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Comments on “Stock Price Cycles and Business Cycles” by Klaus Adam and Sebastian Merkel

Monetary Policy Conference: Bridging Science and Practice, October 7-8, ECB.

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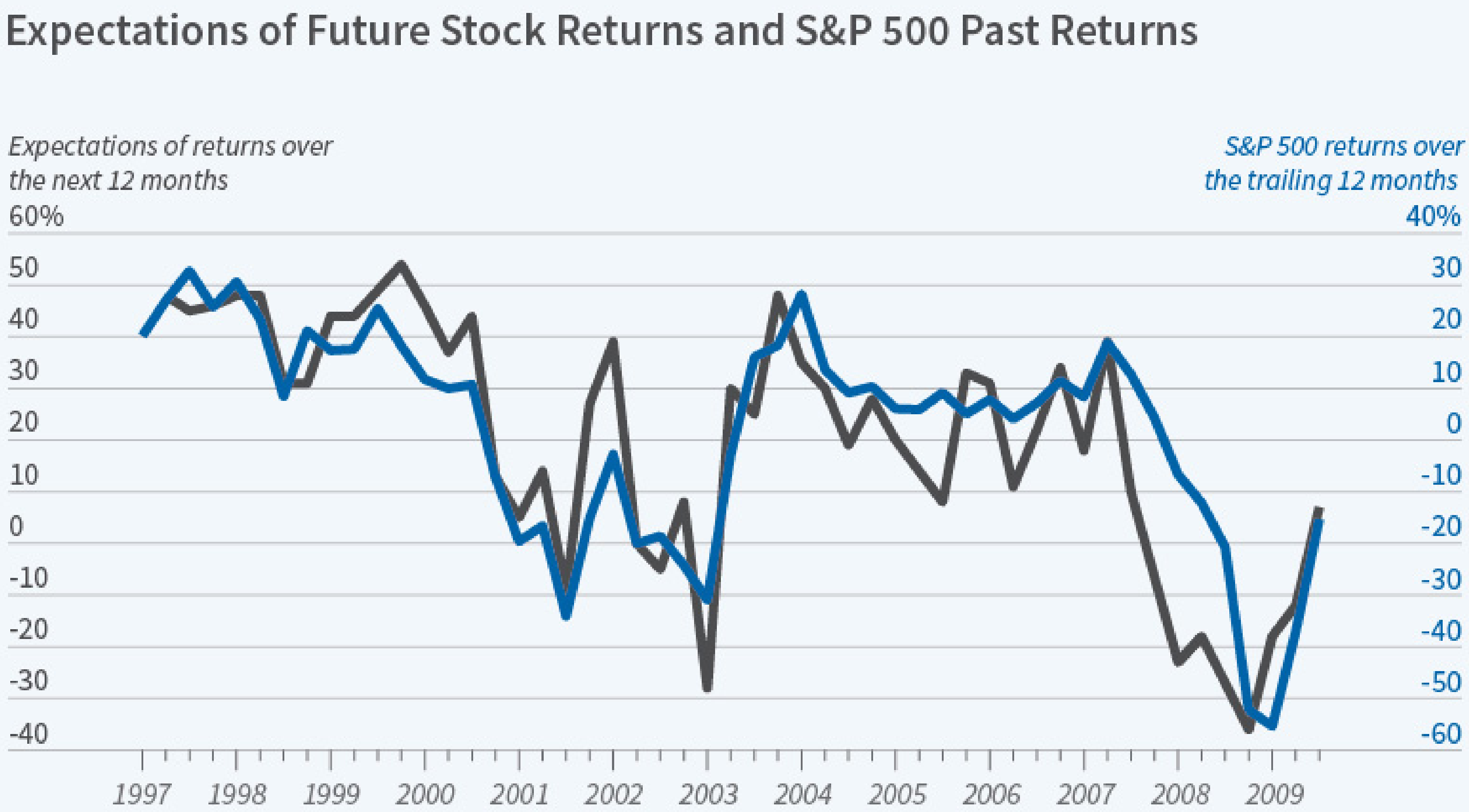
Overview

1. Summary
2. Comment I: Policy implications
3. Comment II: The stochastic discount factor
4. Comment III: The co-movement puzzle
5. Comment IV: Model performance
6. Conclusion

Departing from rational expectations (RE)

- What explains the high volatility of stock prices?
- Joint behaviour of stock prices and macro variables
- Motivated by survey data on stock prices

