetitions of 200 periods.

Table 2. Business Cycle Statistics

	Volatility			Correlation			Persistence	
	σ_c/σ_y	σ_x/σ_y	σ_n/σ_y	$\rho(c;y)$	$\rho(x;y)$	$\rho(n;y)$	$\rho(c^0;c)$	$\rho(y^0;y)$
Data	0.80	2.61	0.99	0.96	0.94	0.80	0.86	0.89
RBC Model								
Benchmark	0.33	3.13	0.40	0.97	0.99	0.91	0.73	0.70
High °	0.14	3.68	0.50	0.98	0.99	-0.78	0.72	0.70
Habit Model								
Benchmark	0.30	2.69	1.74	0.26	0.98	0.03	0.91	-0.04
Inelastic Labor	0.64	2.13	0.00	0.71	0.93	0.00	0.93	0.71
Spirit of Capitalism Model								
Benchmark	2.22	0.69	1.95	0.9				

Fig 1:
RBC Model

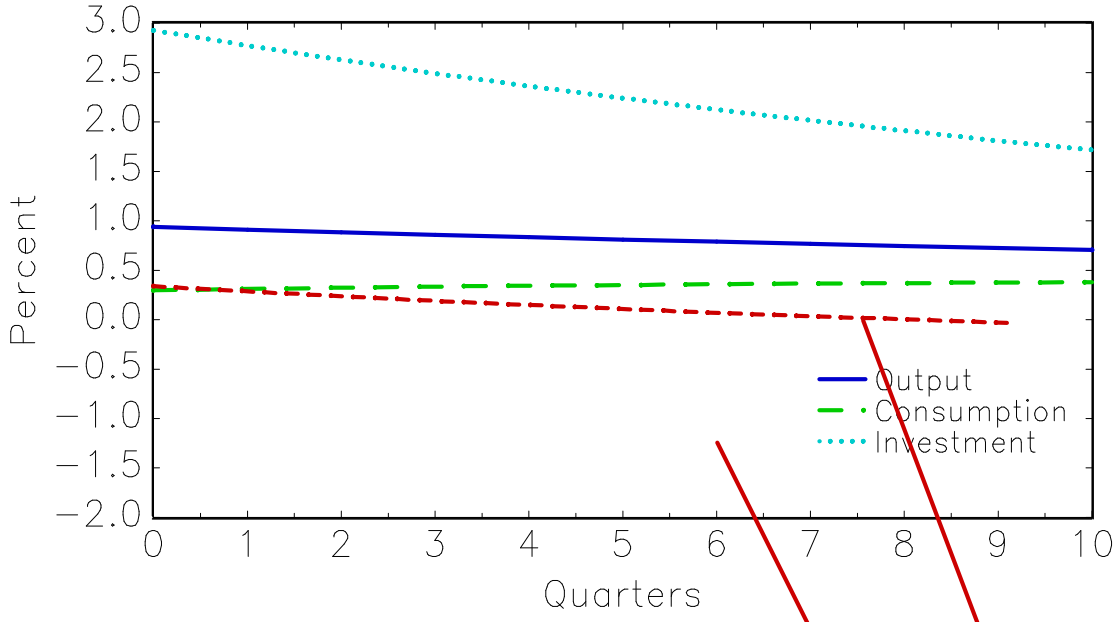

Fig 2:
Habit Model

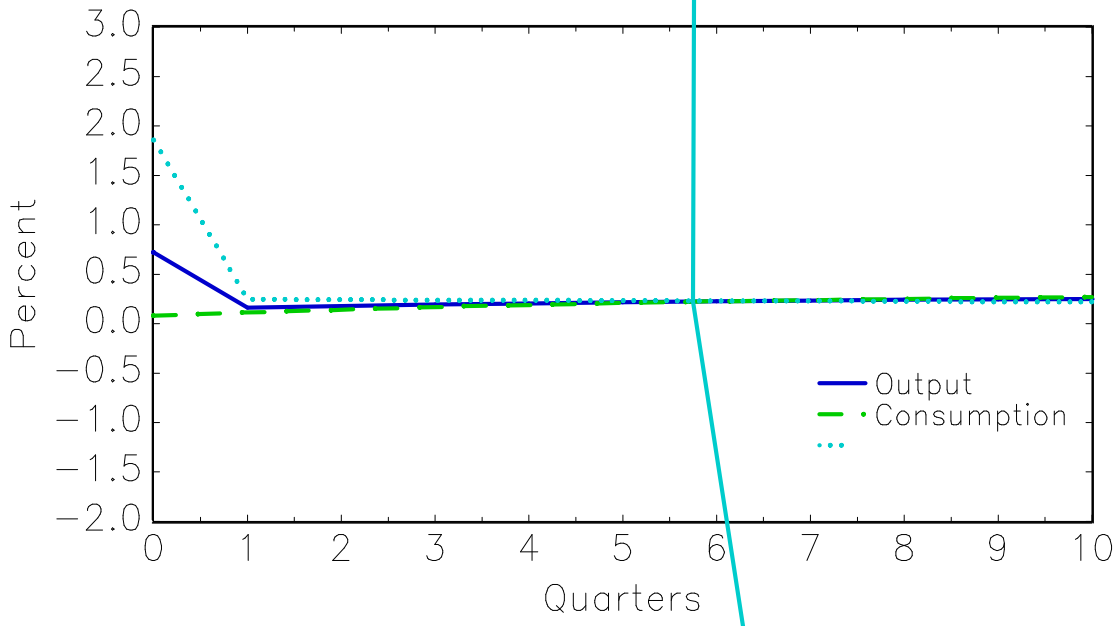

Fig 3:
Spirit of Capitalism Model