Why Has the Financial Sector Grown so Much? The Role of Corporate Finance.

Thomas Philippon
New York University, NBER and CEPR

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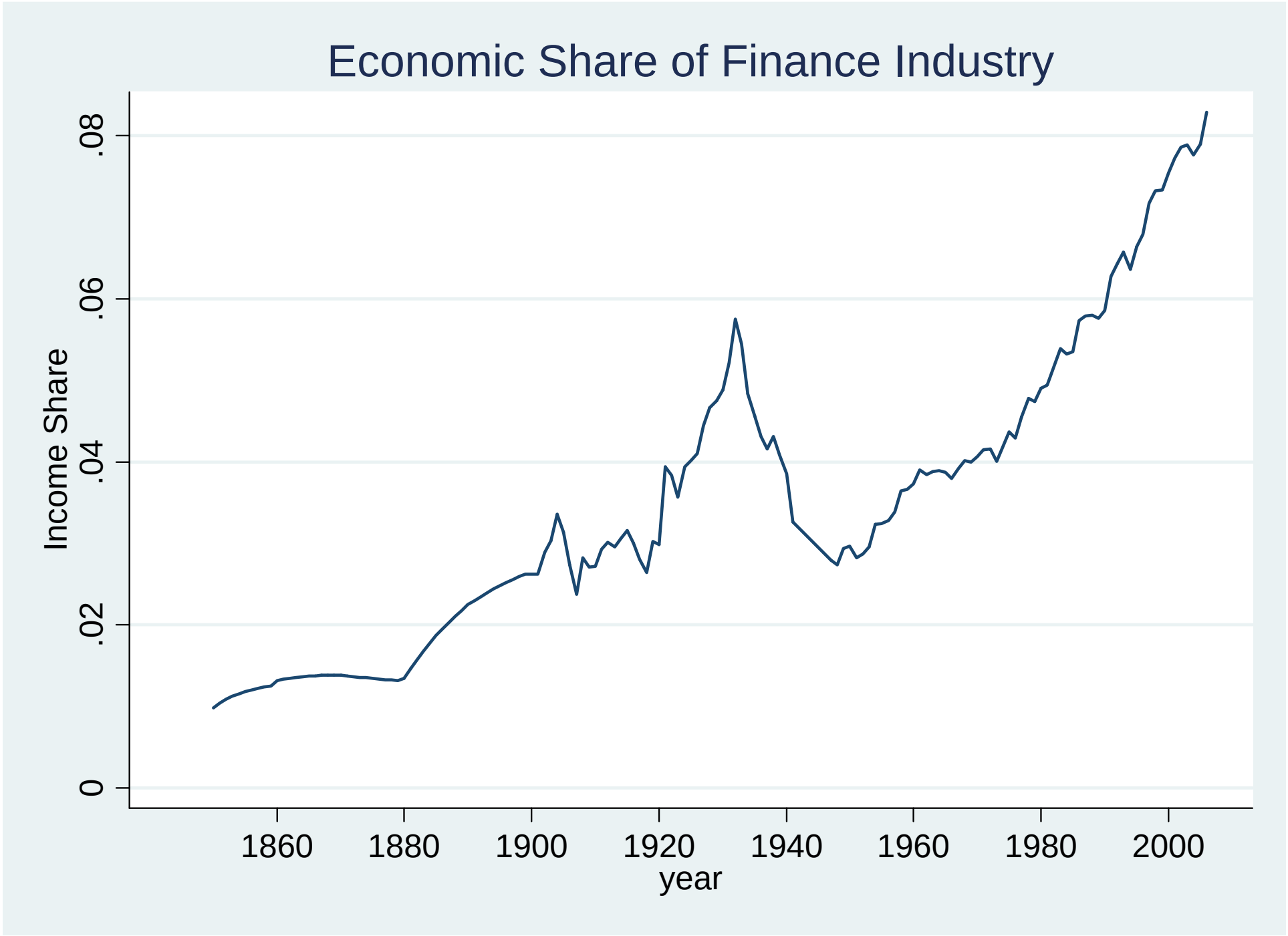
Economic Share of Finance Industry
Income Share
0
.02
.04
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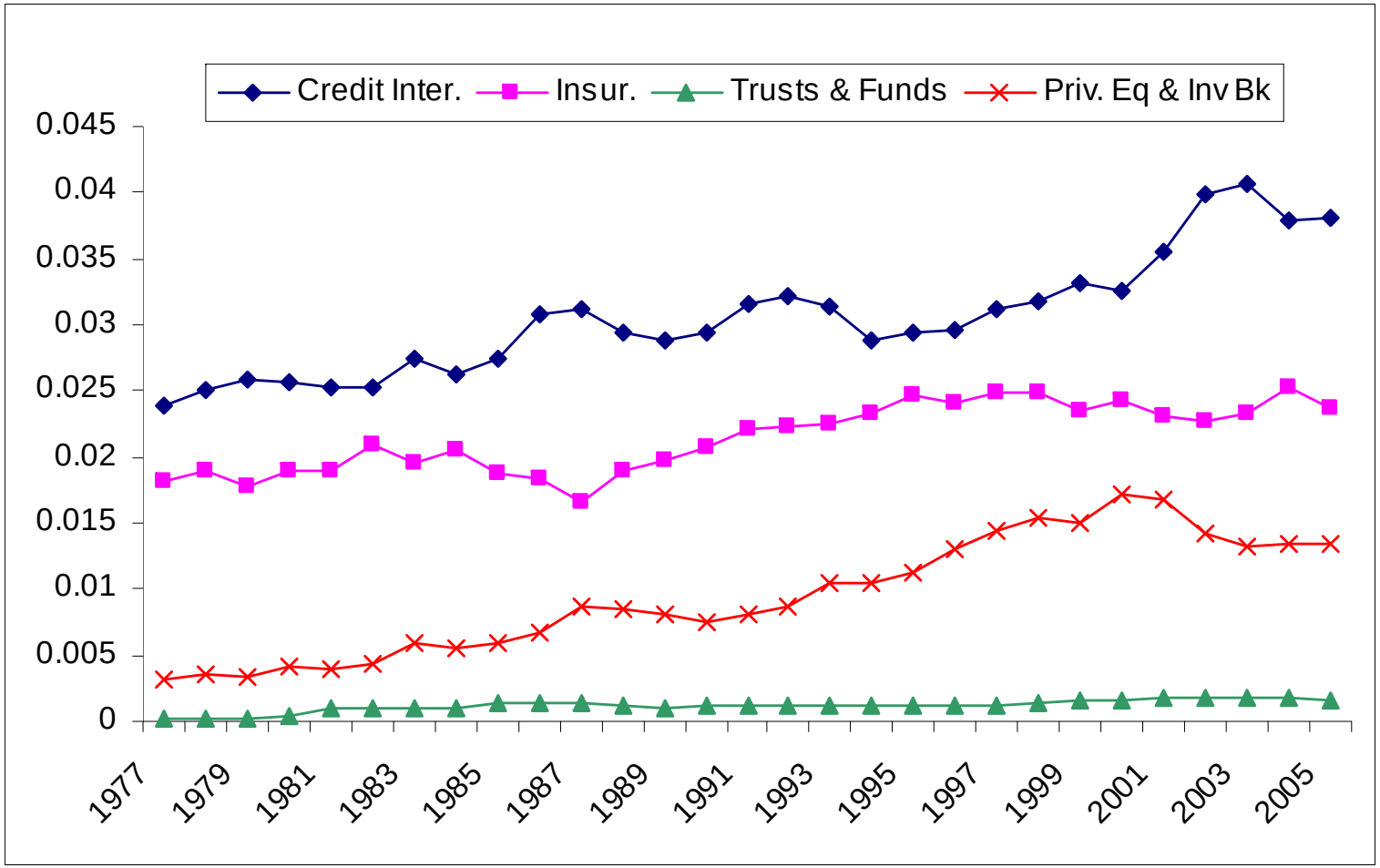
1860
1880
1900
1920
1940
1960
1980
2000
year

Within finance

- Subsectors
  - Shares of GDP (fig 2)
  - Value added vs. assets under management (fig 3)

Figure 2: GDP Shares of Finance Industries

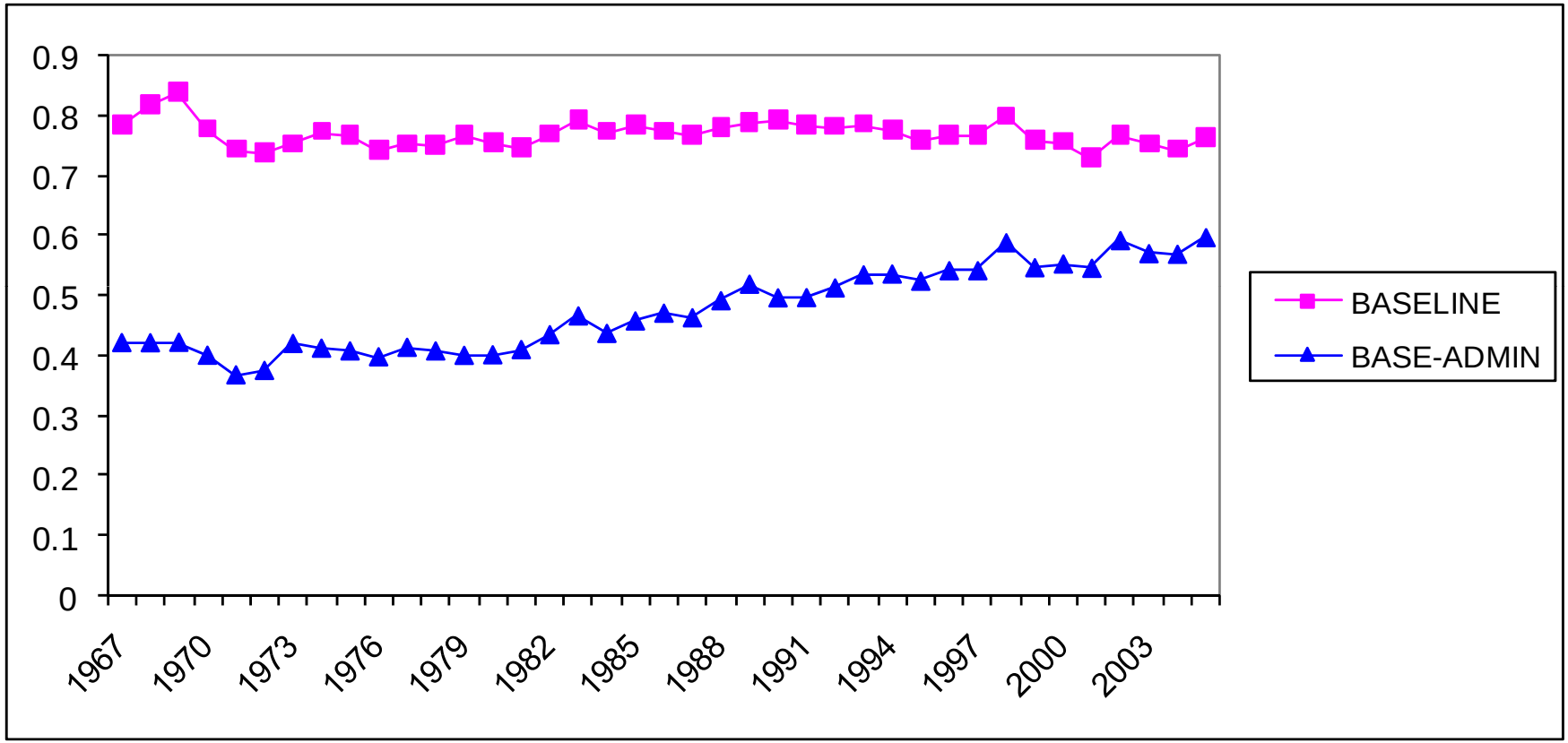


Source: U.S. Annual Industry Accounts, Bureau of Economic Analysis

Within finance

- Subsectors
  - Shares of GDP (fig 2)
  - Value added vs. assets under management (fig 3)
- Functional analysis:
  - A trader is a trader
  - tasks performed vs. industry classification (fig4)

Finance Activity related to Corporate Finance.