Summary



Expectations of returns is built from a Gallup survey of individual investors' expectations
Source: N. Gennaioli, Y. Ma, and A. Shleifer, NBER Working Paper No. 21260 and published as "Expectations and Investment," NBER Macroeconomics Annual, 30(1), 2015, pp. 379–431

Main innovation

- Learning in Boldrin, Christiano and Fisher (2001)
- Agents form beliefs about expected stock prices:

$$\ln Q_{s,t} = \ln Q_{s,t-1} + \ln \beta_{s,t} + \ln \varepsilon_{s,t},$$

- Observe current prices but not shocks
- To forecast future prices need to estimate persistence

Belief formation mechanism

- Agents' capital gain expectations:

$$E_t^{\mathcal{P}}\left[\frac{Q_{s,t+1}}{Q_{s,t}}\right] = m_{s,t}$$

Where:

$$\ln m_{s,t} = \ln m_{s,t-1} + g\left(\ln Q_{s,t-1} - \ln Q_{s,t-2} - \ln m_{s,t-1}\right) + g \ln \varepsilon_{s,t}^{1},$$

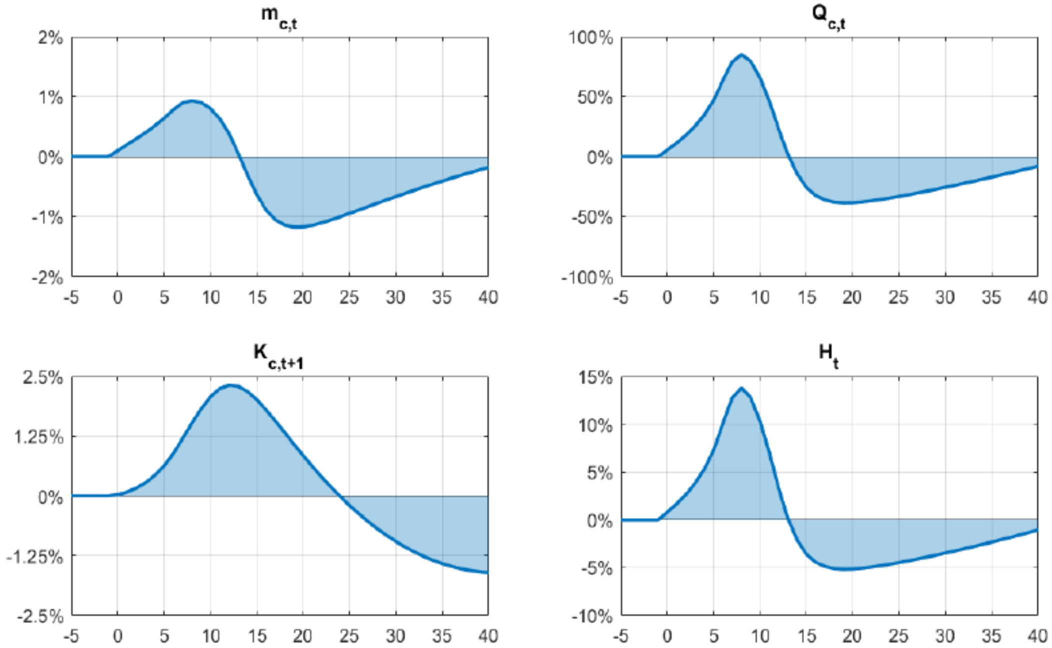
Model performance

Table 6
Empirical model fit

	Data (std.dev.)	Subjective Belief Model	RE Model	RE Model with inv. shocks
		Business Cycle Moments		
$\sigma(Y)$	1.72 (0.25)	1.83*	1.90*	1.85*
$\sigma(C)/\sigma(Y)$	0.61 (0.03)	0.67*	0.75*	0.66*
$\sigma(I)/\sigma(Y)$	2.90 (0.35)	2.90*	1.88*	2.79*
$\sigma(H)/\sigma(Y)$	1.08 (0.13)	1.06*	0.31*	0.56*
$\rho(Y,C)$	0.88 (0.02)	0.84*	0.98*	0.86*
$\rho(Y,I)$	0.86 (0.03)	0.89*	0.97*	0.90*
$\rho(Y,H)$	0.75 (0.03)	0.70*	0.89*	0.80*
		Financial Moments		
$E[P/D]$	152.3 (25.3)	150.0*	174.6*	166.0*
$\sigma(P/D)$	63.39 (12.39)	44.96*	7.00*	8.28*
$\rho(P/D)$	0.98 (0.003)	0.97*	0.96	0.95
$E[r^e]$	1.87 (0.45)	1.25*	0.77	0.57
$\sigma(r^e)$	7.98 (0.35)	7.07*	0.16	0.16
$E[r^f]$	0.25 (0.13)	0.78	0.77	0.58
$\sigma(r^f)$	0.82 (0.12)	0.06	0.09	0.06
$\sigma(D_{t+1}/D_t)$	1.75 (0.38)	2.46*	1.19*	1.69*
		Other Moments		
$\rho(H,P/D)$	0.51 (0.17)	0.79	-0.97	-0.95
$\rho(I/Y,P/D)$	0.58 (0.19)	0.69	-0.97	-0.94
$\rho(E^{\mathcal{P}}[r^e],P/D)$	0.79 (0.07)	0.52	-0.99	-0.98

