A Theory of Business Transfers

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Motivation

- Privately-owned firms
  - Account for 1/2 of US business net income
  - Relevant for growth, wealth, tax policy/compliance
- But pose challenge for theory and measurement

Meeting the Challenge

- Propose theory of firm dynamics and capital reallocation
  - Add transfers to model of firm dynamics
  - Add self-created intangibles as productive capital
- Use administrative IRS data to discipline theory

Today: 3 Main Take-aways

- IRS data make study of business transfers possible
- New theory is needed to analyze these data
- Theory provides insights for tax policy/administration

IRS data make study of business transfers possible

Business Transfers are Taxable Events

- Seller and buyer both report sale
  - Seller has to pay capital gains
  - Buyer has to report depreciable assets
- Price allocated across asset types
  - Seller wants to allocate to long-term
  - Buyer wants to allocate to short-term

$\Rightarrow$ Conflicts of interest and thus consistent reporting

What Do Filings Reveal?

- Transferred assets are primarily intangible
  - Customer bases and client lists
  - Non-compete covenants
  - Licenses and permits
  - Franchises, trademarks, tradenames
  - Workforce in place
  - IT and other know-how in place
  - Goodwill and on-going concern value
  - Consulting contracts during transition
- Transferred assets are sold as a group

What Else Do We Use?

- From other tax filings before/after sale
  - Characteristics and business filings for buyers/sellers
  - Characteristics and individual filings for all owners
- From brokered sales
  - Time between listing and sale

New theory is needed to analyze these data

New Theory

- Model of firm dynamics with self-created intangibles
  - **Indivisible and nonrentable** capital
  - **Bilaterally-traded** assets making up business
  - **Requiring time** to find buyers/negotiate allocations

$\Rightarrow$ Adds intangible investment and transfers to Hopenhayn

Environment: A Helicopter View

- Infinite horizon with continuous time
- Business type indexed by $s = (z, \kappa)$
  - z: non-transferable capital/owner productivity
  - κ: transferable and accumulable capital
- Key decisions for owners
  - Production
  - Investment
  - Transfers

Production

- Technology:

$$\begin{aligned} y(s) &= \max_n y(s,n) \\ &\equiv \max_n \hat{z}(s)\kappa(s)^{\hat{\alpha}} n^{\gamma} - wn \\ &\equiv z(s)\kappa(s)^{\alpha} \end{aligned}$$

  where

  - $\hat{z}$: non-transferable capital/owner productivity
  - κ: transferable and accumulable capital
  - n: all external rented factors

- *Idea*: $\hat{z}$ is owner-specific, κ is self-created intangibles

Firm Dynamics, $s \to s'$

- Entry $\to (z, \kappa)$
- Shocks to productivity $z \to z'$
- Investment $\kappa \to \kappa'$
- Capital transfer $\kappa \to \kappa'$
- Exit $(z, \kappa) \to$

Firm Dynamics: Some notation

- Entry and exit:

$$\begin{aligned} G(s) &= \text{initial distribution of type} \\ c_e &= \text{entry cost} \\ \delta &= \text{exit rate} \end{aligned}$$

- Shocks to productivity:

$$dz = \mu(z)dt + \sigma(z)d\mathcal{B}$$

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Note: just standard Hopenhayn so far

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Next: add self-created intangibles and transfers

Firm Dynamics: Build or Buy Capital?

- Given decreasing returns to scale

$\Rightarrow$ Owners build to optimal size through

  - Internal investment or
  - Business transfers

Firm Dynamics: Build or Buy Capital?

- Investment: $d\kappa = \theta - \delta_\kappa$ with convex cost $C(\theta)$
- Transfers between s, $\tilde{s}$:
  - Bilateral meeting rate: η
  - † Allocation: $\kappa^m(s, \tilde{s}) \in \{\kappa(s) + \kappa(\tilde{s}), 0\}$
  - Price: $p^m(s, \tilde{s})$