Within finance

- Subsectors
  - Shares of GDP (fig 2)
  - Value added vs. assets under management (fig 3)
- Functional analysis:
  - A trader is a trader
  - tasks performed vs. industry classification (fig4)
- Bottom line: importance of corporate finance and credit intermediation

Potential explanations

- Globalization
  - Financial globalization starts later
  - Not highly correlated over long period
  - U.S. financial sector is not a large exporter (unlike UK)
- Finance is special ...empirically
  - Different from rest of service industry (see health care in Table 1)
- Finance is special...theoretically
  - Elasticity of substitution not applicable
  - Growth. Neither in theory nor in practice

Taking stock

- Importance of Finance in the economy varies a lot
  - Why? Types of growth?
- Look for an explanation inside the domestic corporate non financial sector
  - Fundamental determinants of finance share of income?
- Need a model to organize the data
  - Explicit role for financial intetmediation
  - Career choice & general equilibrium

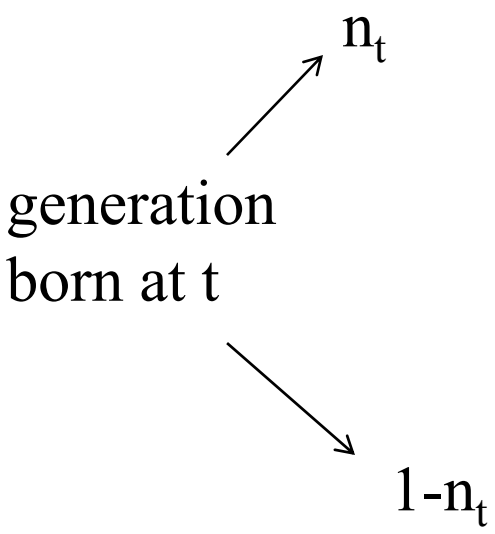
Technology and Preferences

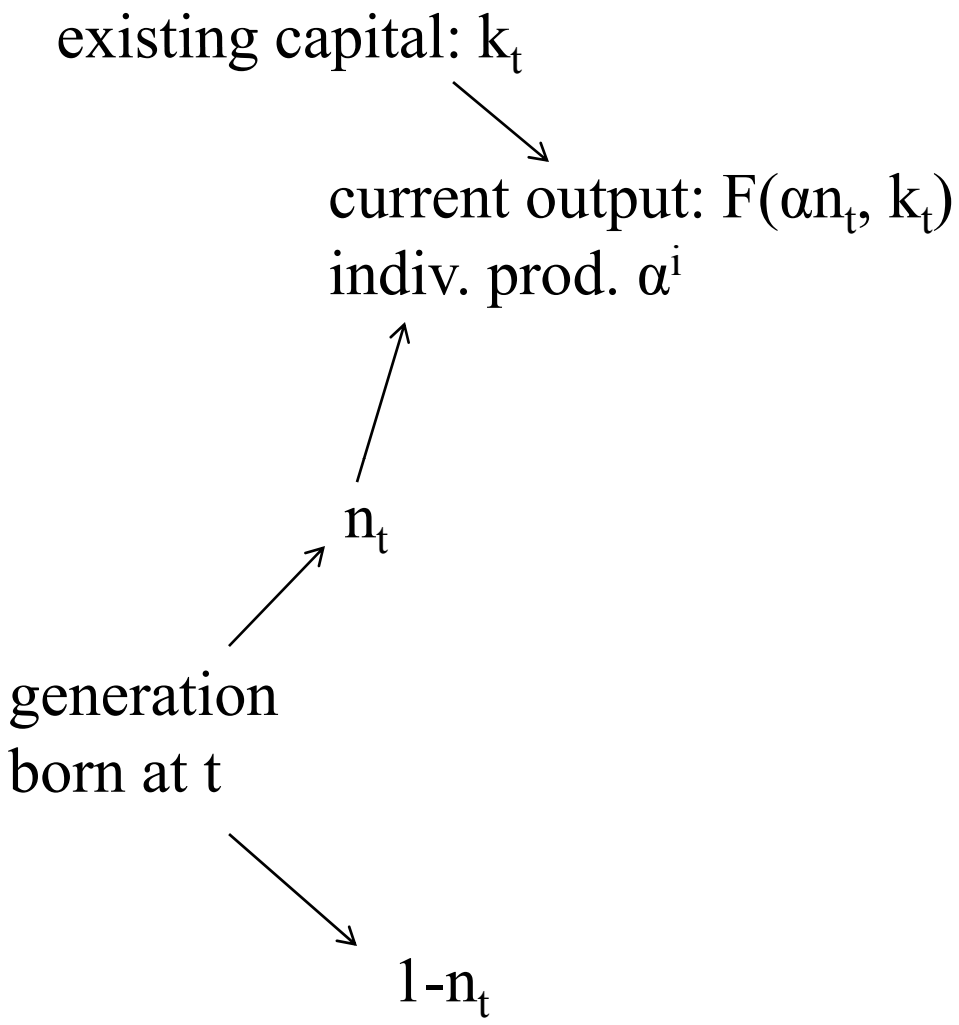
- Overlapping generations of risk neutral agents

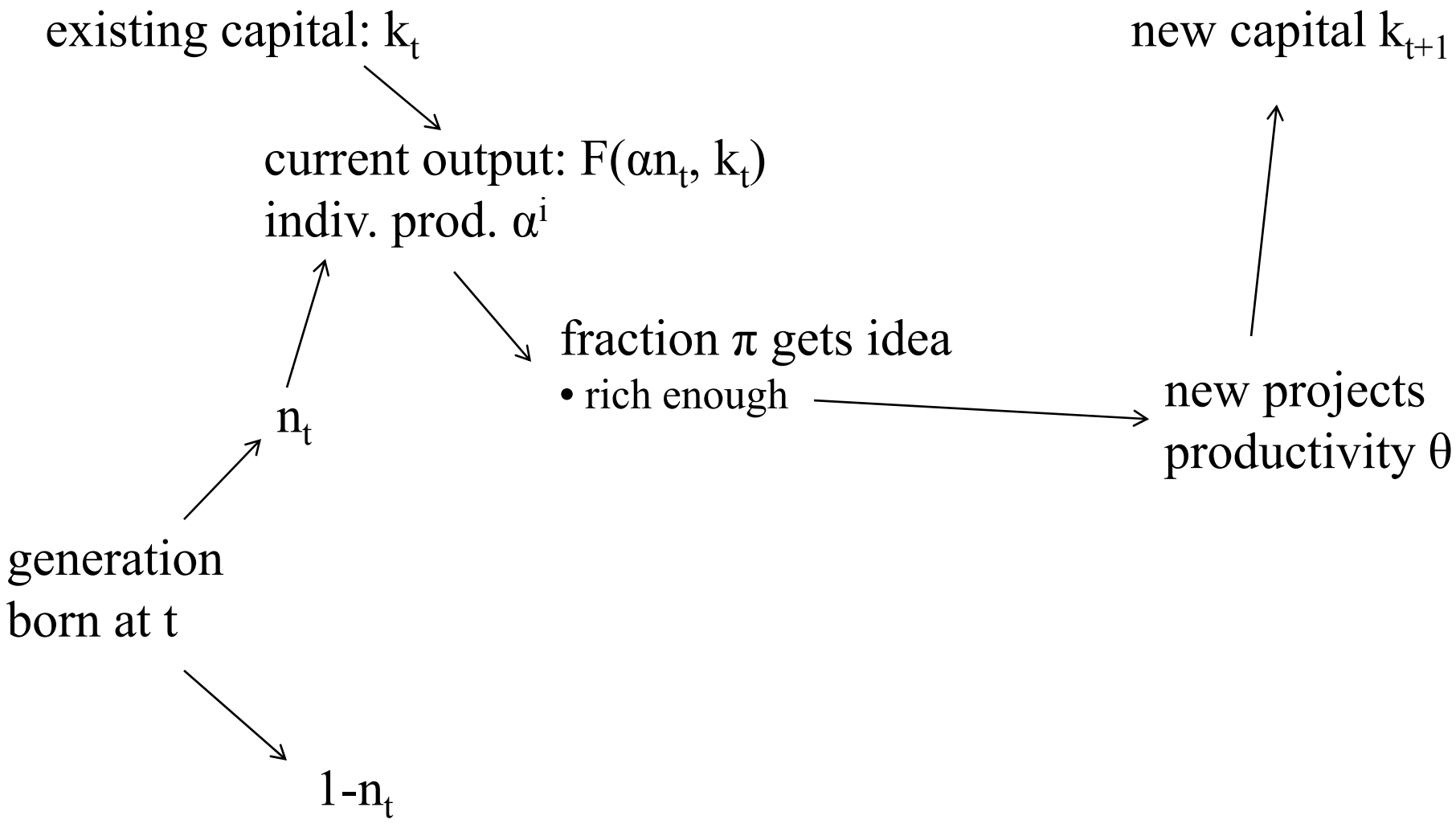
$$U_t^i = E_t \left[C_t^i + \frac{C_{t+1}^i}{1+\rho} \right]$$