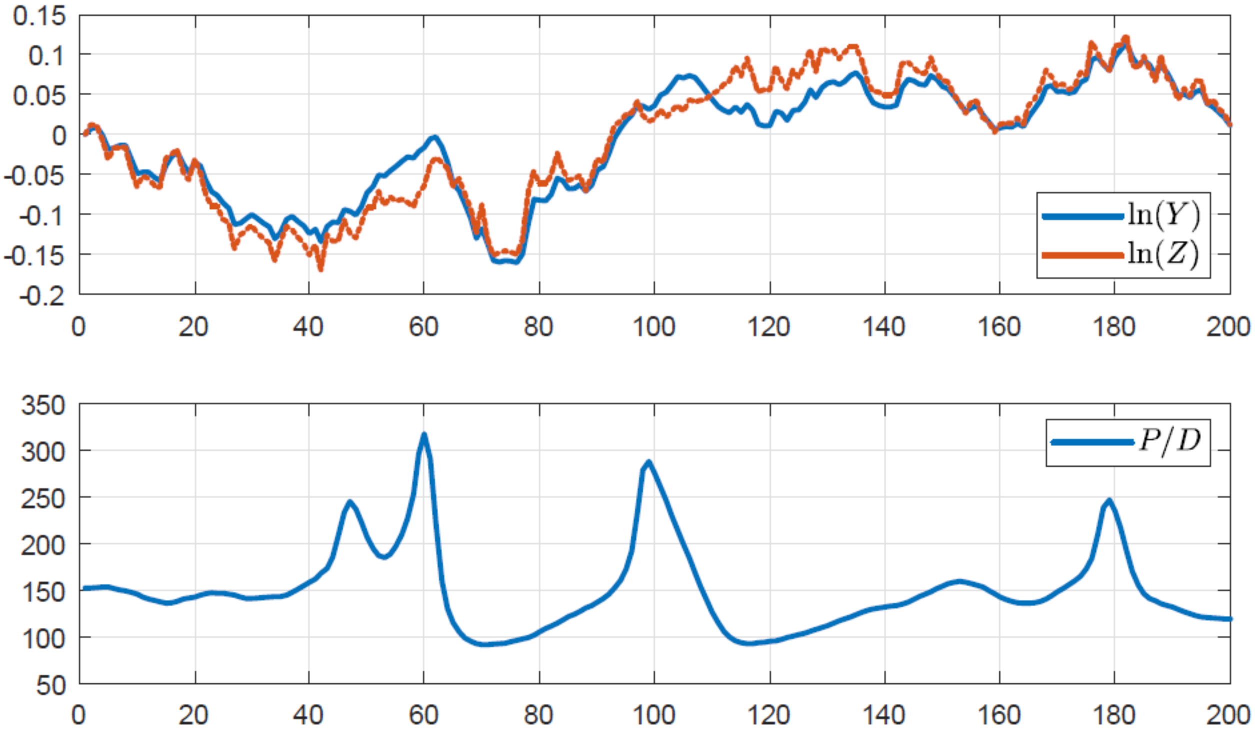
Notes: Model moments marked with an asterisk have been targeted in the estimation. The label of the moments symbols can be found in tables 1, 2 and 3. Financial return moments are expressed in quarterly rates of return. Similarly, the P/D ratio is defined as the price over quarterly dividend payments.

