Discussion of Bigio and La'O

"Financial Frictions in Production Networks"

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Overview

- Input-output economics is intriguing!
  - Shocks to one sector affect other sectors — a key theme of macro missing from “standard” model
  - Amplification and propagation possibilities...
- I’ve looked at this in the context of development
  - How can distortions get amplified to explain 50-fold income differences across countries?
  - Much easier by comparison for changing distortions to reduce GDP by 2 or 3 pp in a recession!

Outline

- Simple model and intuition for magnitudes
- The “wedges”: interpretation and economic consequences
- Other comments

First point: the “liquidity multiplier”

(a) depends on the I-O structure and is independent of identifying the “financial frictions”

(b) amplifies other shocks as well, not just financial frictions — distortions in one sector will affect other sectors.

Simple Model: Environment

Production of final good $$Y_t = \bar{A} L_t^{1-\sigma} X_t^{\sigma}$$

Resource constraint $$C_t + X_{t+1} = Y_t$$

Utility $$U = \sum_t \beta^t U(C_t, L_t), \quad U(C, L) = \log C - L$$

Notice that X is just like capital with full depreciation.

Simple Model: Equilibrium

- Financial friction: Firms can run away with fraction ϕ of final good

$$wL + pX \leq \phi Y$$

Note: Friction is equivalent to a sales tax: $\phi = 1 - \tau$

- Households "accumulate" and sell intermediate goods to firms

Solution (steady state)

- Intermediate use is proportional to output

$$X = \phi\beta\sigma Y$$

  Amplification: $\downarrow\phi \Rightarrow \downarrow X \Rightarrow \downarrow Y \Rightarrow \downarrow X \Rightarrow \downarrow Y$ etc.

- Plugging into production function ($Y = \bar{A} L^{1-\sigma} X^{\sigma}$):

$$Y = (\phi\beta\sigma)^{\frac{\sigma}{1-\sigma}} \bar{A}^{\frac{1}{1-\sigma}} L$$

  - With exogenous L, effect of distortion depends on $\frac{1}{1-\sigma}$ because of amplification effect:

$$1 + \sigma + \sigma^2 + \ldots = \frac{1}{1-\sigma}$$

  - But only affects σ share of the inputs $\Rightarrow \frac{\sigma}{1-\sigma}$

- With endogenous labor supply, L is affected by ϕ as well, so you get an even bigger effect.