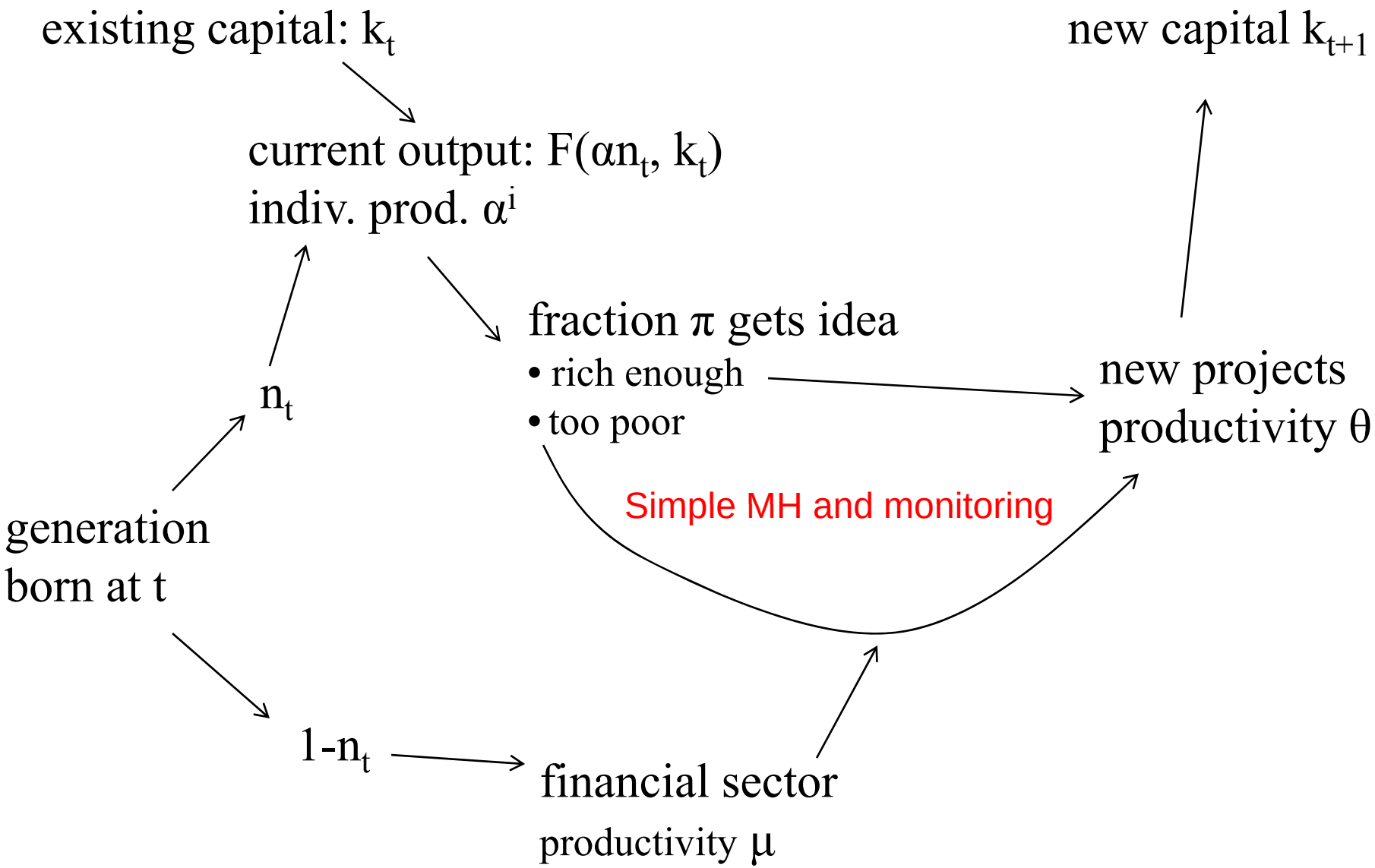
- Agent chooses a career in the first period of her life
  - Each cohort of size 1
- Two sectors
  - Industrial sector: n_t
  - Financial sector: $1 - n_t$

existing capital: k_t

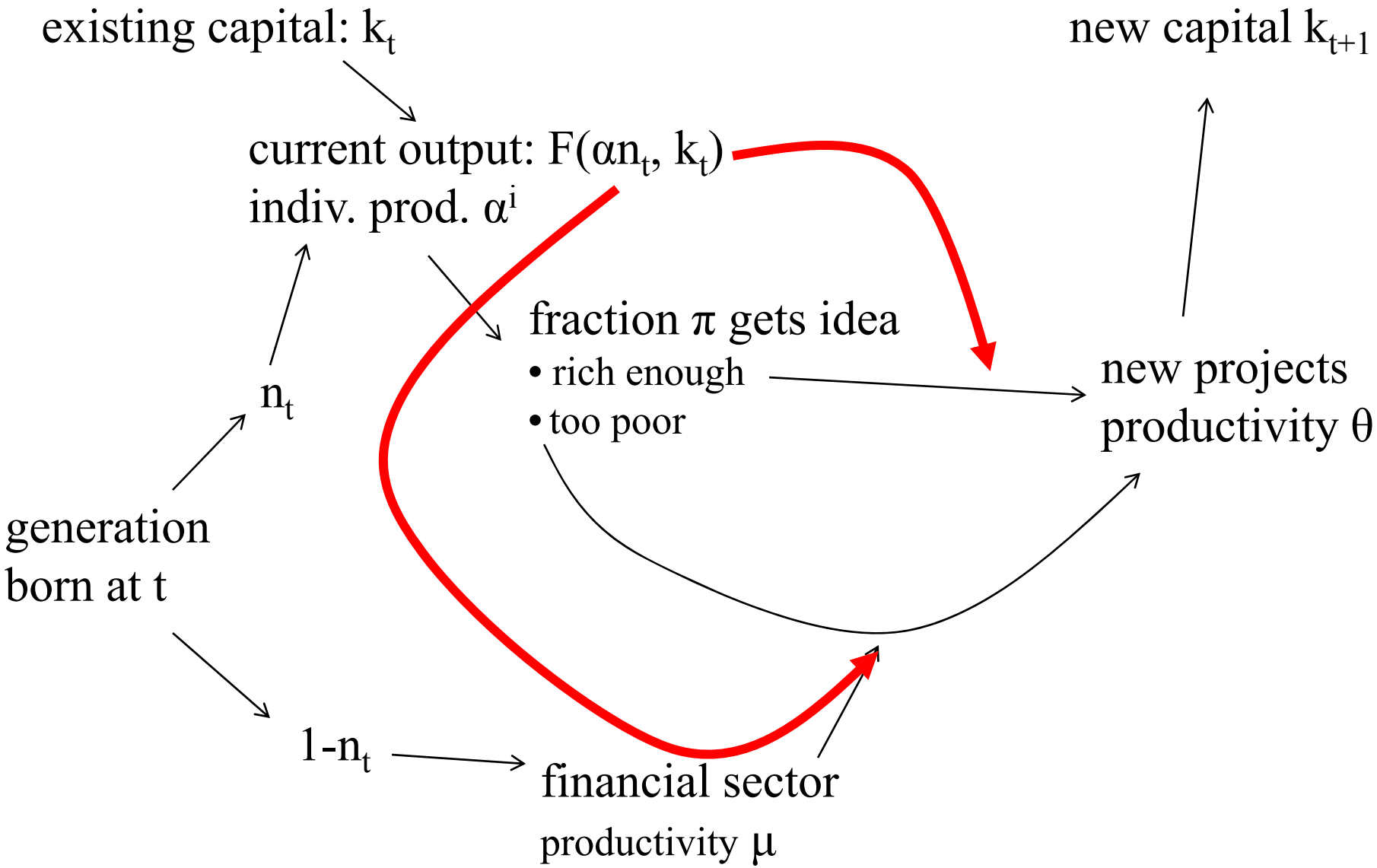


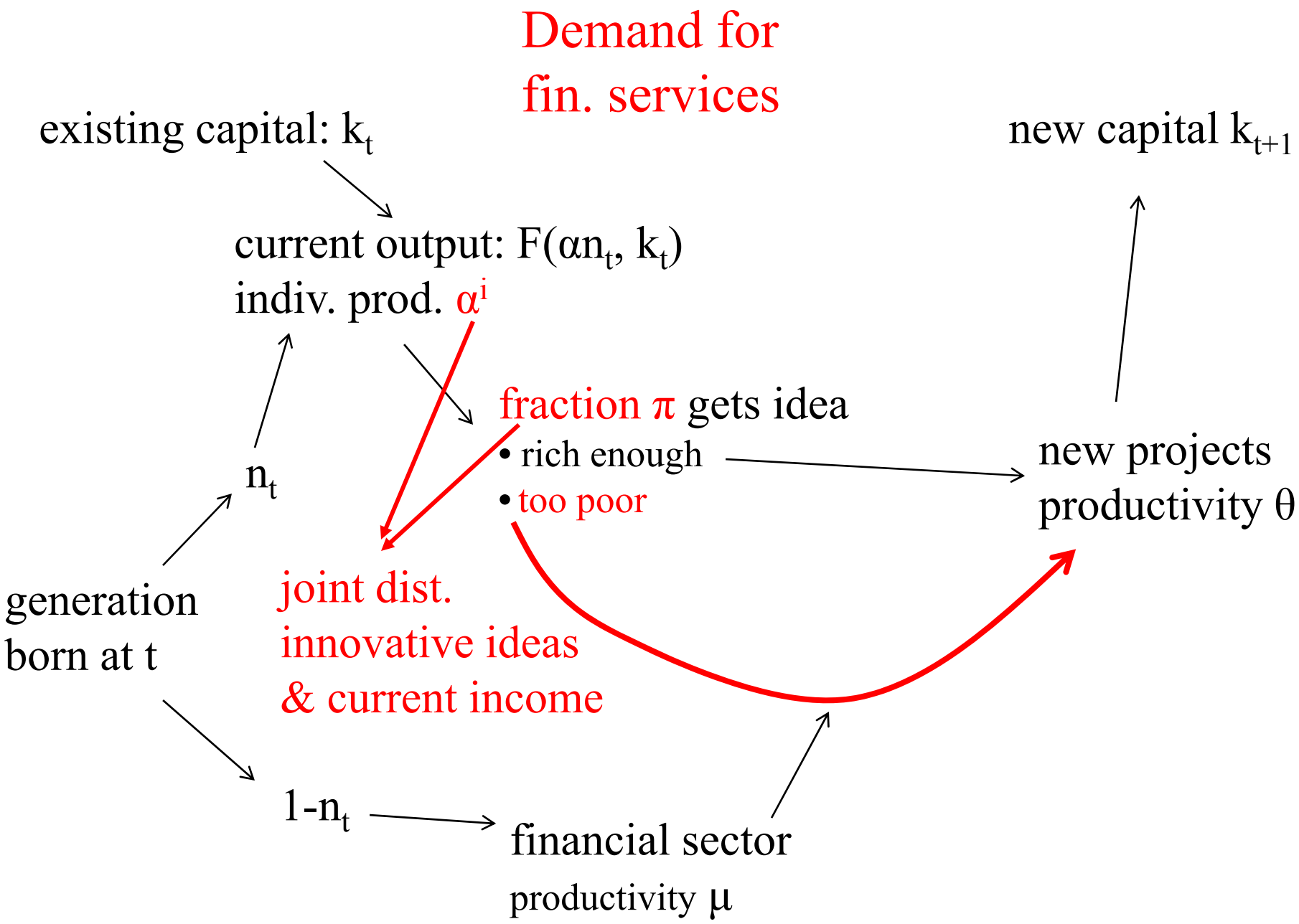

existing capital: k_t
current output: $F(\alpha n_t, k_t)$
indiv. prod. α^i
n_t
generation
born at t
$1-n_t$