Stock price cycles



- Optimism shock
- Boom-bust cycles

Asymmetries



- State of pessimism vs. optimism
- Skewed PD ratio distribution

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Inefficient fluctuations

- Adam and Merkel (2019): “A large part of the observed volatility of stock prices, investment and hours worked is inefficient”
- RE outcome interpreted as efficient
- “Excess volatility” due to belief-driven boom and bust cycles
- Compare subjective belief model with RE counterpart

Table 7
The effects of shutting down subjective price beliefs

	Data	Subjective Belief Model	REE Implied by Subj. Belief Model
	Business Cycle Moments		
$\sigma(Y)$	1.72 (0.25)	1.83	1.60
$\sigma(C)/\sigma(Y)$	0.61 (0.03)	0.67	0.89
$\sigma(I)/\sigma(Y)$	2.90 (0.35)	2.90	1.59
$\sigma(H)/\sigma(Y)$	1.08 (0.13)	1.06	0.12
$\rho(Y,C)$	0.88 (0.02)	0.84	0.96
$\rho(Y,I)$	0.86 (0.03)	0.89	0.91
$\rho(Y,H)$	0.75 (0.03)	0.70	0.70
	Financial Moments		
$E[P/D]$	152.3 (25.3)	150.0	199.7
$\sigma(P/D)$	63.39 (12.39)	44.96	8.99
$\rho(P/D)$	0.98 (0.003)	0.97	0.99
$E[r^e]$	1.87 (0.45)	1.25	0.68
$\sigma(r^e)$	7.98 (0.35)	7.07	0.19
$E[r^f]$	0.25 (0.13)	0.78	0.68
$\sigma(r^f)$	0.82 (0.12)	0.06	0.06
$\sigma(D_{t+1}/D_t)$	1.75 (0.38)	2.46	0.92

Stock prices in the RE model

- Zero risk premium under RE
- Dramatic decline in the volatility of stock return under RE
- Is a real business cycle model with RE the relevant benchmark?
- Many RE models in which fluctuations can be inefficient

Welfare cost of uncertainty

- Compare subjective belief model with deterministic version
- Equity premium falls from 1.9% to 0%
- How much extra consumption needed to compensate for uncertainty?
- Lucas (2003), Tallarini (2000)

Overview

What is a bad state of the world?

- Risk premium to compensate agents when marginal utility is high
- Marginal utility is a measure of "hunger"

$$C_t = W_t,$$

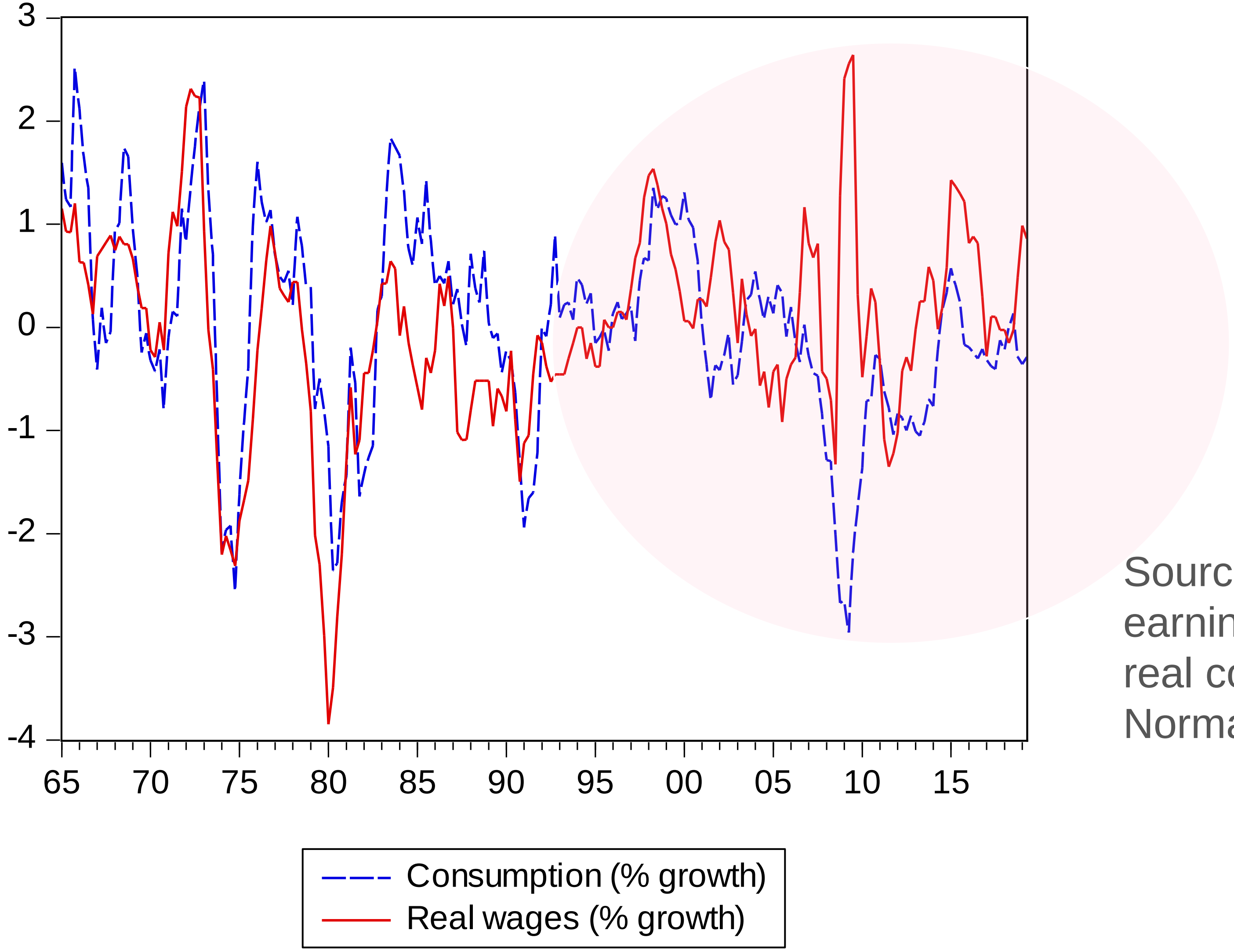
$$Q_{c,t} = \beta E_t^{\mathcal{P}} \left[\frac{W_t}{W_{t+1}} \left(\left(1 - \delta_c\right) Q_{c,t+1} + R_{c,t+1} \right) \right],$$