† More general specifications also explored

Adding it up: Owner's Value

$$(r+\delta)V(s) = \underbrace{\max_n \; y(s,n)}_{\text{production}} + \underbrace{\mu(z)\partial_z V(s) + \frac{1}{2}\sigma^2(z)\partial_{zz}V(s)}_{\text{shocks to productivity}}$$

$$+ \underbrace{\max_\theta \; \partial_\kappa V(s)(\theta - \delta_k) - C(\theta)}_{\text{investment}} + \underbrace{\max_\lambda \eta W(s;\lambda)}_{\text{transfer}}$$

where expected gain from transfer is:

$$W(s;\lambda) = \sum_{\tilde{s}} \left\{ V([z, \kappa^m(s,\tilde{s})]) - V(s) - p^m(s,\tilde{s}) \right\} \underbrace{\lambda(s,\tilde{s})}_{\substack{\text{Partner} \\ \text{Distribution}}}$$

Closing the Model

- Free entry condition

$$\int V(s) dG(s) \leq c_e$$

where measure of entrants is $\phi_e(s) = mG(s) > 0$

- Evolution of types:

$$\dot{\phi} = \Gamma(\theta, \lambda; \phi) + \phi_e$$

induced by drivers of firm dynamics

Recursive Equilibrium

$$\text{Objects: } \{ \underbrace{V,}_{\substack{\text{value}\\\text{function}}} \underbrace{\kappa^m, p^m, \theta, \lambda,}_{\substack{\text{policy}\\\text{functions}}} \underbrace{\phi, \phi_e,}_{\text{measures}} \underbrace{w}_{\text{wage}} \}$$

that satisfy

1. business owners' optimality
2. market clearing
3. consistency of measures

- Can solve dynamic program iteratively
  - Update: $(\phi, V) \to$ static planner $\to (\phi, V)$

Properties of Equilibrium

- Competitive allocations maximize

  $\int e^{-rt} \sum_s [y(s) - C(\theta(s,t)) - m(t)c_e]\phi(s,t)dt$

  $\Rightarrow$ achieves efficiency

- Competitive prices independent of z

  $p^m(s,\tilde{s}) = \mathcal{P}(\kappa(\tilde{s}))$

  $\Rightarrow$ same good sold at same price

- Bilateral trades are pairwise stable

  $\nexists$ feasible trade for $(s,\tilde{s})$ making pair strictly better off

Model Predictions

- Who trades with whom?
- What are the terms of trade?
- What is the implied dispersion in MPKs?
- How do financing constraints affect predictions?

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Let's simulate the model and find out...

Model Parameters

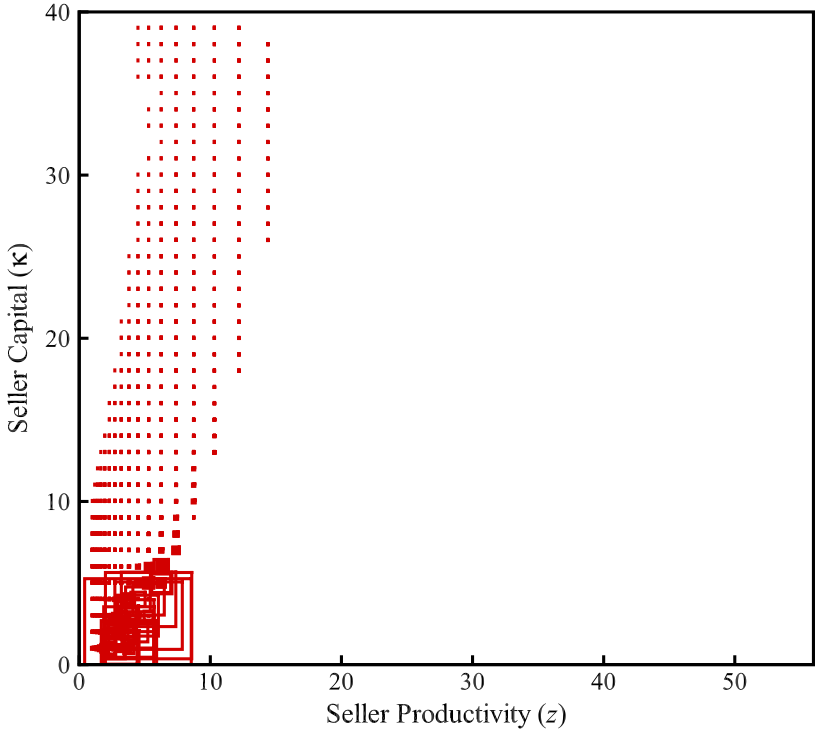
Description	Values
Returns to scale	$\alpha = 0.5$
Discount rate	$r = 0.06$
Investment cost†	$A = 20, \rho = 2.0$
Productivity	$\mu = 0, \sigma = 0.25$
Entrant distribution	mass at $z = z_0, \kappa = 1$
Death rate	$\delta = 0.10$
Depreciation rate	$\delta_\kappa = 0.058$
Bilateral meeting rate	$\eta = 0.40$