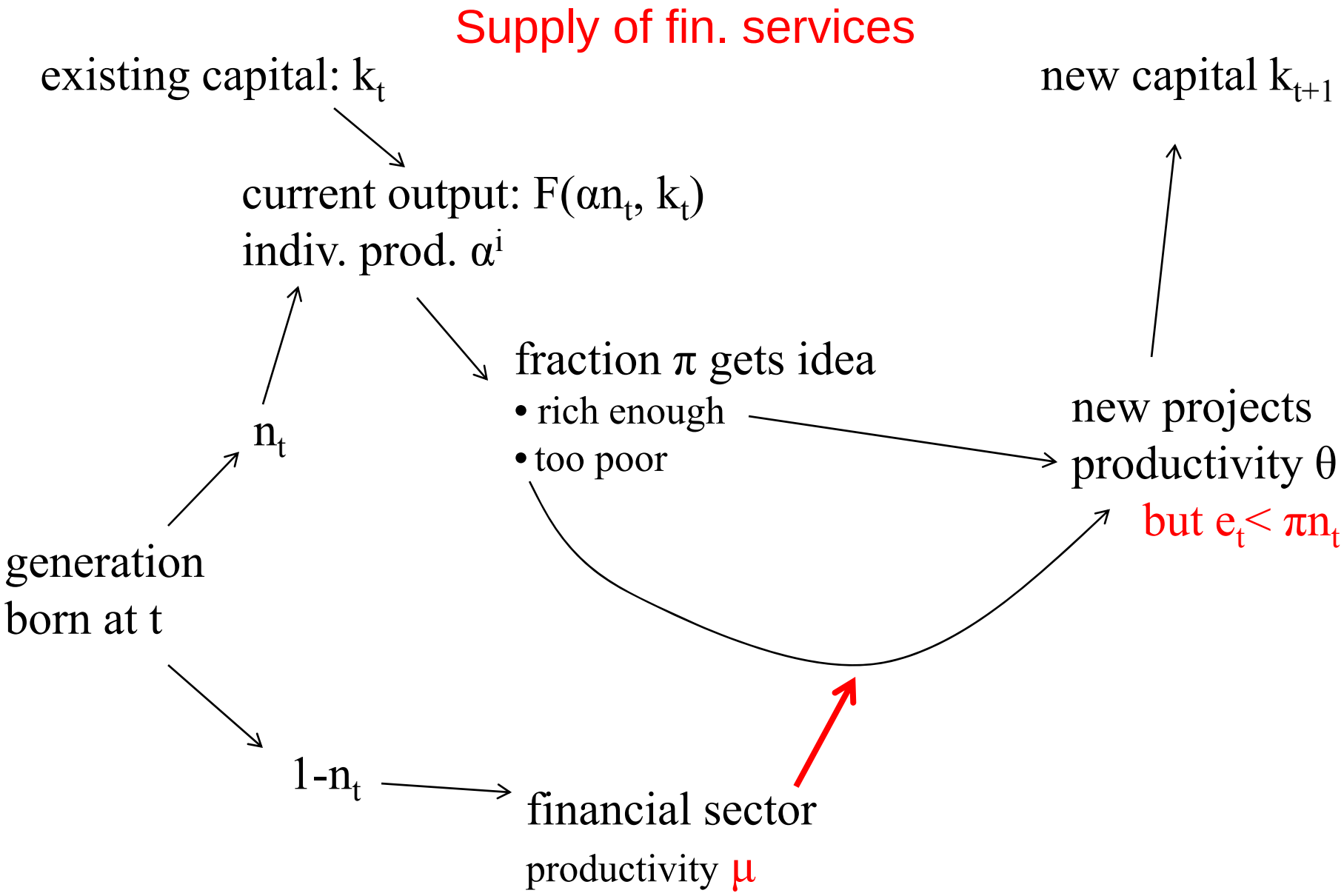

existing capital: k_t
new capital k_{t+1}
current output: $F(\alpha n_t, k_t)$
indiv. prod. α^i
fraction π gets idea
• rich enough
new projects
productivity θ
n_t
generation
born at t
$1-n_t$


existing capital: k_t
new capital k_{t+1}
current output: $F(\alpha n_t, k_t)$
indiv. prod. α^i
fraction π gets idea
• rich enough
• too poor
new projects
productivity θ
n_t
Simple MH and monitoring
generation
born at t
$1-n_t$
financial sector
productivity μ

Savings

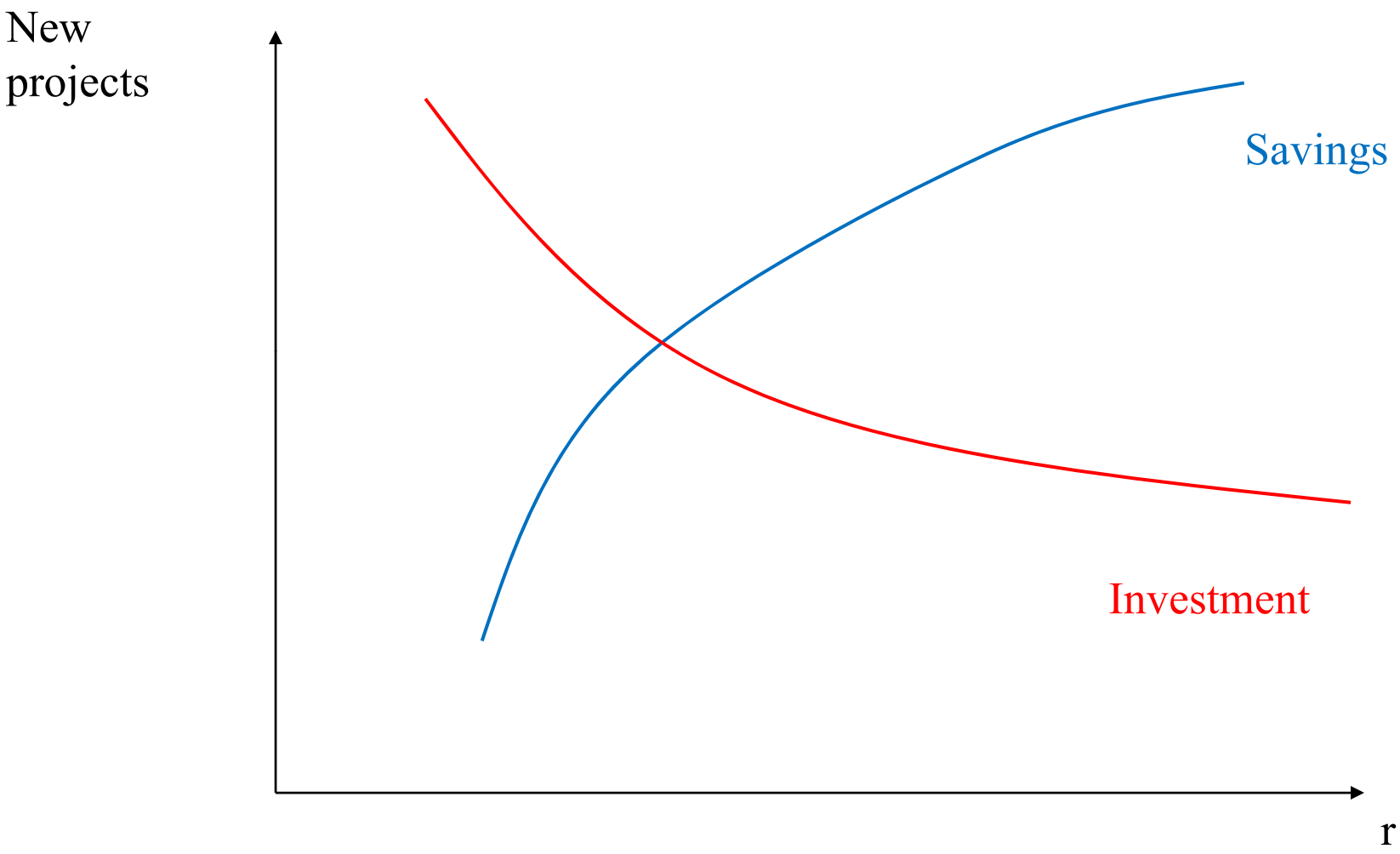

existing capital: k_t
new capital k_{t+1}
current output: $F(\alpha n_t, k_t)$
indiv. prod. α^i
fraction π gets idea
• rich enough
• too poor
new projects
productivity θ
n_t
generation
born at t
$1-n_t$
financial sector
productivity μ


Demand for
fin. services
existing capital: k_t
new capital k_{t+1}
current output: $F(\alpha n_t, k_t)$
indiv. prod. α^i
fraction π gets idea
• rich enough
• too poor
new projects
productivity θ
n_t
generation
born at t
joint dist.
innovative ideas
& current income
$1-n_t$
financial sector
productivity μ