$$Q_{i,t} = \beta E_t^{\mathcal{P}} \left[\frac{W_t}{W_{t+1}} \left(\left(1 - \delta_i\right) Q_{i,t+1} + R_{i,t+1} \right) \right],$$

What is a bad state of the world?

- Here SDF determined by real wages
- High expected marginal when agents expect difficult times ahead
- But real wages only very imperfectly correlated with consumption, especially since late 90's

Real wages not a good measure of "hunger"



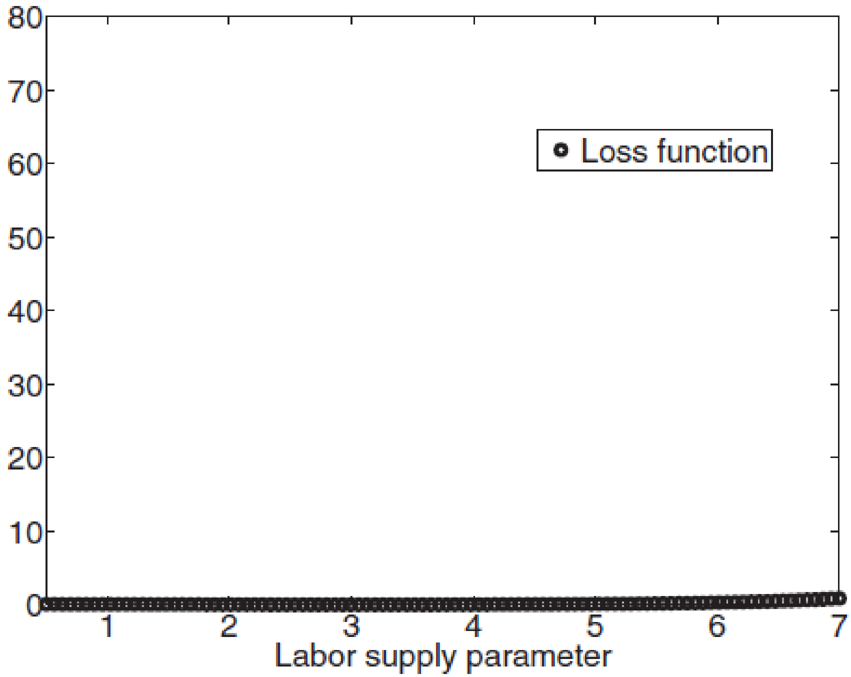
Source: BLS for real earnings and BEA for real consumption. Normalized data.

Why is the SDF determined by wages?

