LEONID KOGAN, DIMITRIS PAPANIKOLAOU, NOAH STOFFMAN WINNERS AND LOSERS: CREATIVE DESTRUCTION AND THE STOCK MARKET

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Aggregate shocks

- neutral TFP x_t
- **'embodied' shock** ξ_t that improves new vintages of capital

Idiosyncratic shocks

- **Households**: uninsurable innovation risk $dN^I_{i,t}$
  - embodied shock ξ_t amplifies idiosyncratic risk
  - similar to Constantinides and Duffie
- **Firms**: time-varying ability to turn innovation into projects
  - generates cross-sectional firm heterogeneity

Preferences

- Epstein–Zin (high estimated IES and risk aversion)
- preference for relative consumption
  - magnifies SDF exposure to redistributive shocks
- random death shocks at rate δ^h

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Wealth accumulation

- wealth share $w_{n,t} = W_{n,t}/W_t$ conditional on survival

$$\frac{dw_{n,t}}{w_{n,t}} = \underbrace{\delta^h dt}_{\text{accidental bequests}} + \underbrace{\frac{\lambda}{\mu_I} \frac{\eta \nu_t}{W_t} \left(dN^I_{i,t} - \mu_I dt \right)}_{\text{innovation risk}}$$

  - $dN^I_{i,t}$ counts innnovation arrivals
  - ν_t value of a newly created project (function of ξ_t)
  - η share of project value retained by innovator
- wealthy households lived long and innovated a lot

Tradable household wealth $W_t = V_t + G_t + H_t$ (traded in complete markets)

- V_t market value of existing projects in firms

$$V_t = \int_0^1 E_t \left[\sum_{j \in \mathcal{I}_{f,t}} \int_t^\infty \frac{\Lambda_s}{\Lambda_t} \pi_{j,s} ds \right] df$$

- G_t market value of investment opportunities that accrues to shareholders

$$G_t = (1 - \eta) \int_0^1 E_t \left[\int_t^\infty \frac{\Lambda_s}{\Lambda_t} \lambda_{f,s} \nu_s ds \right] df$$

- H_t market value of human capital

$$H_t = E_t \left[\int_t^\infty e^{-\delta^h (s-t)} \frac{\Lambda_s}{\Lambda_t} w_s ds \right]$$

Incomplete markets for value of new projects $\eta \nu_t$ retained by innovators

A **firm** is a collection of projects with different vintages

- profit flow for project j

$$\pi_{j,t} = \max_{L_{j,t}} \left(u_{j,t} \exp\left(\xi_{\tau(j)}\right) k_{j,t}\right)^{\phi} \left(e^{x_t} L_{j,t}\right)^{1-\phi}$$

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Project size $k_{j,\tau(j)}$ chosen at project inception

$$\nu_{\tau(j)} \doteq \max_{k_{j,\tau(j)}} \left\{ E_t \left[\int_{\tau(j)}^{\infty} \frac{\Lambda_s}{\Lambda_t} \pi_{j,s} ds \right] - k_{j,\tau(j)}^{1/\alpha} \right\}$$

- convex cost
- once project created, capital only depreciates
- the only dynamic decision related to innovation in the model

Probability of receiving a project varies over time

- 2-state Markov chain, arrival intensities $\lambda_H > \lambda_L$, transition probability

$$\begin{pmatrix} -\mu_L & \mu_L \\ \mu_H & -\mu_H \end{pmatrix}$$

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This generates 'growth' and 'value' firms

- growth firms are those with **high arrival intensity** λ_f
  - high chance of getting new project is insurance against ξ shock
- also those will **small existing size** k_f
  - a new project in a large firm makes less of a difference

Risk premia are generated by interaction of

- **exposures** of cash flows to risk
- investor **compensations** for these exposures
- e.g., linear factor models