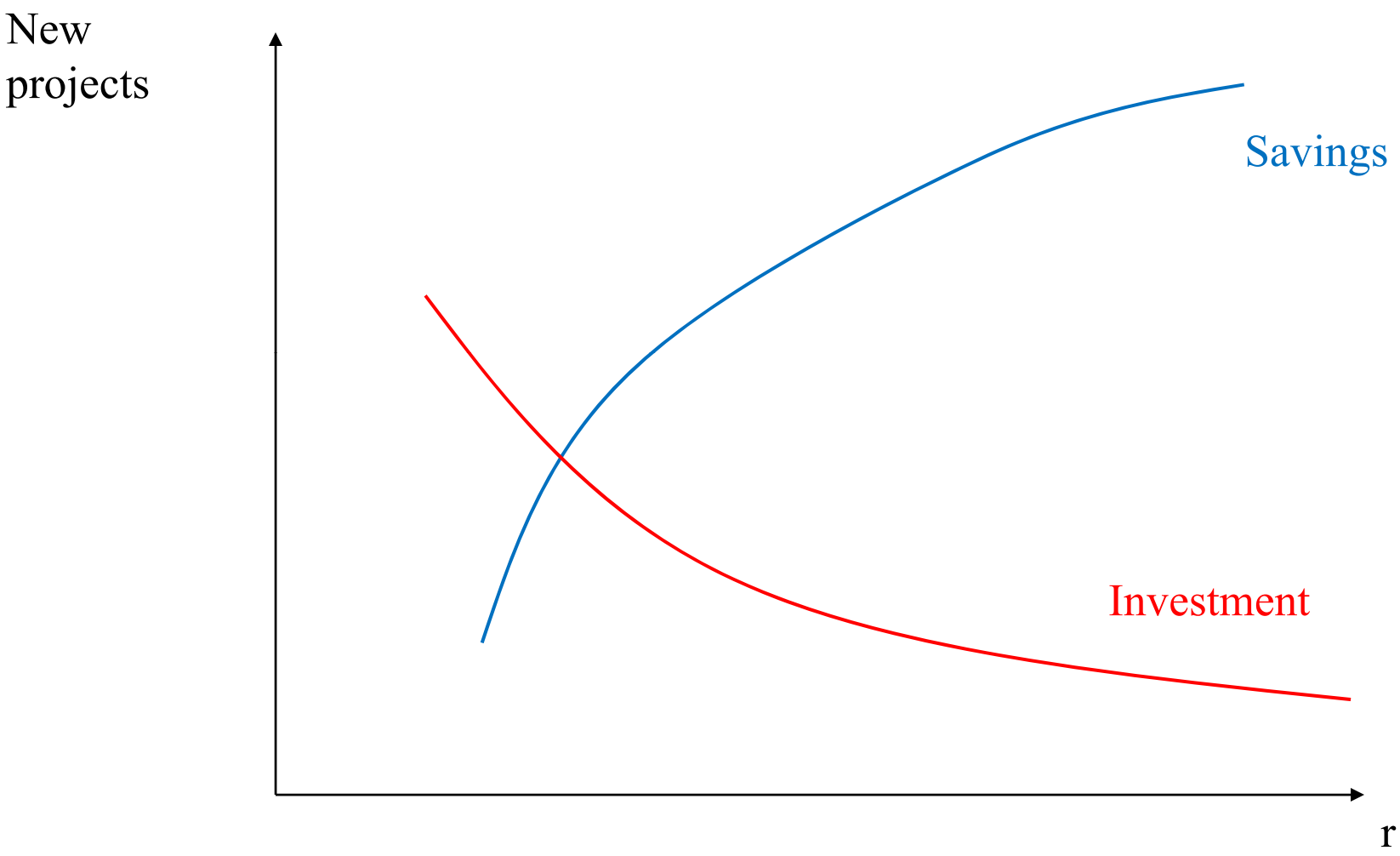

Supply of fin. services
existing capital: k_t
new capital k_{t+1}
current output: $F(\alpha n_t, k_t)$
indiv. prod. α^i
fraction π gets idea
• rich enough
• too poor
new projects
productivity θ
but $e_t < \pi n_t$
n_t
generation
born at t
$1-n_t$
financial sector
productivity μ

Equilibrium wihtout Financial Intermediation

Equilibrium without Moral Hazard



Equilibrium with Moral Hazard



Equilibrium Financial Intermediation

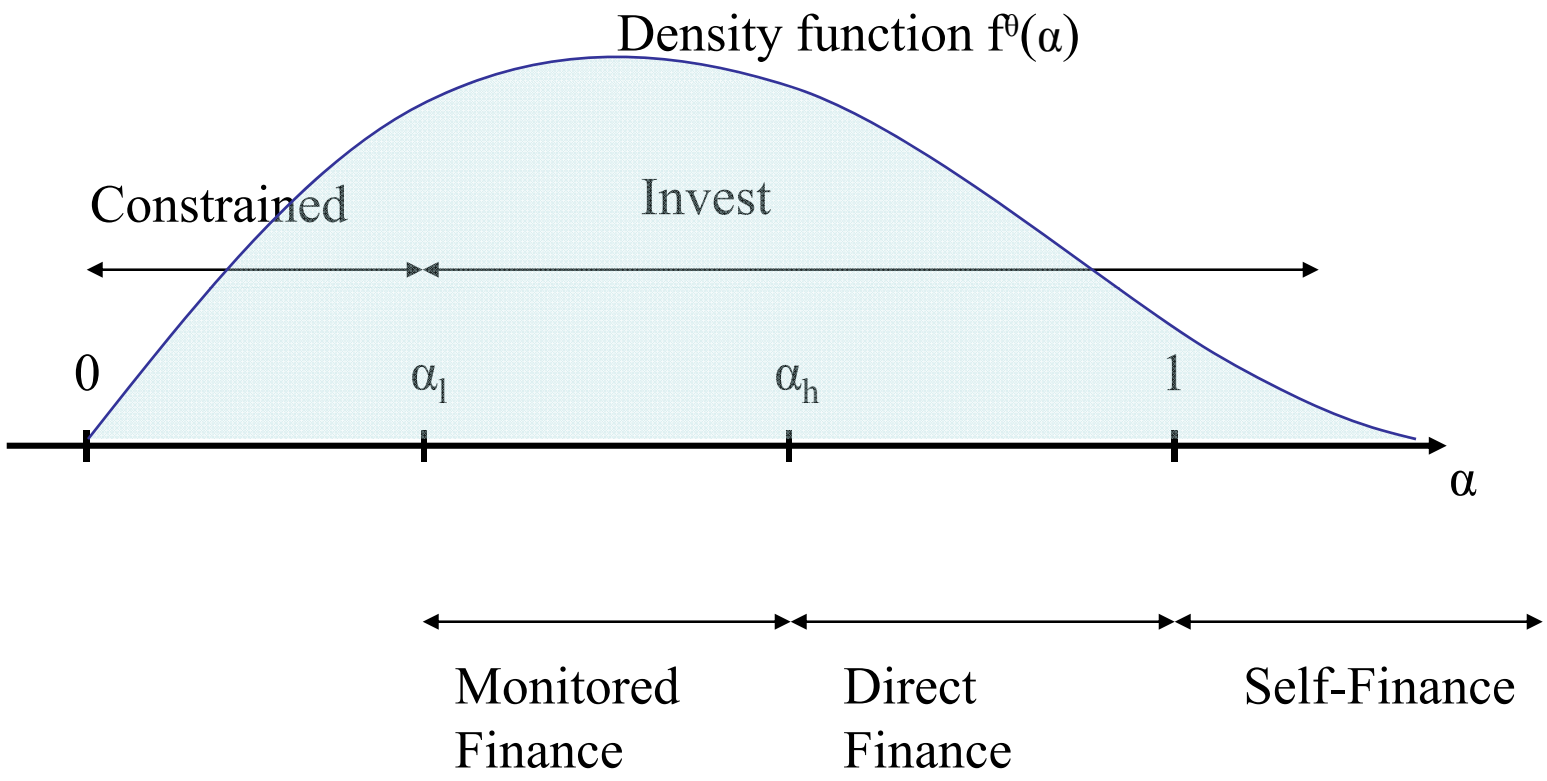
- Career Choice

$$\mu\phi = \bar{\alpha} + \pi\left(1 - F^{\theta}\left(\alpha_h\right)\right)v + \pi\int_{\alpha_l}^{\alpha_h}\left(v - \phi m\left(\alpha\right)\right)dF^{\theta}\left(\alpha\right)$$

- Monitoring Market Clearing

$$\mu\left(1-n\right) = \pi n\int_{\alpha_l}^{\alpha_h} m\left(\alpha\right)dF^{\theta}\left(\alpha\right)$$

Figure 9: Equilibrium With Monitoring



Theoretical Comparative Statics

Proposition.

- The income share of the financial sector is constant on the balanced growth path.
- For a given interest rate, the income share of finance is independent of the growth rate of the economy.
- The size of the financial sector goes to zero when its efficiency becomes either very small or very large.
- Efficiency gains in finance reduce rationing and increase investment, but have an ambiguous effect on the GDP share of the finance industry.

Estimation of model parameters

- Moments
  - Investment share of low cash firms:

$$s = \frac{F^{\theta}(0.33) - F^{\theta}(\alpha_l)}{1 - F^{\theta}(\alpha_l)}$$

  - Investment share of GDP
  - Corporate CMI over GDP
  - Corporate finance share of GDP

Table 1: Data

Period	Finance Share of Compensation	Investment Share of Firms with Income<0.33*Capex	Non Financial Corporate Credit Market Instruments over GDP	Health Care Share of Compensation
1927-1931	5.03%	28.51%	58.79%	0.87%
1937-1941	4.07%	17.92%	49.24%	0.96%
1947-1955	2.99%	14.61%	30.24%	1.21%
1956-1965	3.77%	18.61%	37.27%	1.76%
1966-1975	4.12%	20.41%	47.34%	3.11%
1976-1985	4.77%	25.85%	52.44%	5.27%
1986-1995	5.87%	35.37%	60.41%	7.89%
1996-2005	7.13%	39.41%	62.38%	8.85%

Notes: Finance Share is the compensation of employees in the Finance and Insurance industry divided by the compensation of all employees. Investment share of low cash firms is the fraction of all capital expenditures in Compustat accounted for by firms whose income is less than one third of their capital expenditures. Before 1955, the investment share of low cash firms is estimated from turnover of industry leaders using CRSP. Before 1952, non financial corporate credit market is estimated using total corporate credit. Sources: National Income and Product Accounts, Annual Industry Accounts, CRSP, Compustat, Flow of Funds, and Historical Statistics of the United States.

Table 2: Estimation of Model Parameters

Empirical Moments (1956-1965)	Share of Compensation for Corporate Finance Services	Investment Share of Firms with Income<0.33*Capex	Non Financial Corporate Credit Market Instruments over GDP	Aggregate Investment over GDP
	2.26%	18.61%	37.27%	11%
	Severity of Micro Moral Hazard	Efficiency of Corporate Finance	Technological Parameter	Distribution of Entrepreneur's Cash Flows
Implied Parameters	z/θ	μ/π	$E[\alpha]/\pi$	α^{θ}
	0.74	4.22	5.38	1.27

Notes: See Table 1 for a description of the data. Share of Compensation for Corporate Finance Services is 0.6 times the Share of Finance. The aggregate investment to GDP ratio is set at its post war average. Notice that $1-0.5\alpha^{\theta}$ is the financing need for the median potential entrepreneur.
Source: National Income and Product Accounts, Compustat, and Flow of Funds, NBER.

