

Technological Revolutions and Stock Prices

Discussion on Pástor and Veronesi (2006)

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An economic explanation of the burst of bubble:

The adoption of new technology makes its risk systematic

A highly *creative/imaginative* idea. . .

A few concerns about the model-implied dynamics for stock price and capital investment

Secondary, however

Model

Timeline

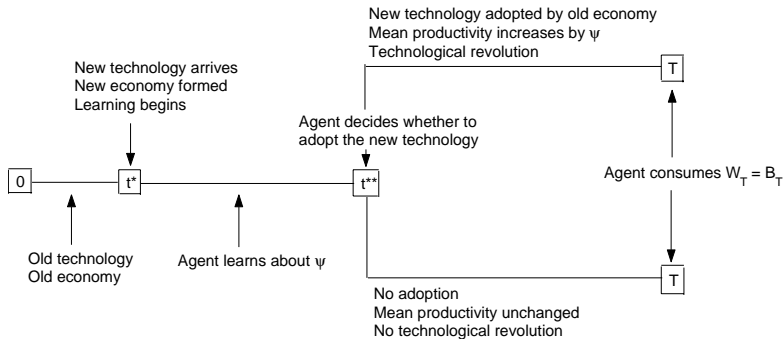


Figure 1. The Sequence of Events. In this chart, t^{**} , the time when the agent decides whether to adopt the new technology, is taken as given. We initially take t^{**} as given for the purpose of obtaining closed-form solutions for prices, but later we solve for the optimal time t^{**} to adopt the new technology.

Model

Structure

Output: $Y_t = \rho_t B_t$

Capital: $dB_t = \rho_t B_t dt$

Old technology: $d\rho_t = \phi(\bar{\rho} - \rho_t) dt + \sigma dZ_{0t}$

New technology: $d\rho_t = \phi(\bar{\rho} + \psi - \rho_t) dt + \sigma dZ_{0t}$

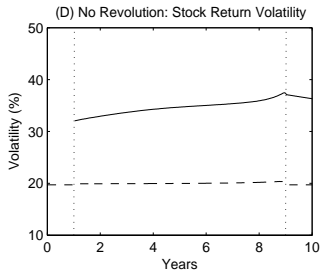
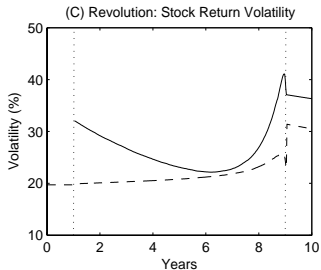
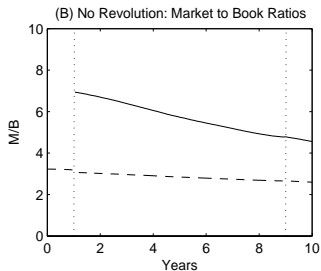
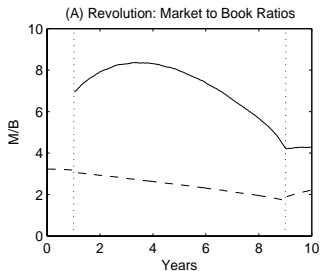
At time t^* , ψ drawn from $\psi \sim \mathcal{N}(0, \hat{\sigma}_{t^*}^2)$

From t^* to t^{**} : new firms experiment new technology costlessly

At time t^{**} , adopt new technology if $\hat{\psi}_{t^{**}} \geq \underline{\psi}(\kappa, \gamma, \hat{\sigma}_{t^*}^2)$