- Assume infinite Frisch elasticity of labor supply (e.g., Boldrin, Christiano and Fisher 2001)
- Linear disutility of labor (e.g., Hansen 1985)
- But recent evidence suggests much smaller values
- Hall (2009): “The model embodies the findings of research that the Frisch elasticity of labor supply is less than one.”
- Chetty et al. (2011): “Calibrate representative agent macro models to match a Frisch elasticity of aggregate hours of 0.75.”

Low Frisch elasticity is not key

- Argue that labor market frictions are key: “Infinite Frisch elasticity to maximally distinguish our setup.”
- Vary Frisch from 0.55 to 5.3 in RBC model that matches financial moments
- Key is to reduce wealth elasticity of labor supply



Source: Jaccard (2014)

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Co-movement of inputs in a two-sector model

- Difficult to reproduce positive co-movement between hours and investment in a two-sector model
- Greenwood and Hercowitz (1991), BCF (2001), Di Cecio (2009)
- Here investment in capital good sector exogenous
- Hours in the consumption good sector are constant
- Capital share in investment good sector (implausibly?) high
- Average consumption and investment to output ratios?

Costs and benefits of two-sector assumption

- Advantage of two-sector specification: asset prices affect allocation of resources
- But since here allocation of inputs partly exogenous and restricted, also comes at a cost
- In the end, study concludes that welfare cost is small
- Most points could be made in a one sector model to avoid many of these issues

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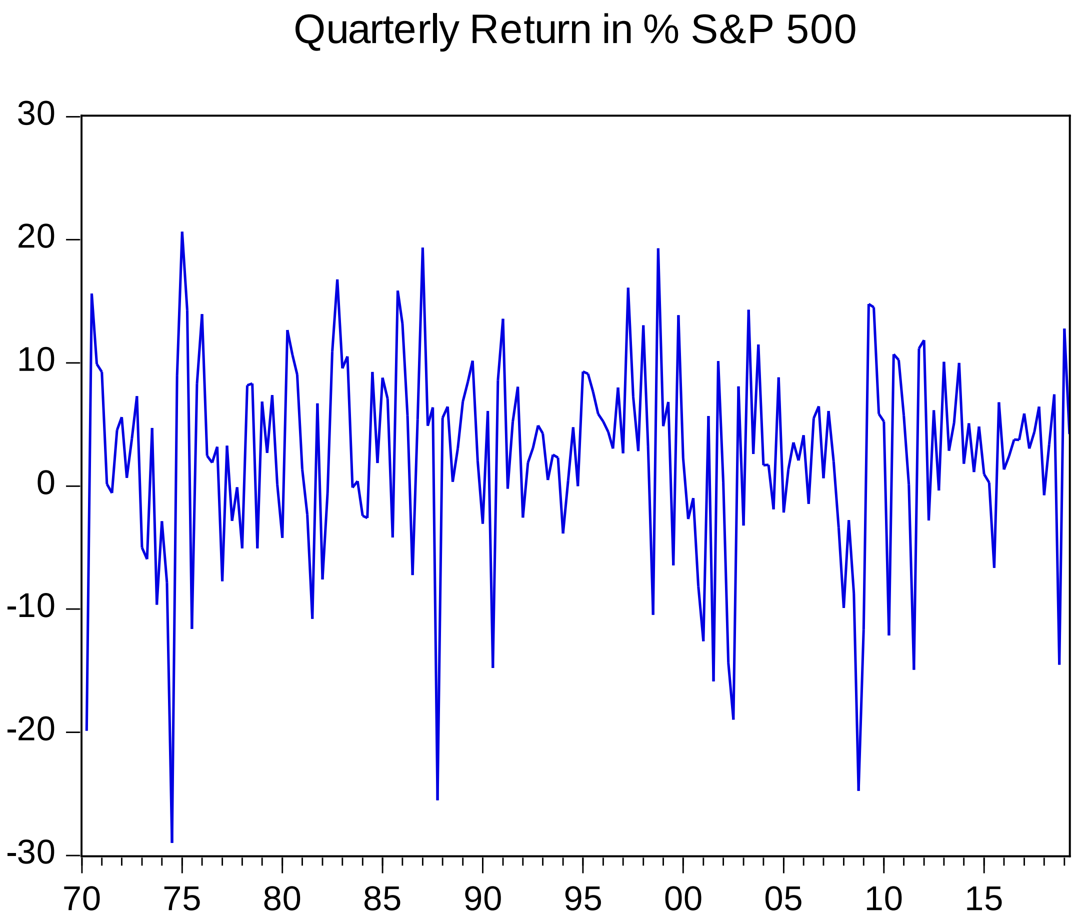
Several contributions