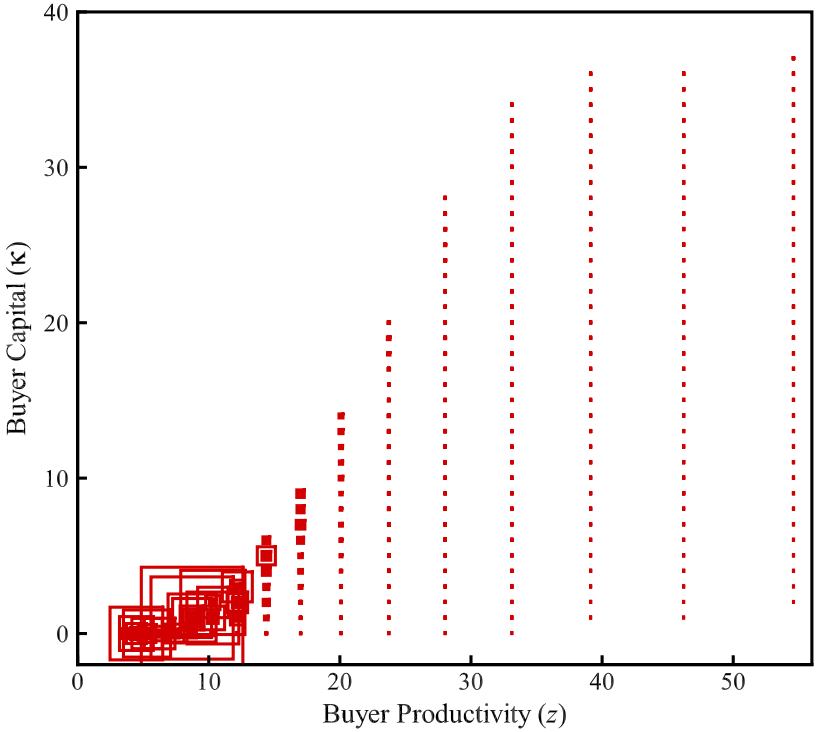
† $C(\theta) = A\theta^{\rho}$

How are Key Parameters Identified?

- Key parameters
  - Meeting rate η
  - Investment costs $C(\theta) = A\theta^{\rho}$
  - Returns to scale in $y = z\kappa^{\alpha}$
- Key moments from IRS (8594 and annual filings)
  - Frequency of business transfers
  - Growth in business net income
  - Quantile regressions of y on $\mathcal{P}$