$$L = (1-\sigma)\frac{\phi}{1-\phi\beta\sigma}$$

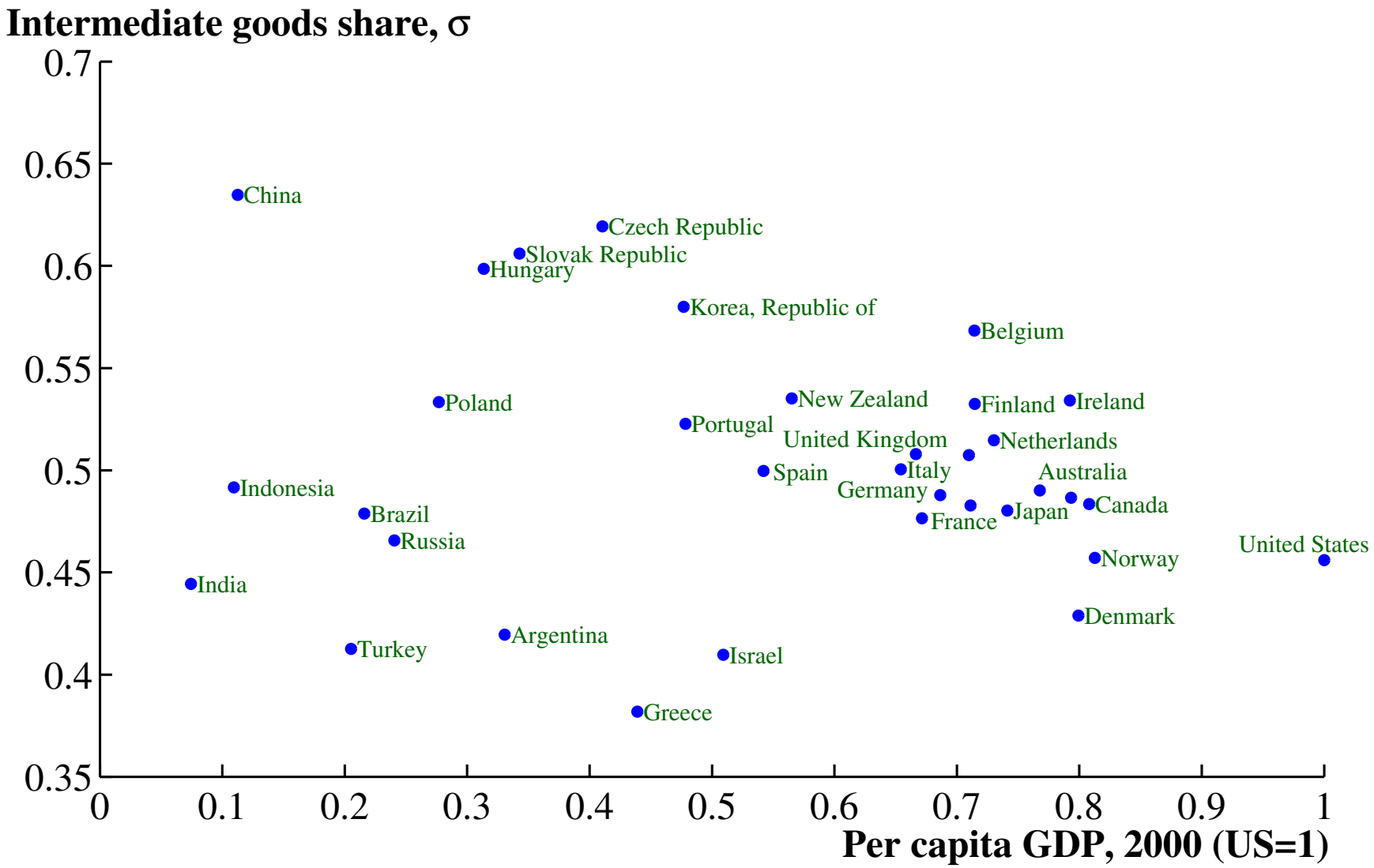
$$\Rightarrow \quad Y = \frac{\phi^{\frac{1}{1-\sigma}} A^{\frac{1}{1-\sigma}}}{1-\phi\beta\sigma}$$

Elas wrt ϕ is larger than $\frac{1}{1-\sigma}$!

- Evidence (next slide): $\sigma \approx 1/2 \Rightarrow \frac{1}{1-\sigma} \approx 2$

  – Extent of LM $>$ 2 depends on labor supply elasticity...

Evidence on the Intermediate Goods Share, σ



Richer Model

- Long and Plosser (1983): Input-output model
  - Each sector uses all others as an input
  - Let $W \equiv N \times N$ matrix of IG exponents (σ_{ij}).
  - Cobb-Douglas $\Rightarrow$ log-linear $\Rightarrow$ elegant solution
- Liquidity multiplier $\sim$ the Leontief inverse (Prop 10):