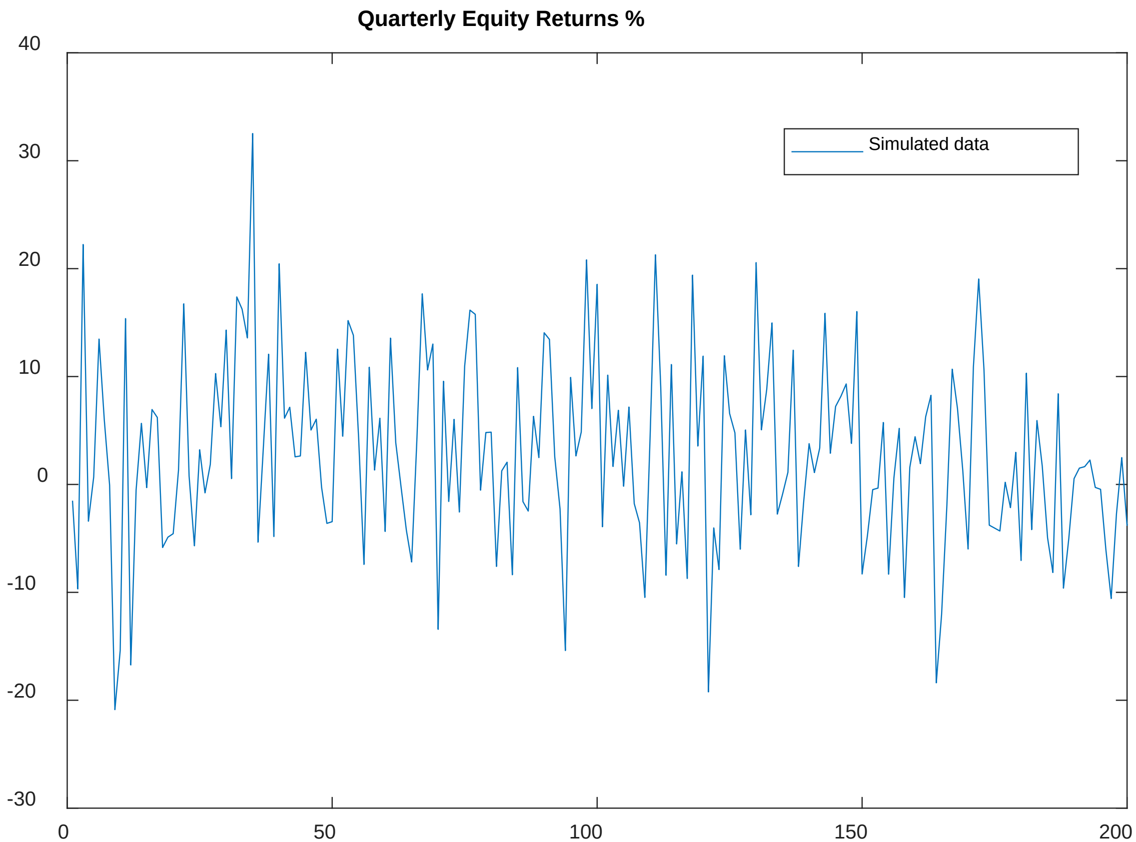
- Consistent with new survey evidence on expected returns
- Asymmetries
- Strong endogenous propagation mechanism
- Volatility of stock returns
- Volatility of dividends

Potential inconsistencies



- At quarterly frequency, autocorrelation close to zero
- Not a problem for existing models with RE

Comparison with a RE model (Jaccard, JEEA 2018)



- Sample of 200 simulated observations
- At quarterly frequency, autocorrelation close to zero
- Increases with the horizon, as in the data

Mean reversion of realized returns

- Subjective belief model can explain return expectation from survey data
- But not clear that it can explain very low persistence of realized returns at quarterly frequency
- Maybe more suited for house prices?

Risk-free rate puzzle

- Weil (1989)
- 1.0% in the data vs. 3.1% in the model
- Precautionary saving plays a much smaller role
- Compare with BCF for example

Volatility of dividends

- Introduce payout ratio parameter
- No counterpart in the literature
- Capital can be securitized via shares
- Micro-foundation not entirely clear
- Volatility of dividends probably biggest remaining issue in this literature
- Especially if firm leverage is countercyclical (e.g., Kekre 2016)

Impact of risk-free rate on boom-bust cycles

- Argue that economy more stable when risk-free rates are higher
- But really a statement about time-discount factor, not risk-free rate dynamics
- Lower time-discount rate implies higher average/steady state risk-free rate
- In RE model, risk-free rate increase after positive shock
- What happens in this model?