Testing model predictions

- Calibrate to 1960. Keep $(z, \theta, \pi, \bar{\alpha})$ constant

Testing model predictions

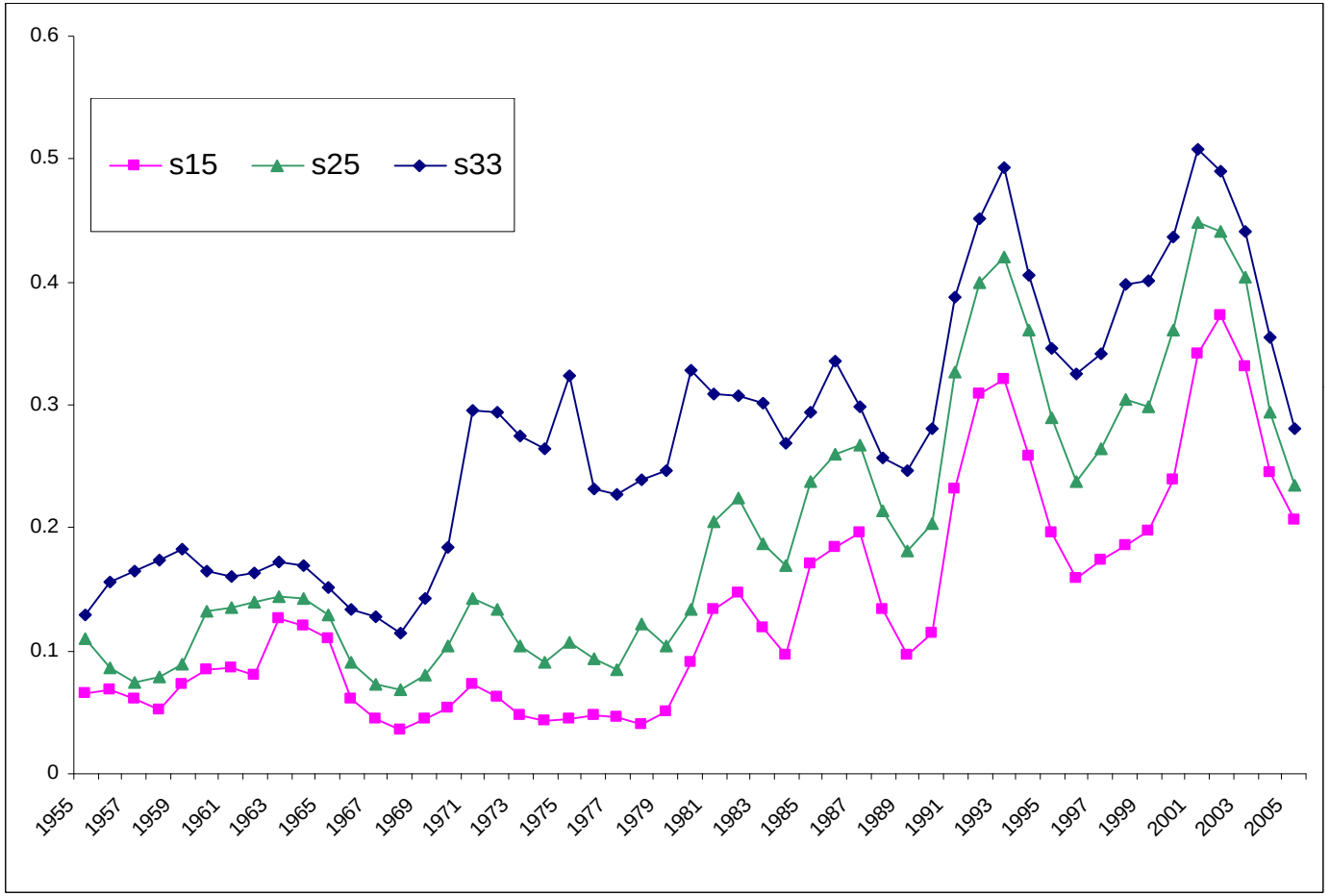
- Calibrate to 1960. Keep $(z, \theta, \pi, \bar{\alpha})$ constant
- Inputs
  - Investment share of low cash firms
  - Aggregate investment rate

Table 3: Testing the Model's Predictions

	Fixed parameters		Inputs		Implied Time-Varying Parameters		Predicted Values		Realized Values		Extra Prediction
	z/θ	$E[\alpha]/\pi$	Investment Share of Low Cash Firms	Aggregate Investment over GDP	μ/π	α^{θ}	Corporate Finance Income Share	Corporate Credit Market over GDP	Corporate Finance Income Share	Corporate Credit Market over GDP	Fraction of Credit Constrained Firms
1927-1931	0.74	5.38	28.5%	11.0%	4.52	0.94	3.29%	53.6%	3.52%	58.8%	9.0%
1937-1941	0.74	5.38	17.9%	10.0%	3.18	0.94	2.41%	41.3%	2.57%	49.2%	21.2%
1947-1955	0.74	5.38	14.6%	10.9%	3.87	1.41	1.87%	31.3%	1.48%	30.2%	10.3%
1956-1965	0.74	5.38	18.6%	11.0%	4.22	1.27	2.26%	37.3%	2.26%	37.3%	9.0%
1966-1975	0.74	5.38	20.4%	11.2%	4.60	1.29	2.41%	39.3%	2.61%	47.3%	6.5%
1976-1985	0.74	5.38	25.8%	11.1%	4.59	1.04	3.00%	48.9%	3.26%	52.4%	7.8%
1986-1995	0.74	5.38	35.4%	10.8%	4.42	0.77	4.01%	61.0%	4.36%	60.4%	11.6%
1996-2005	0.74	5.38	39.4%	11.2%	4.90	0.76	4.44%	67.2%	5.62%	62.4%	6.5%

Notes: See Table 1 and 2 for a complete description of the data. The moral hazard and technology parameters are estimated in 1956-1965 (see Table 2), and are kept constant over time. The two implied parameters (efficiency of financial intermediation and structural financing needs of entrepreneurs) are estimated by matching two time-varying inputs: investment over GDP and the investment share of low cash firms. The model is then used to predict the size of the credit market and the share of income devoted to corporate finance services. The actual values are from Table 1. The corporate finance income share is the finance income share minus a fixed fraction of 1.51% corresponding to other financial services.

Figure 6: Investment Shares of Low Cash Firms

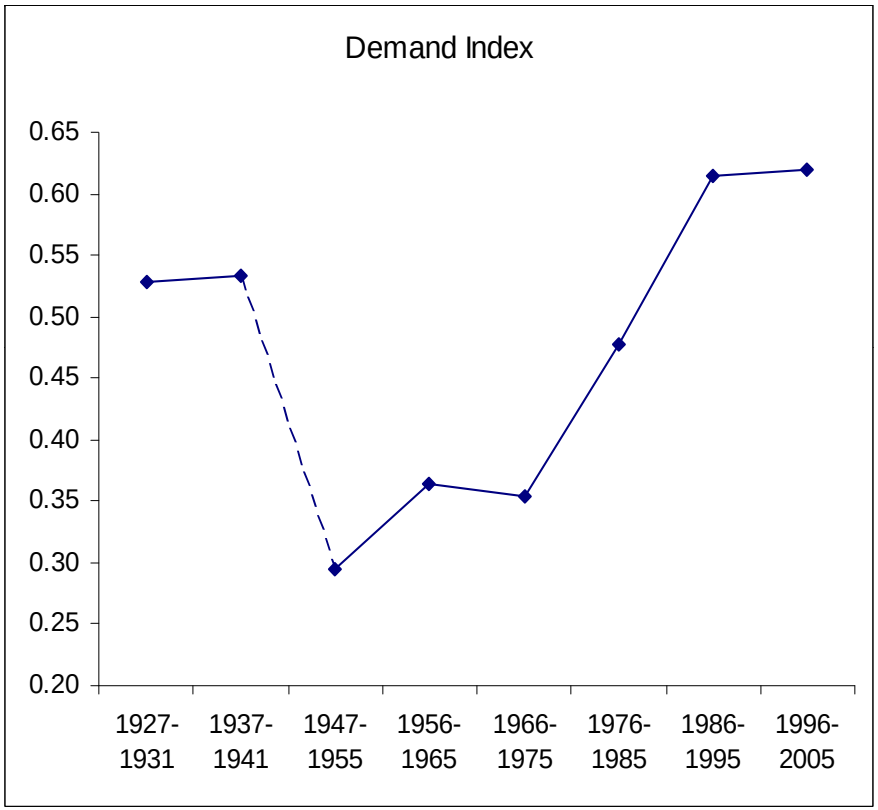


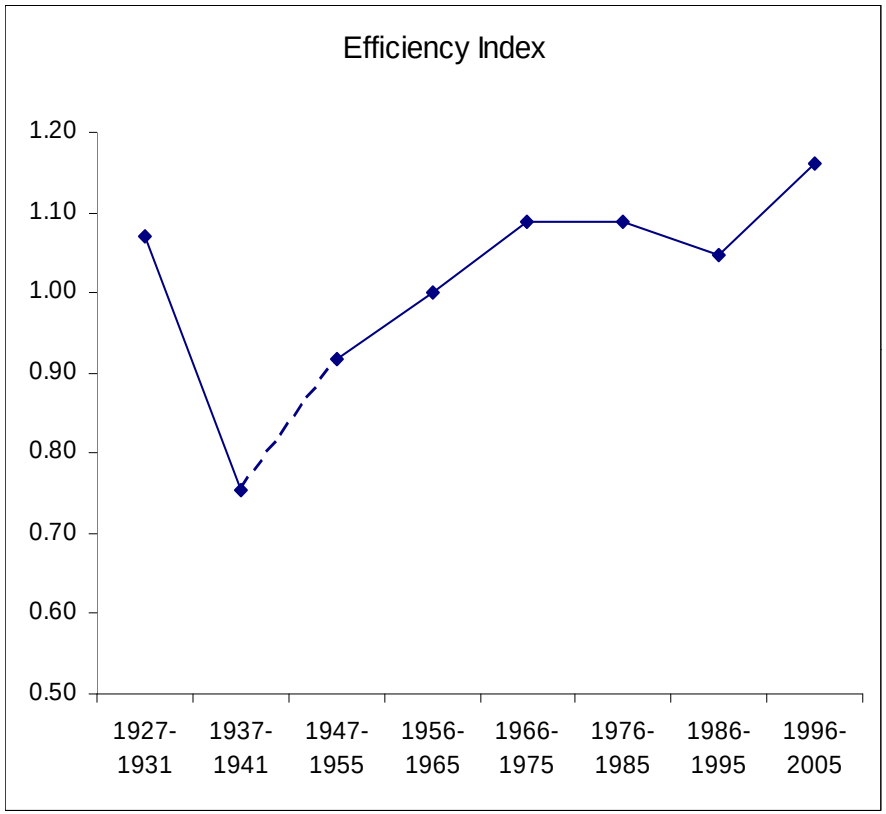
Notes: Sum of capital expenditures by firms whose income is less than 15%, 25% or 33% of their capital expenditures, divided by the sum of capital expenditures by all the firms in the sample.
Source: Author's calculations, Compustat sample of non financial firms.