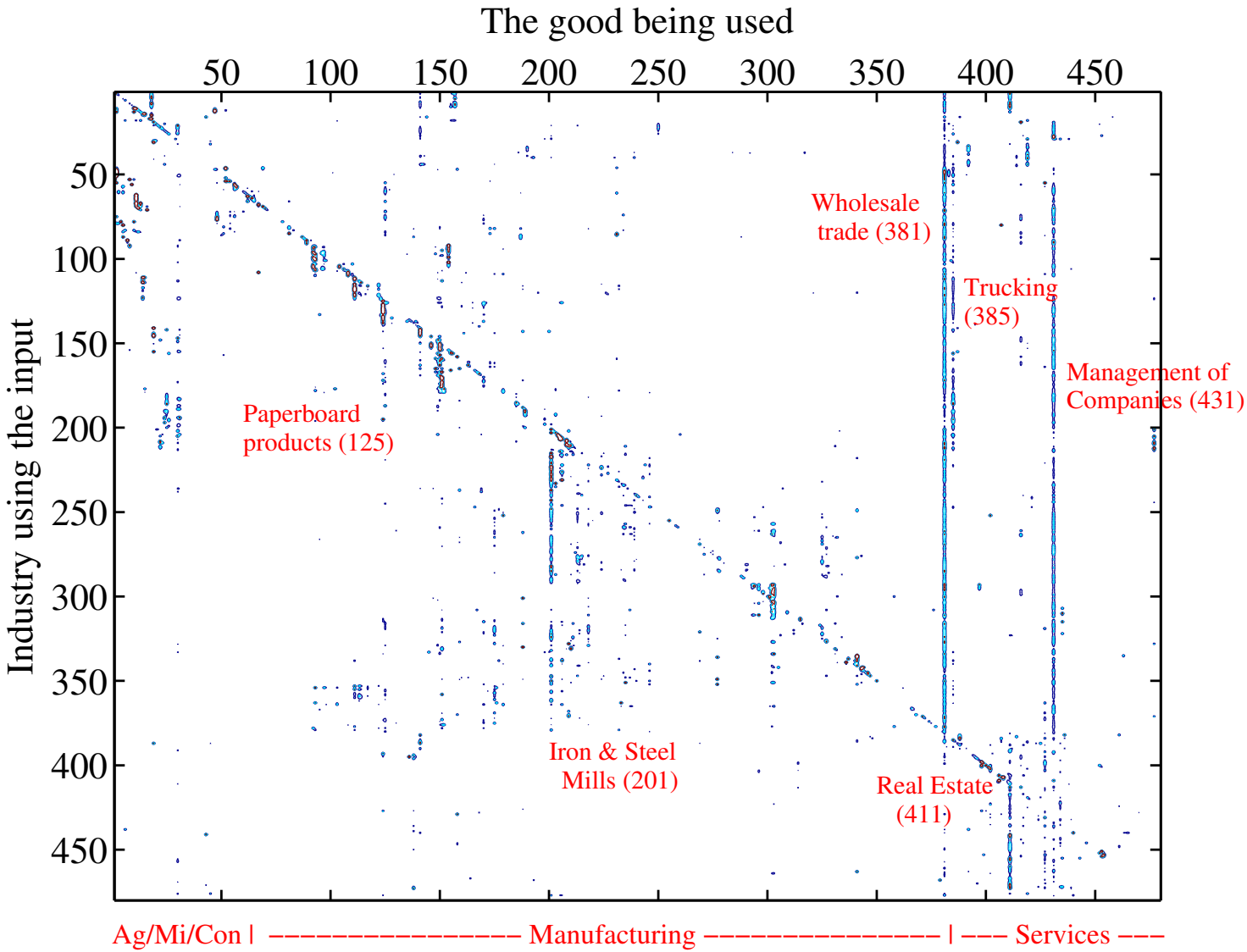
$$(I - W)^{-1}$$

- Matrix version of $1/1 - \sigma$! Can be formalized (Jones 2011)

  If all sectors have the same cumulative exponent $\sigma_i \equiv \sum_j \sigma_{ij} = \bar{\sigma}$ on intermediates, regardless of composition, then LM with fixed labor is

$$\beta'(I - W)^{-1}\mathbf{1} = \frac{1}{1 - \bar{\sigma}}$$

σ_{ij} for the U.S. in 1997 (480 industries)



The sectors with the largest multipliers

	Mutliplier	β_i
General government	0.115	0.112
Real estate	0.094	0.051
Wholesale trade	0.091	0.057
Retail trade	0.061	0.052
Owner-occupied dwellings	0.059	0.058
Management of companies	0.056	0.027
Monetary/depository authorities	0.042	0.029
Telecommunications	0.036	0.018
Advertising	0.032	0.011
Power generation	0.030	0.017

The sectors with the largest “excess” multipliers

	“Excess” multiplier Mult - β_i	Mutliplier	β_i
Real estate	0.043	0.094	0.051
Wholesale trade	0.034	0.091	0.057
Management of companies	0.029	0.056	0.027
Advertising and related	0.020	0.032	0.011
Telecommunications	0.018	0.036	0.018
Oil and gas extraction	0.014	0.018	0.004
Power generation	0.013	0.030	0.017
Monetary/depository	0.013	0.042	0.029
Truck transportation	0.012	0.022	0.010
Legal services	0.011	0.024	0.013

The ϕ_i wedges: interpretation and magnitudes

Are the "wedges" financial frictions?