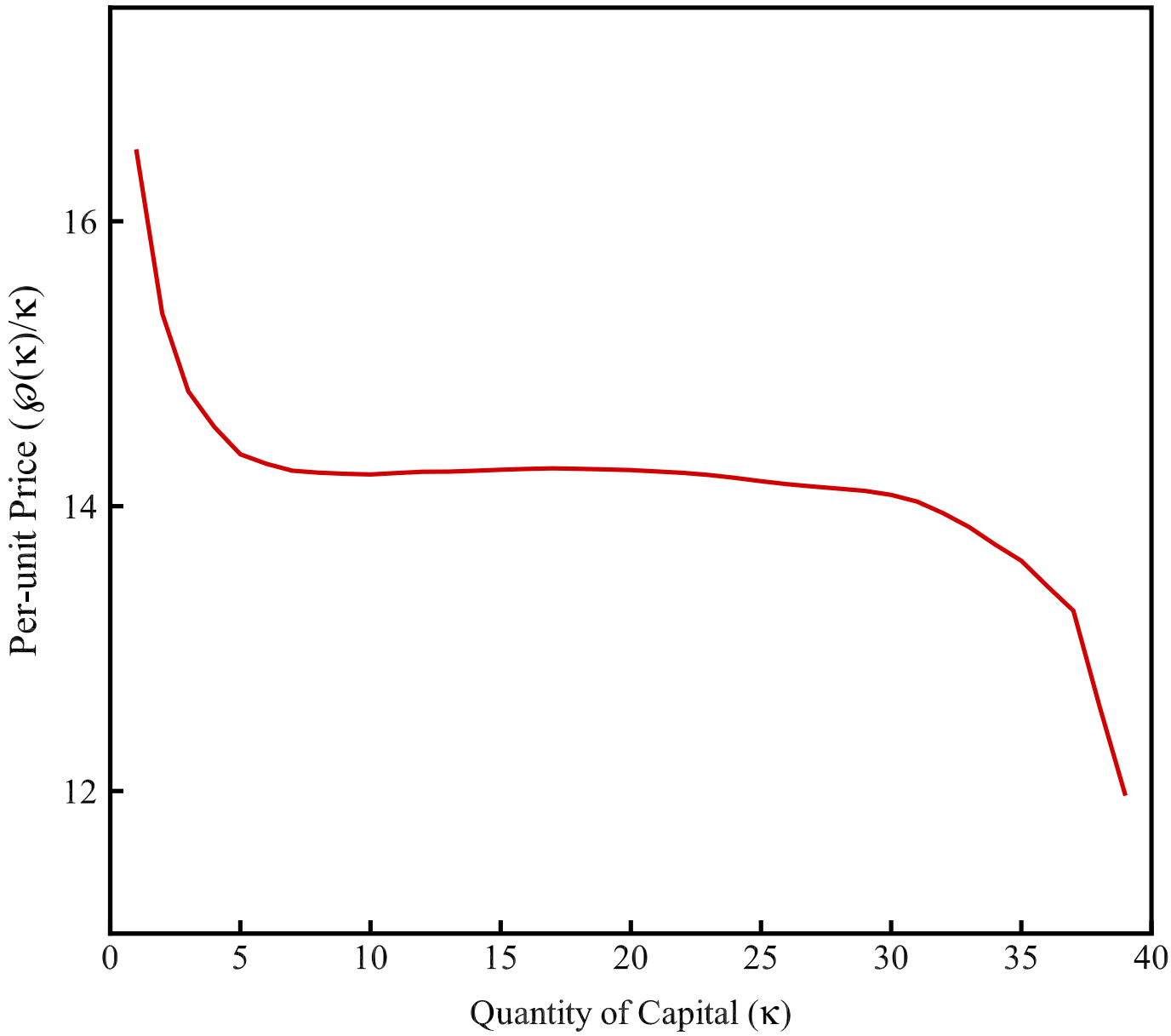
Who Trades with Whom?





- Size of square proportional to number of transactions
- Shows capital trading upward in MPK sense
- Suggests that unit prices would be higher at low κ

What are the Terms of Trade?