Testing model predictions

- Calibrate to 1960. Keep $(z, \theta, \pi, \bar{\alpha})$ constant
- Inputs
  - Investment share of low cash firms
  - Aggregate investment rate
- Implied parameters & historical interpretation

Figure 10: Implied Structural Parameters



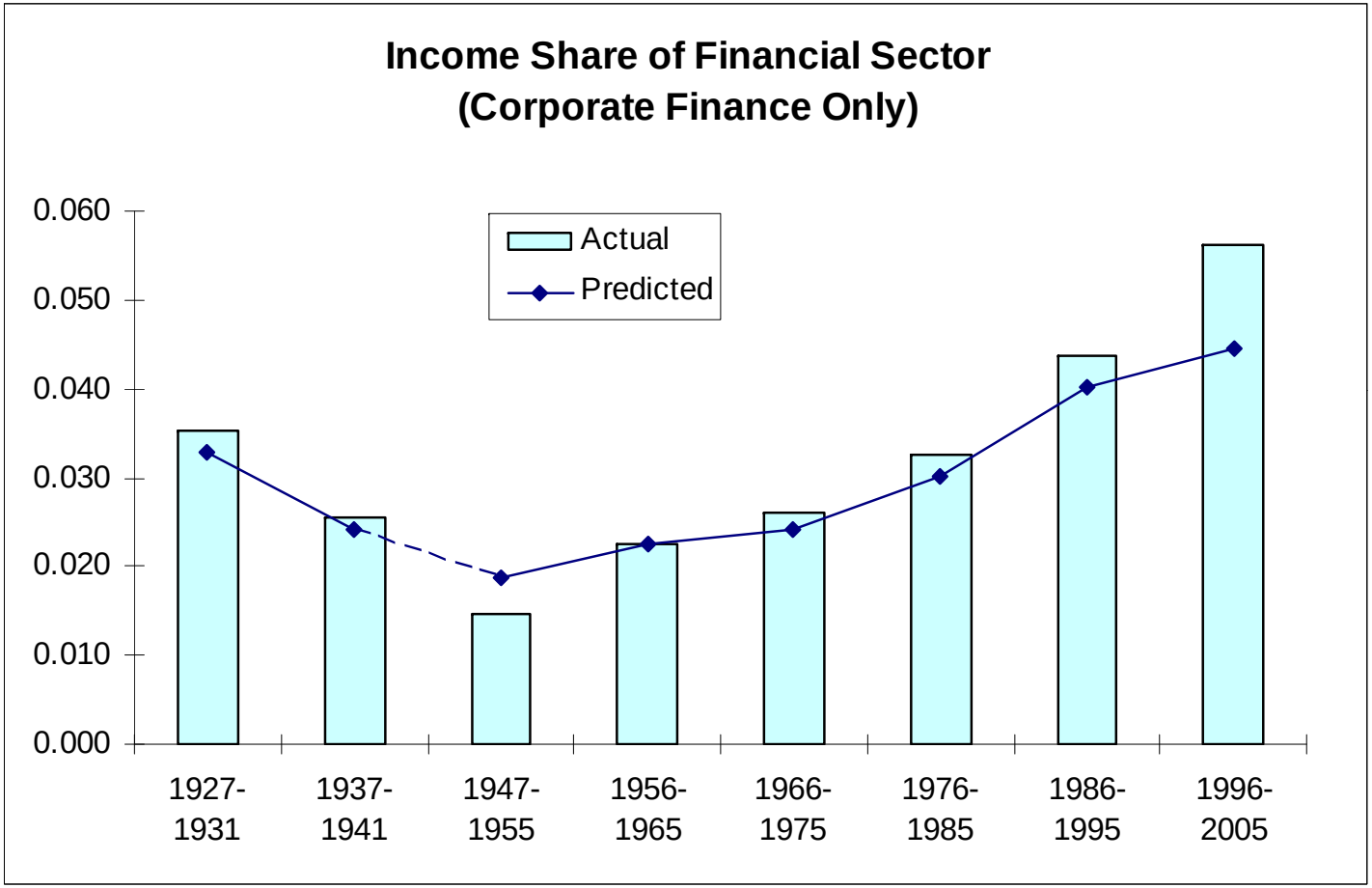


Notes: The efficiency index is μ/π normalized to one in 1956-1965. The demand index is the external finance needed for the median project, $1-\alpha^{\theta}/2$.

Testing model predictions

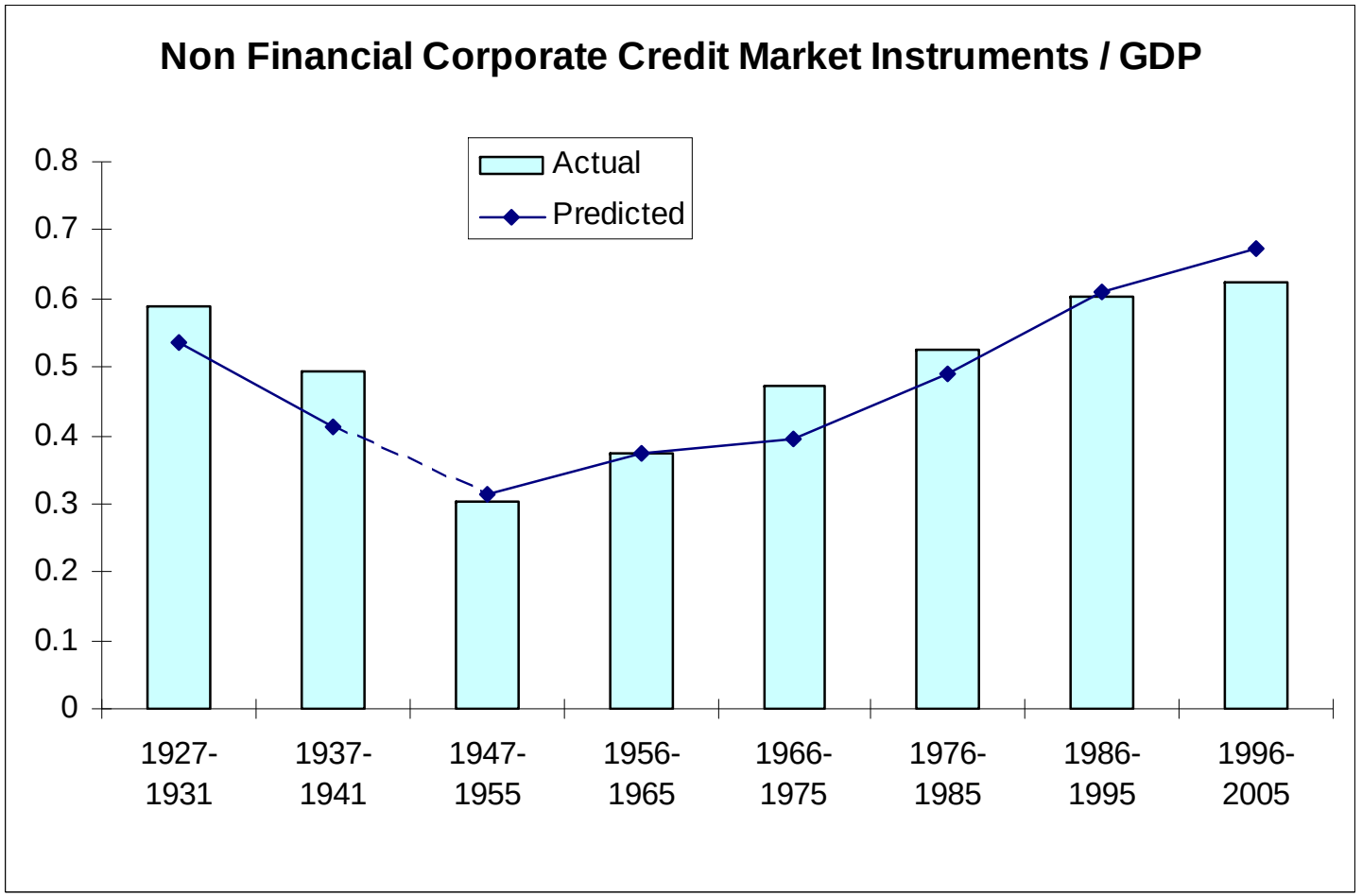
- Calibrate to 1960. Keep $(z, \theta, \pi, \bar{\alpha})$ constant
- Inputs
  - Investment share of low cash firms
  - Aggregate investment rate
- Implied parameters & historical interpretation
- Quantitative predictions: fin. size and credit market