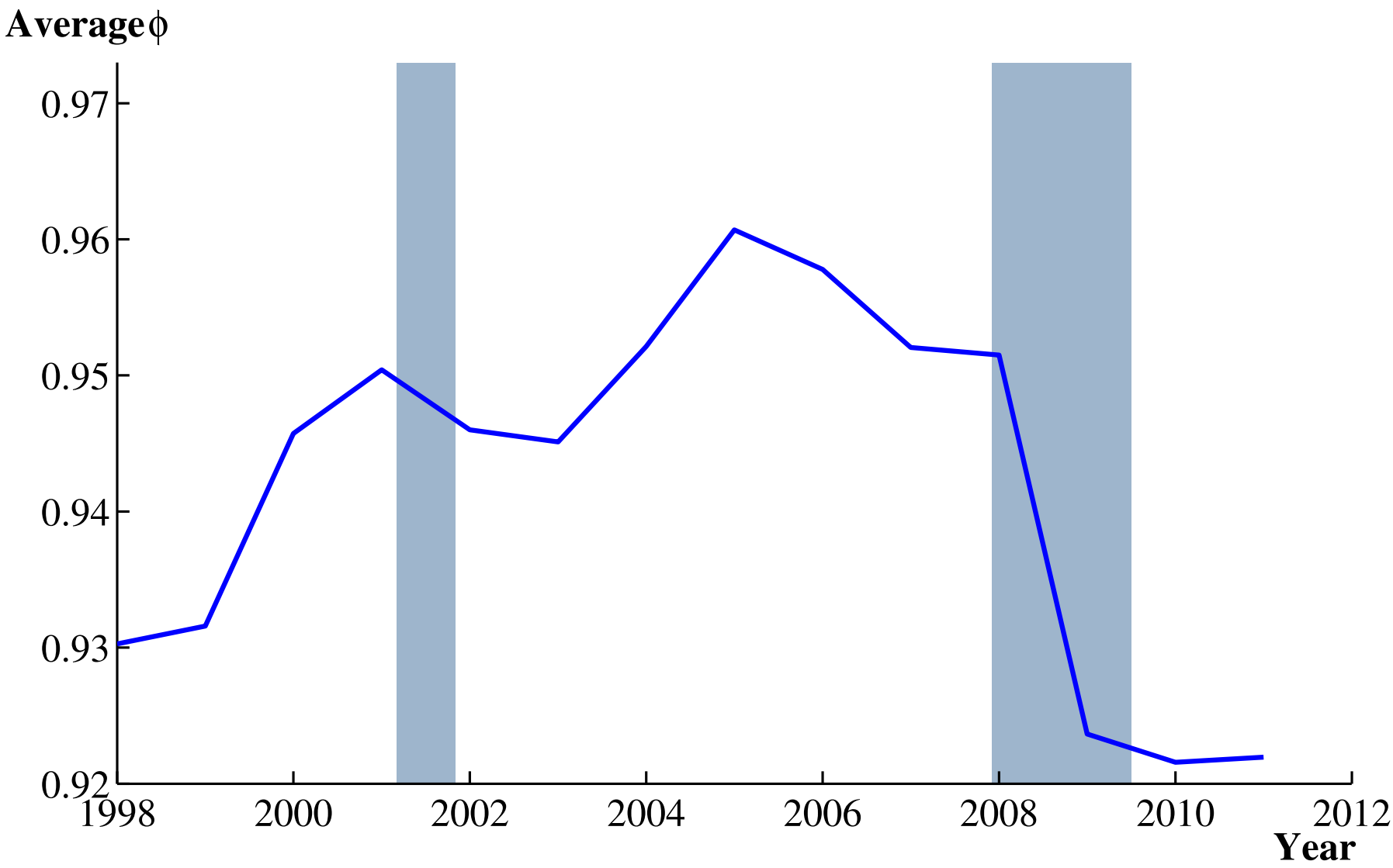
- ϕ_i = Labor+Intermediate "wedge" (wedges between the MPs of labor/intermediates and their prices).

$$\phi_i = \frac{\text{Share of revenue spent on labor and intermediates}}{\text{Production function elasticity, } \alpha_i}$$