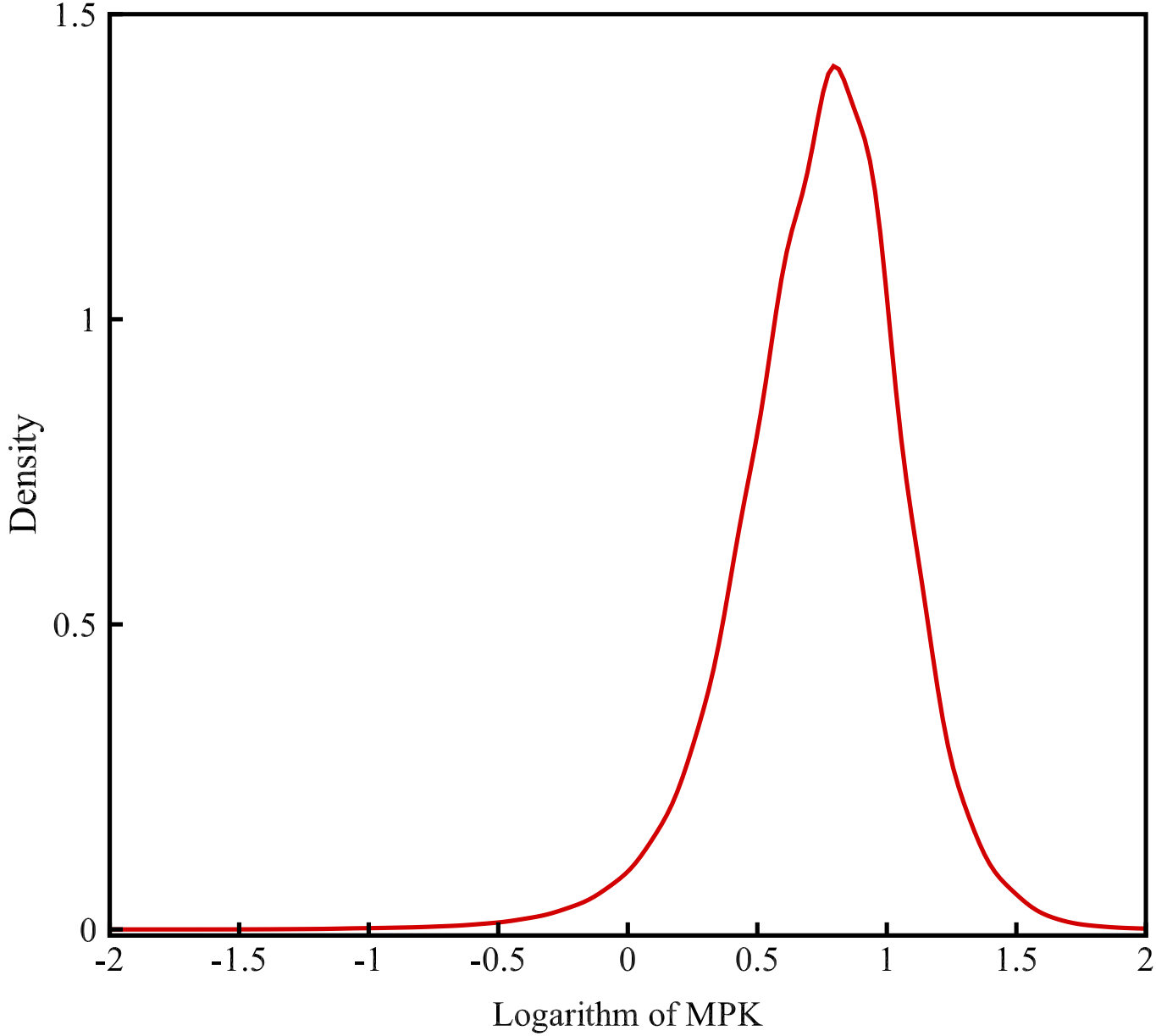
What is the Implied Dispersion in MPKs?

- Compare to "misallocation" literature benchmark
  - Divisible versus indivisible capital
  - Rental versus no rental markets
- Compute *first-best*:

$$\kappa^{FB}(s) \in \text{argmax} \int z(s)[\kappa^{FB}(s)]^{\alpha}\phi(s)ds$$

$$\int \phi(s)\kappa^{FB}(s)ds = \int \phi(s)\kappa(s)ds$$

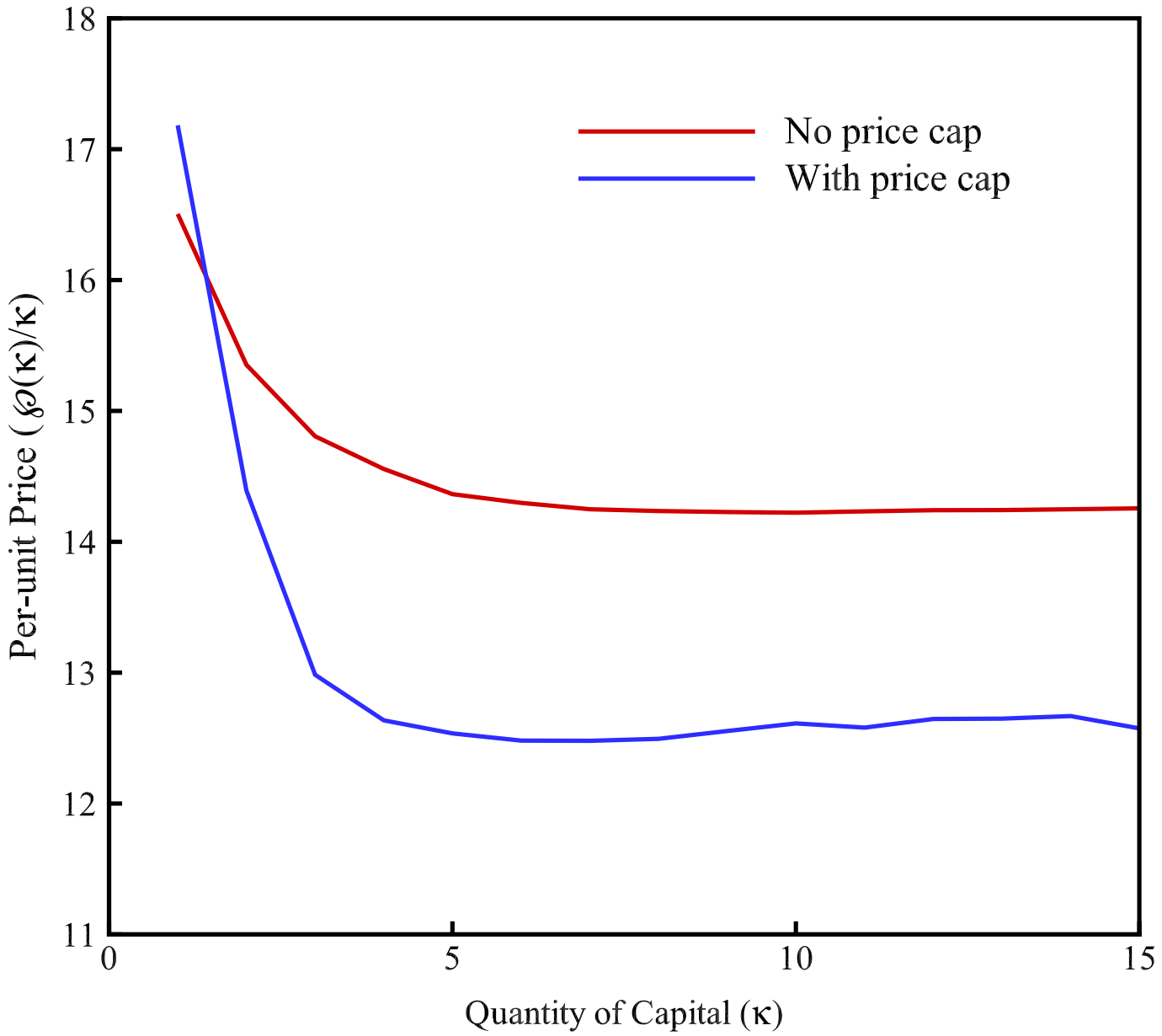
Dispersion in MPKs



Predictions with Financing Constraints

- Add constraint: $p^m \leq$ year's income
- Main effects:
  - No sales with small buyers
  - Large drop in price for big-κ sales

Predictions with Financing Constraints



Theory provides insights for tax policy/administration

Taxing Self-Created Intangible Capital

- Most value in business is κ
- How is it taxed?
  - Income taxes on business owner
  - Capital gains taxes on realized gains
  - Biden proposal: taxes on unrealized gains
- What is the implied tax incidence?

Taxing Capital Gains

- Relevant input to analysis is business wealth
- Three different concepts:
  - Price if sold business today
  - Present value of owner dividends
  - Capitalized income

$\Rightarrow$ All have model counterparts

Taxing Capital Gains

- Relevant input to analysis is business wealth
- Three different concepts:
  - Price if sold business today, $\mathcal{P}(\kappa(s))$
  - Present value of owner dividends, $V(s)$
  - Capitalized income, $\hat{V}(s) = y(s)/$ constant R

$\Rightarrow$ All have model counterparts

Estimating Business Wealth

Distribution Percentile	Transferable Share $\mathcal{P}(\kappa(s))/V(s)$	Income Yield $[y(s) - C(\theta(s))]/V(s)$
5	0.00	−0.16
25	0.25	0.06
50	0.37	0.09
75	0.50	0.12
95	0.68	0.13
99	0.82	0.15

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- Two insights:
  - $\mathcal{P}/\mathcal{V}$ large: relevant for tax elasticities
  - $(y - C)/V$ dispersed: relevant for capitalizing income