$$E\left[R_t^i - R_t^f\right] = \sum_k \beta_k^i \lambda_k$$

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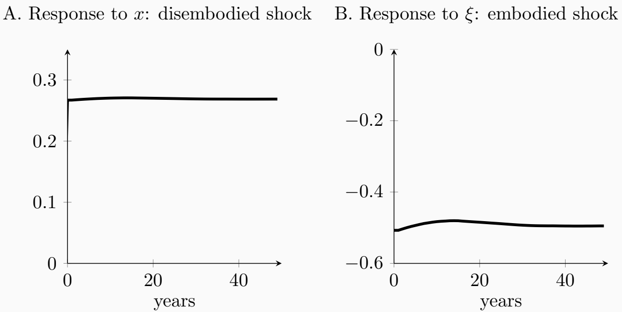
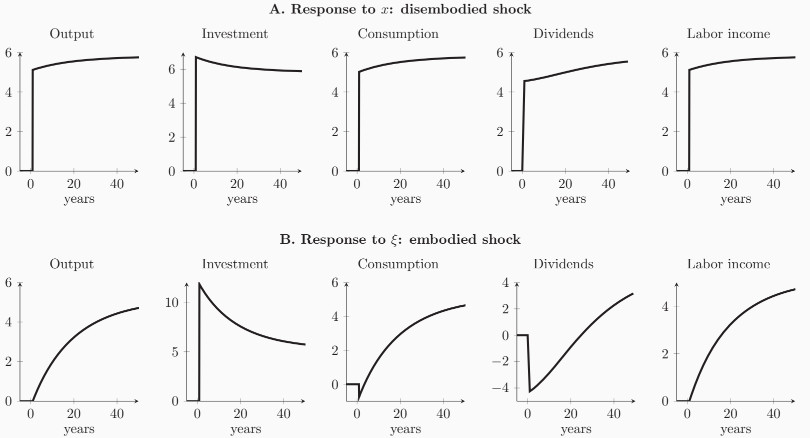
Borovička, Hansen and Scheinkman (2011, 2014)

- **shock-exposure elasticities**: sensitivities of expected cash flows to shocks
- **shock-price elasticities**: compensations per unit of exposure
- functions of cash flow maturity $\implies$ **term structure of risk**

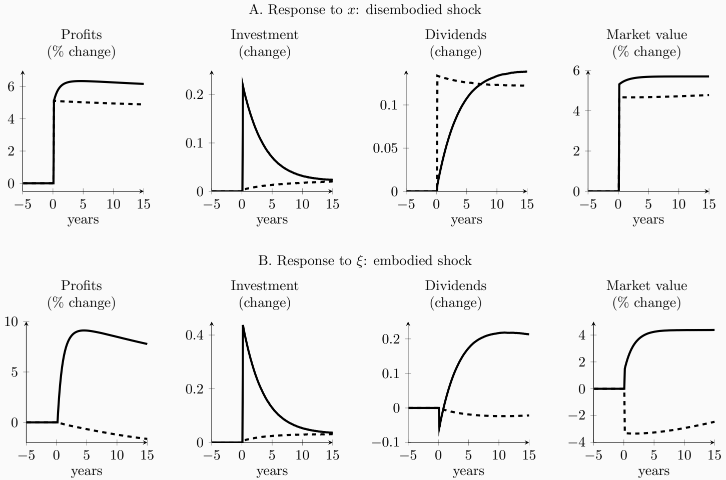


- term structure of risk prices essentially flat
  - frequent outcome under recursive preferences
- slope in term structure of risk premia must arise from shock exposures



- dividend exposure to ξ_t increases, interacting with negative price elasticity
- $\Longrightarrow$ downward sloping term structure of risk premia

SHOCK-EXPOSURE ELASTICITIES AND VALUE PREMIUM



- **growth firms** (solid) less exposed to disembodied shock x_t
- ... and more exposed to the embodied shock ξ_t (negative price!)
- **CAPM failure**: difference mainly in ξ_t (risk premium generated by x_t)

Generating the value premium

- heterogeneous exposures to the embodied shock ξ_t
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Exposure of the SDF to ξ_t

- **aggregate consumption** not sufficiently exposed
  - ξ_t is partly a redistribution shock
- interaction of **uninsurable idiosyncratic shocks** with ξ_t needed
- amplification through **keeping-up-with-the-Joneses** preferences

Median/mean consumption generated by the mechanism

- these households are likely not the innovators
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- median/mean perhaps more related to human capital (job polarization)

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Persistence μ_L of high innovation state and **arrival intensity** λ_H

- strong asymmetry in persistence $\mu_L = 0.283$, $\mu_H = 0.015$
- strong asymmetry in arrival intensity $\lambda_H = 8.588$, $\lambda_L = 0.122$
- support in the data on persistence of growth/value sorting?

QUESTIONS

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Size v market-to-book

- In the model, high k_j firms should have higher expected returns
  - arrival of a new (small) project matters less for a large firm $\implies$ less insurance
- test on the 3-factor model?