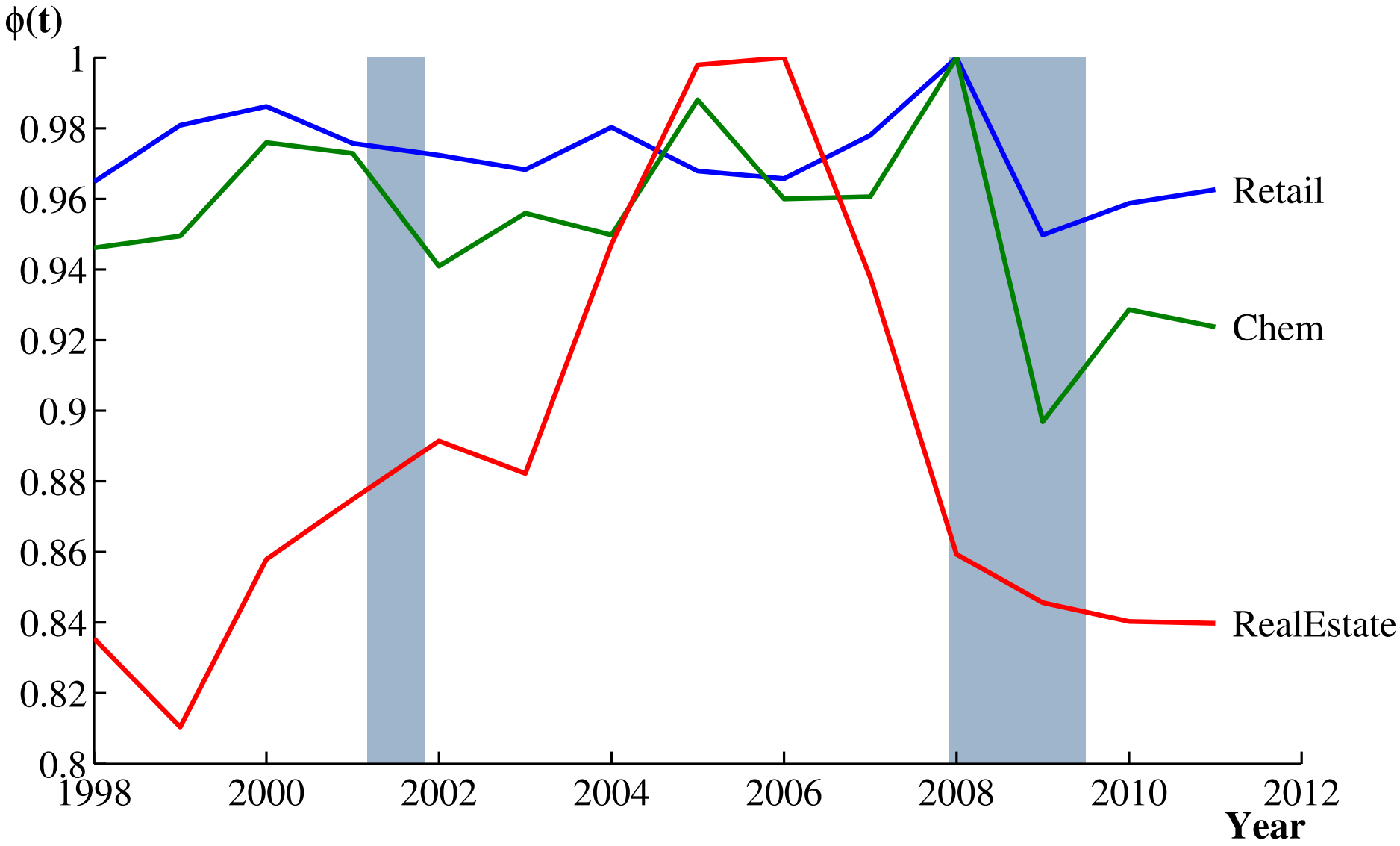
  - Not clear that these are financial frictions
  - Multiplier amplification applies regardless of source.

- They tend to focus on "What effect would a common proportional change in ϕ in all sectors have on GDP?"
  - Also interesting: "What effect did the actual movements in ϕ_i in the data have on GDP?"