Adoption: the new-economy risk becomes systematic, price drops

Model Predictions

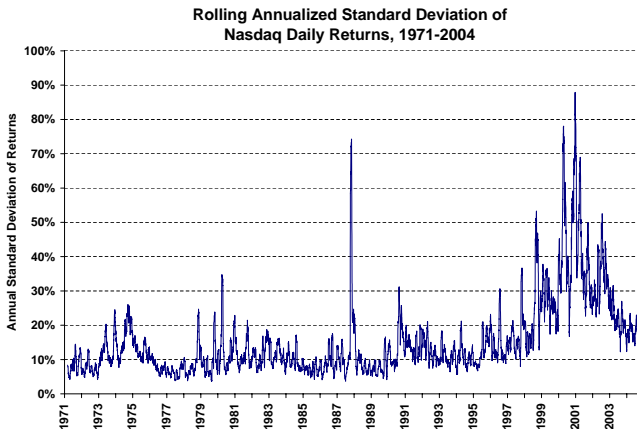


Discussion

Volatility dynamics: I

Model: the U-shape pattern of volatility

Data: volatility clearly peaks around the burst of bubble



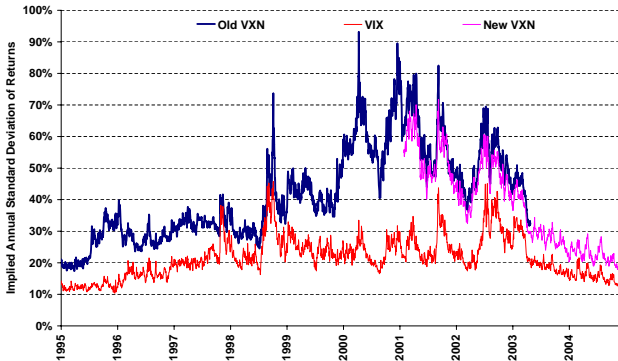
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Discussion

Volatility dynamics: II

Data: similar patterns from implied volatilities

Implied Volatility for S&P 500 (VIX) and Nasdaq 100 Portfolio (VXN),
Annualized Standard Deviation of Returns, 1995-2004



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Discussion

Volatility dynamics: III

Bharath and Viswanathan (2006):

Pre-crash, adoption increases idiosyncratic risk

Post-crash, adoption increases systematic risk

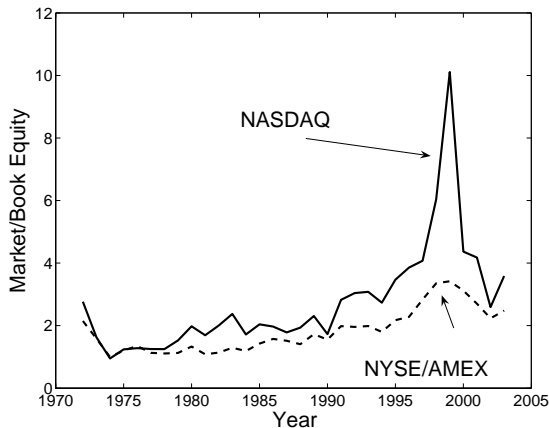
Sample	Total volatility	Beta	Idiosyncratic volatility
Pre-bubble (till June 1998)	7.5%★	9.7%	4.9%
Bubble (June 1998–March 2000)	12.8%★	-7.2%	18.1%★
Post-crash (after March 2000)	-9.4%★	15.1%★	-13.0%★

Discussion

Stock price dynamics

Model: the burst of bubble takes place **gradually** (from Year 3 to Year 9)

Data: the burst happens **abruptly** — business cycle asymmetry

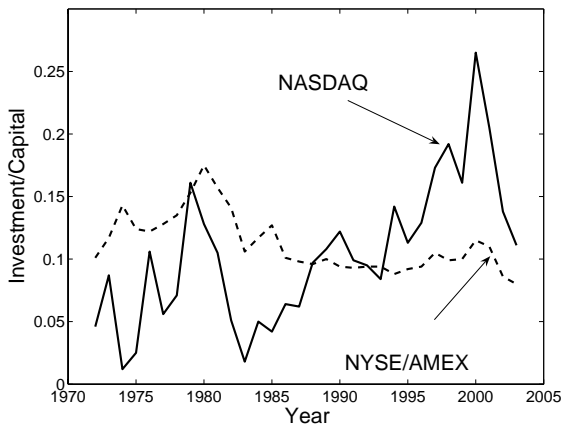


Discussion

Capital investment dynamics

Model: new-tech investment **takes off** at the burst of bubble

Data: Investment **drops** at the burst



Summary

A creative/intriguing explanation about the deflation of bubbles:

The new-economy risk goes from being idiosyncratic to systematic

A necessary condition: the new-tech investment must rise rapidly at the burst of bubble **so that its scale can affect terminal wealth**

Concerns:

New-tech investment drops at the burst of bubble

Bubble bursts more rapidly in the data than in the model