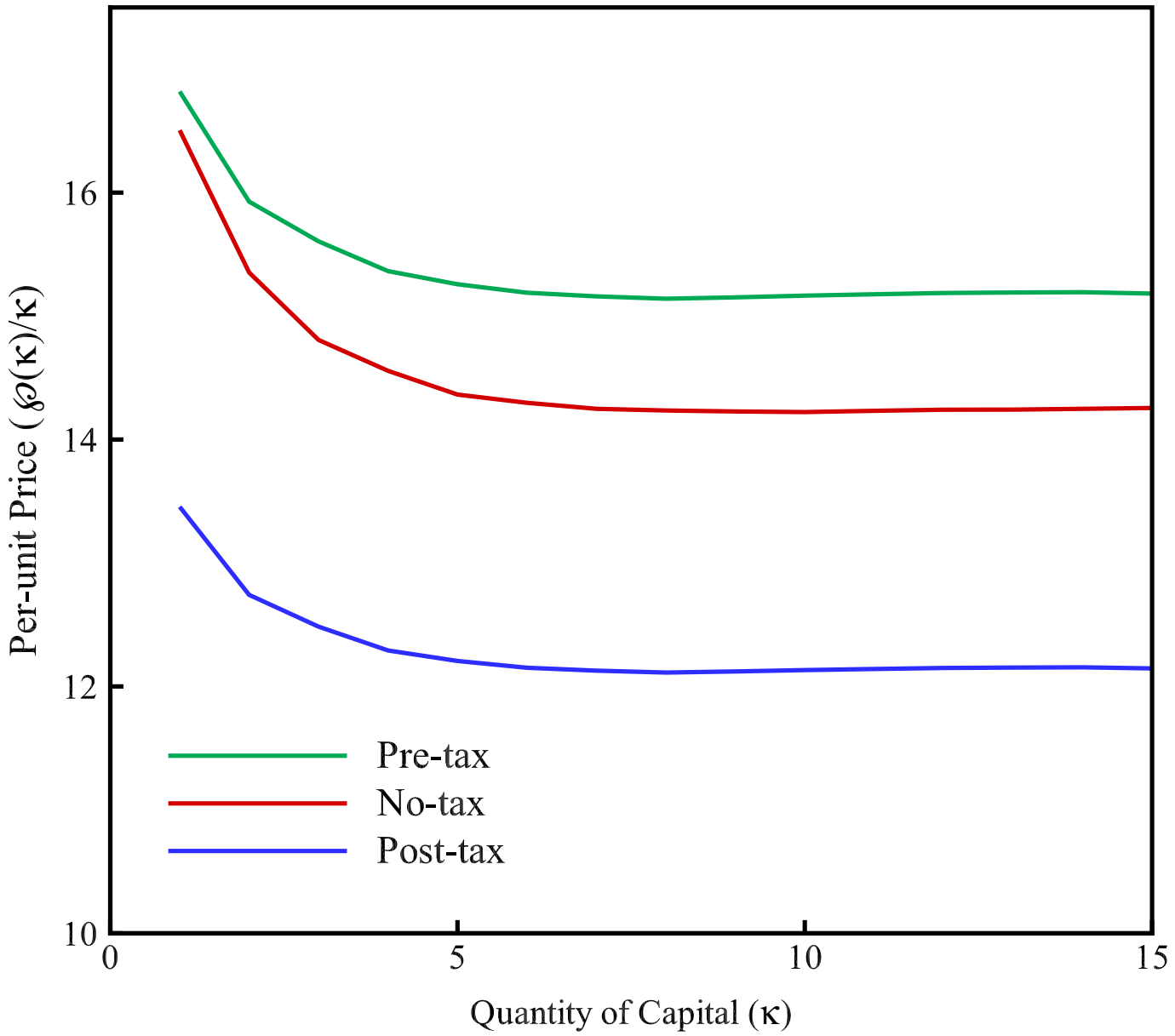
Incidence When Taxing Realized Gains

- Introduce tax τ on realized gains
  - Seller receives $(1-\tau)p^m(s,\tilde{s})$
  - Government receives $\tau p^m(s,\tilde{s})$
- Positive tax base due to κ (not in Hopenhayn)