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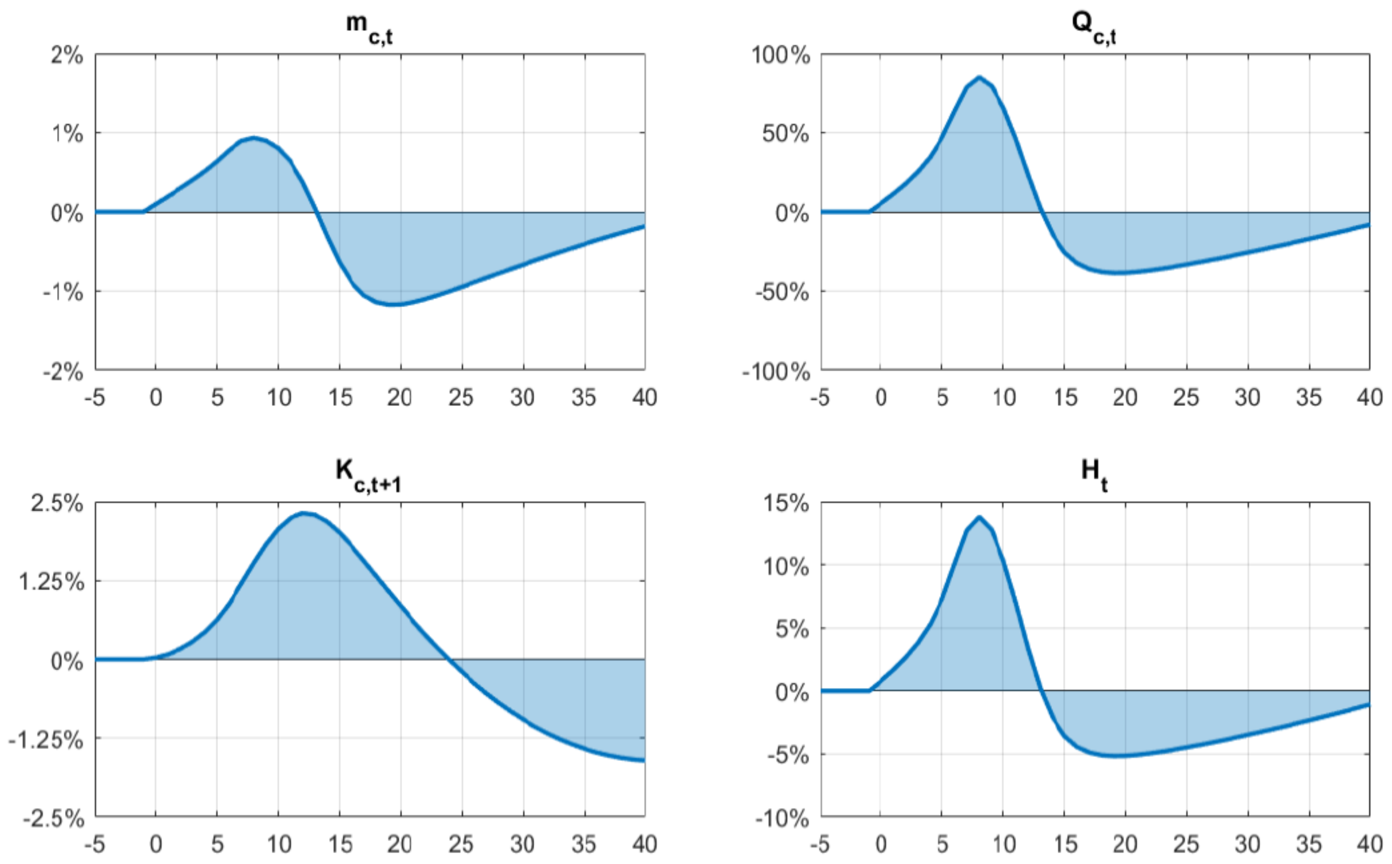
Main takeaways

- New approach to asset pricing in production economies
- Consistent with data on survey expectations
- First attempts will necessary be inconsistent with some other empirical facts
- Details about implementation

Rich dynamics



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THANK YOU FOR YOUR ATTENTION!