Average wedge, $\phi(t)$



Wedges in select sectors



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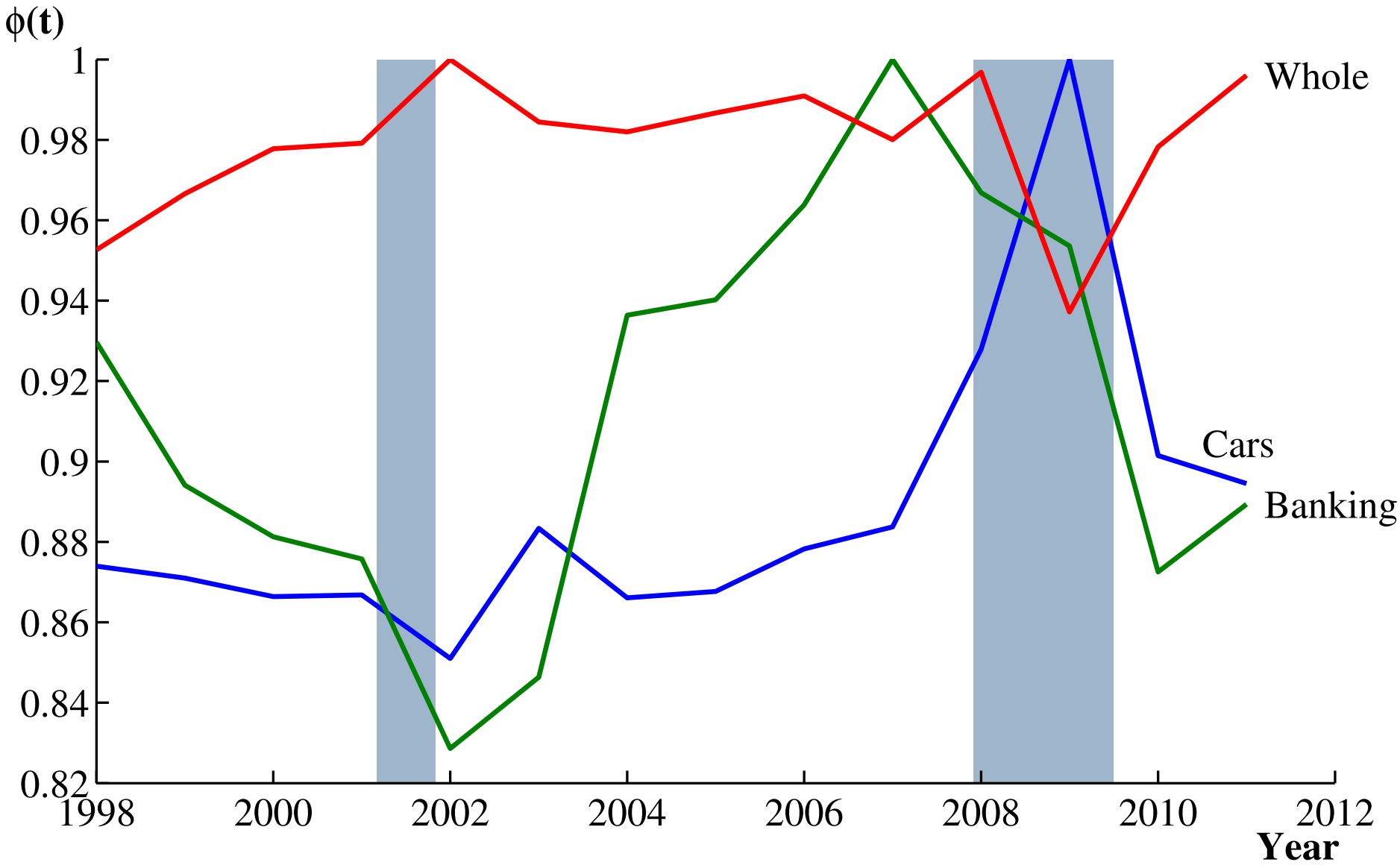


What about static misallocation?

- Maybe the dispersion of the ϕ across sectors increased sharply?
- Yes! See figure next slide.
- Magnitude
  - If lognormal frictions, then log output falls like