Effects of Tax

- Fewer trades (obvious)
  - Tax eliminates trades where gains are small
- Lower investment and entry (obvious)
  - Tax introduces lock-in effect
- Heterogeneity in tax incidence
  - Nonmonotonic in size of business sold
  - Larger on seller for small and large quantities

Heterogeneity in Tax Incidence



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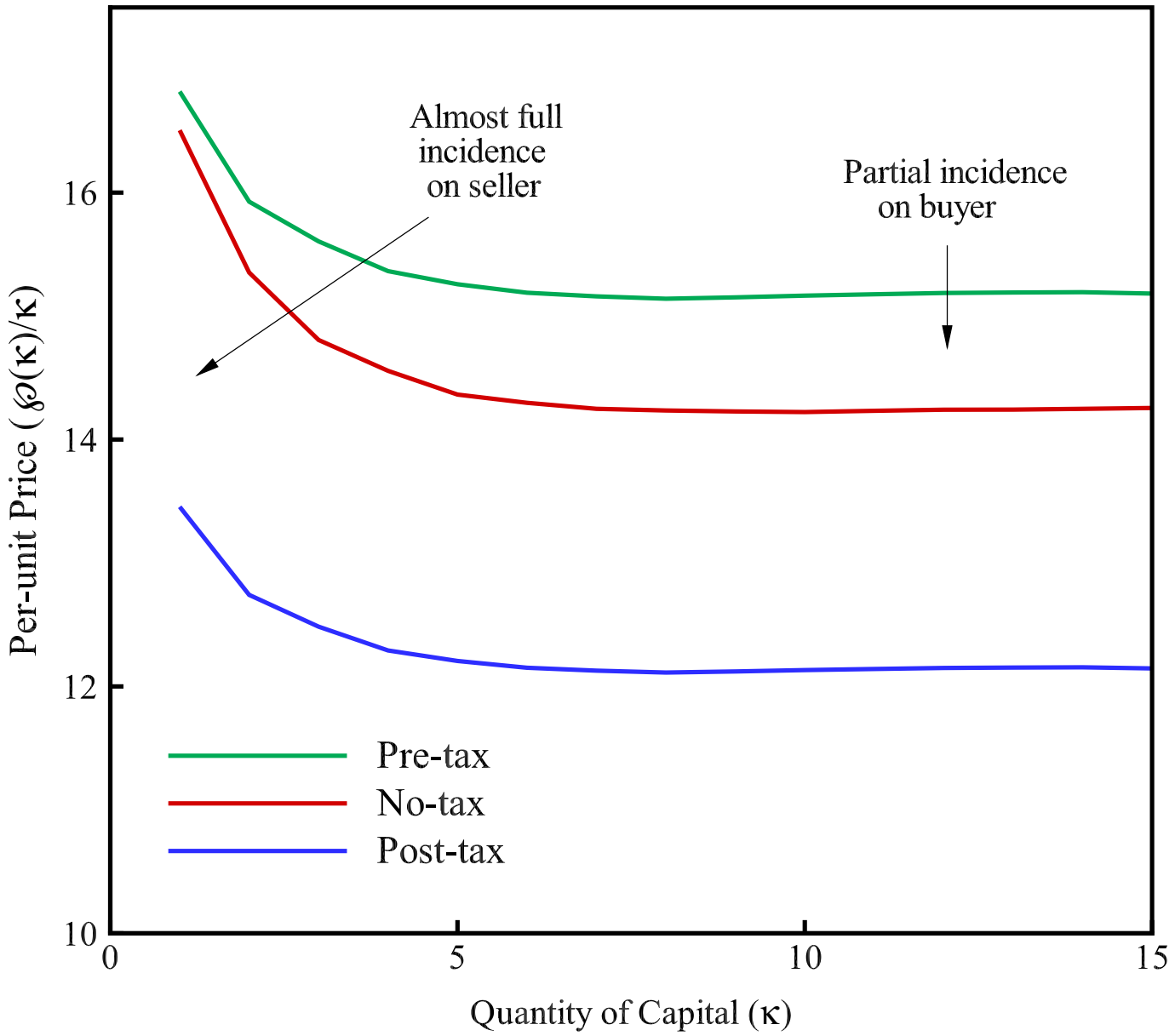

Recap

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- New theory is needed to analyze these data
- Theory provides insights for tax policy/administration