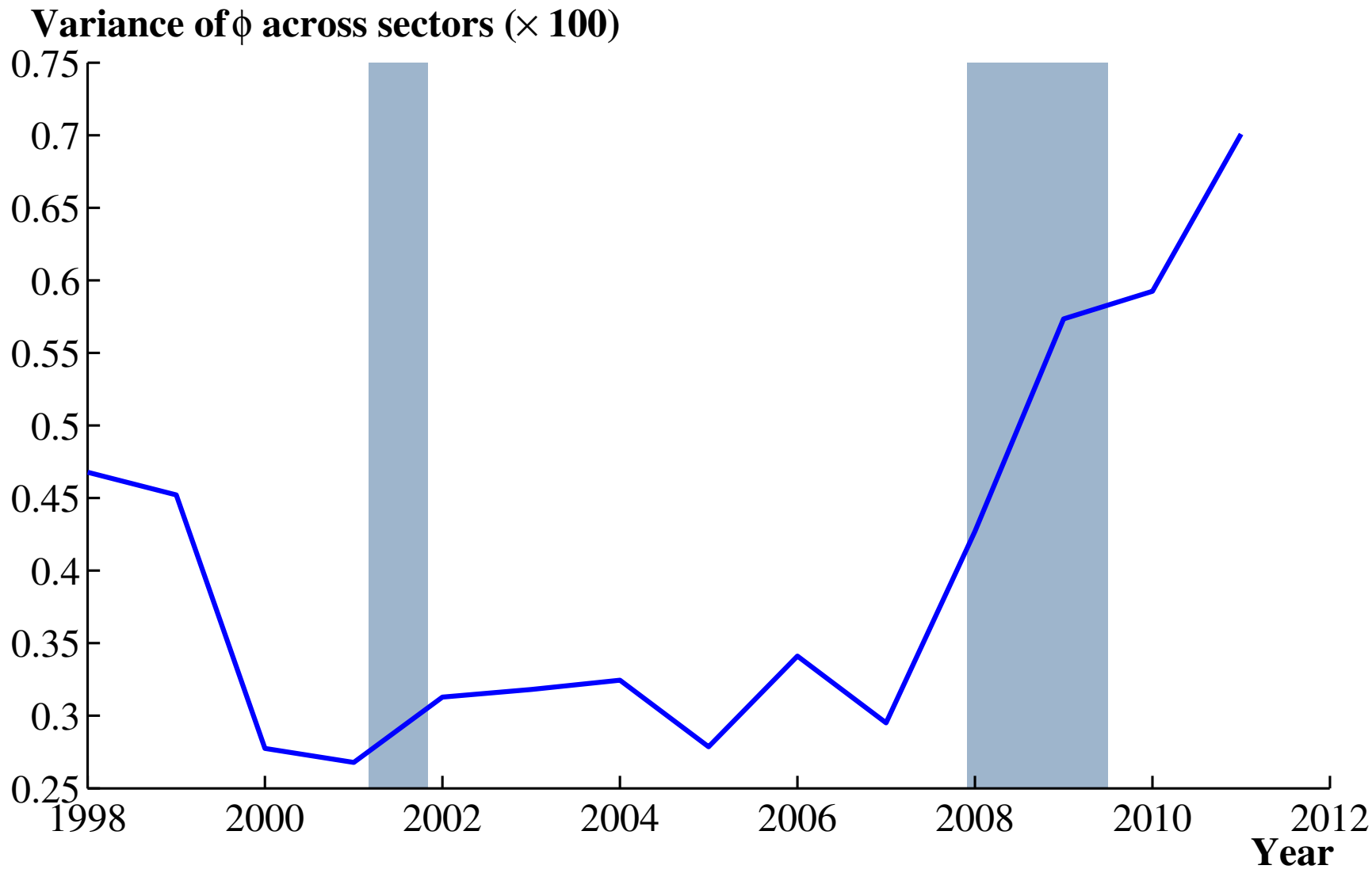
$$\frac{1}{2} \cdot \frac{1}{1-\sigma} \cdot \text{Variance}$$

$\Rightarrow$ Approximately the change in variance $\approx$ 0.4.

Implies a 0.4 percentage point decline in output

  - Calculate exactly using linear algebra...
  - Misallocation across firms within a sector as well?

Did (static) misallocation rise? (variance of ϕ)



Average ϕ and Fernald's TFP index

Additional Comments

- Odd to have no capital in a model of financial frictions...
- Dynamics: Intermediate goods are another form of capital — raise the share of produced factors and will increase persistence of shocks as well?
- Standard wedge criticism: these are reduced form impacts of a set of underlying structural shocks that are correlated across sectors. Can you recover the structural shocks?
  - There are other structural shocks besides financial frictions
  - Financial frictions may affect economy in ways beyond labor wedge?
- Can you trace a well-identified ("case study") shock through the input-output matrix?

Promising area of research!