Figure 11: Predicted Size of Financial Sector

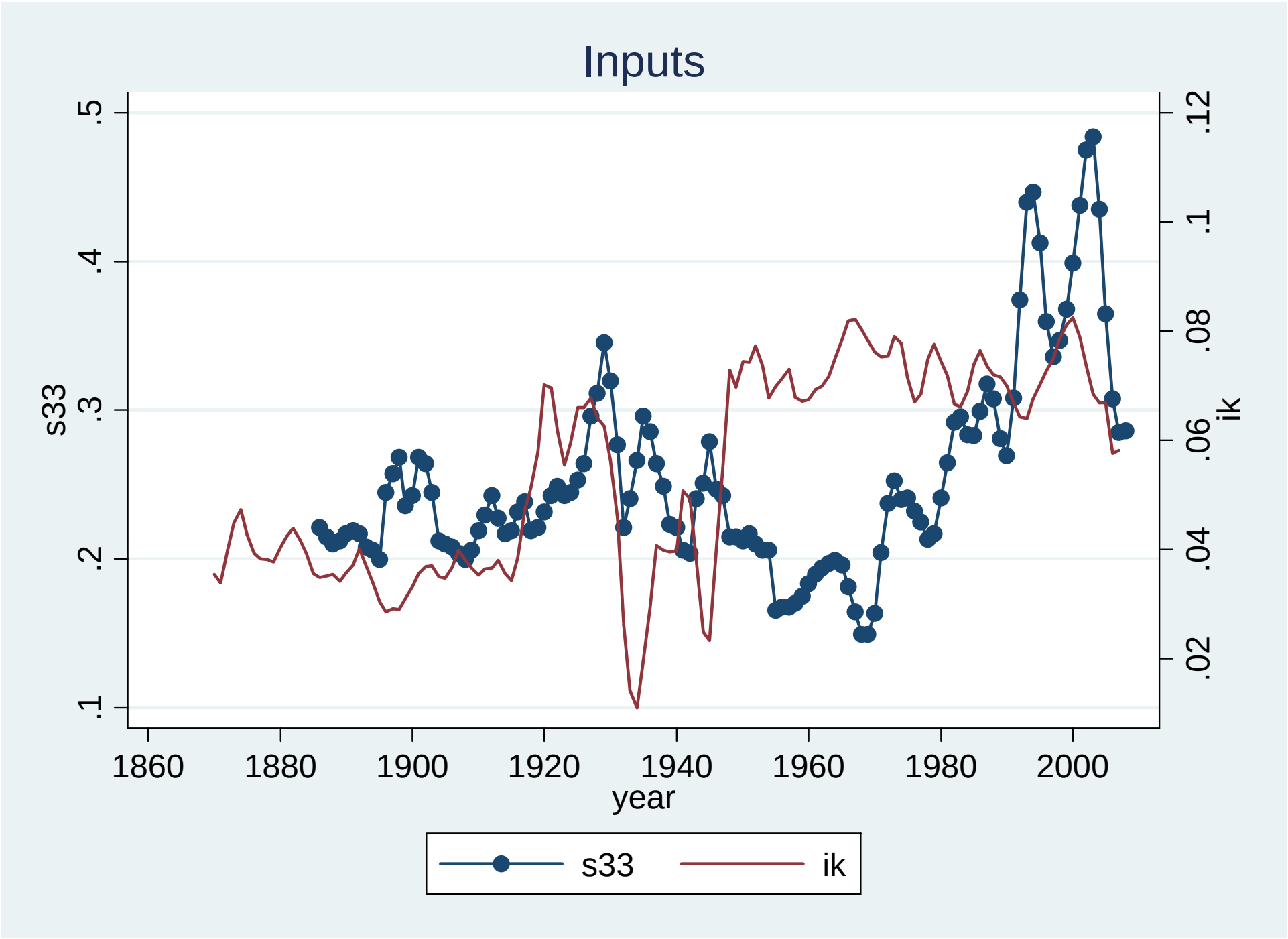


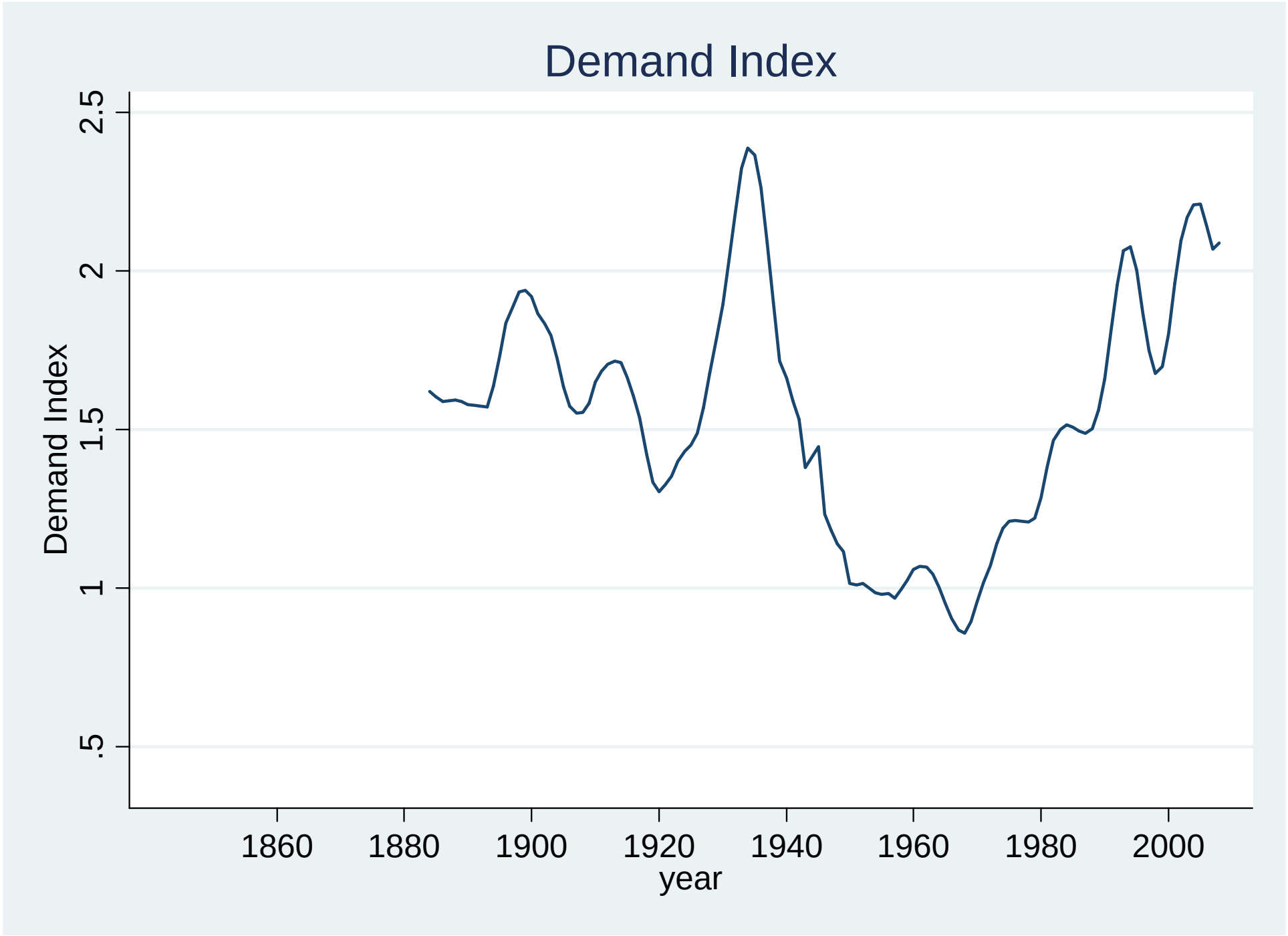
Notes: Actual share is income share of finance and insurance minus the fraction that does not reflect corporate finance services (see Table 3). Predicted value constructed from estimated model using aggregate investment rate and s33 (investment share of low cash firms, and its predicted value before 1955) as inputs.

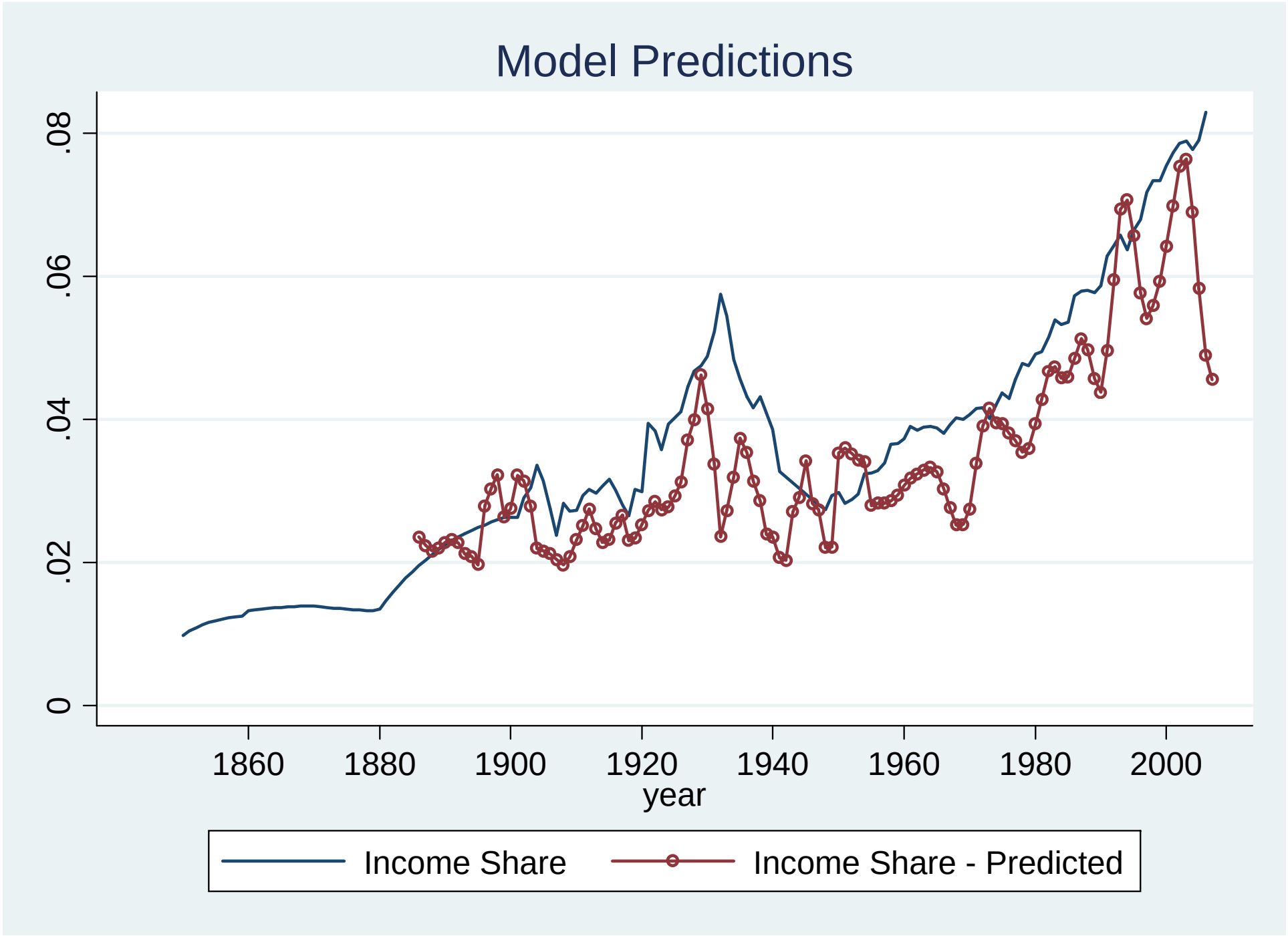
Figure 12: Predicted Size of Credit Market

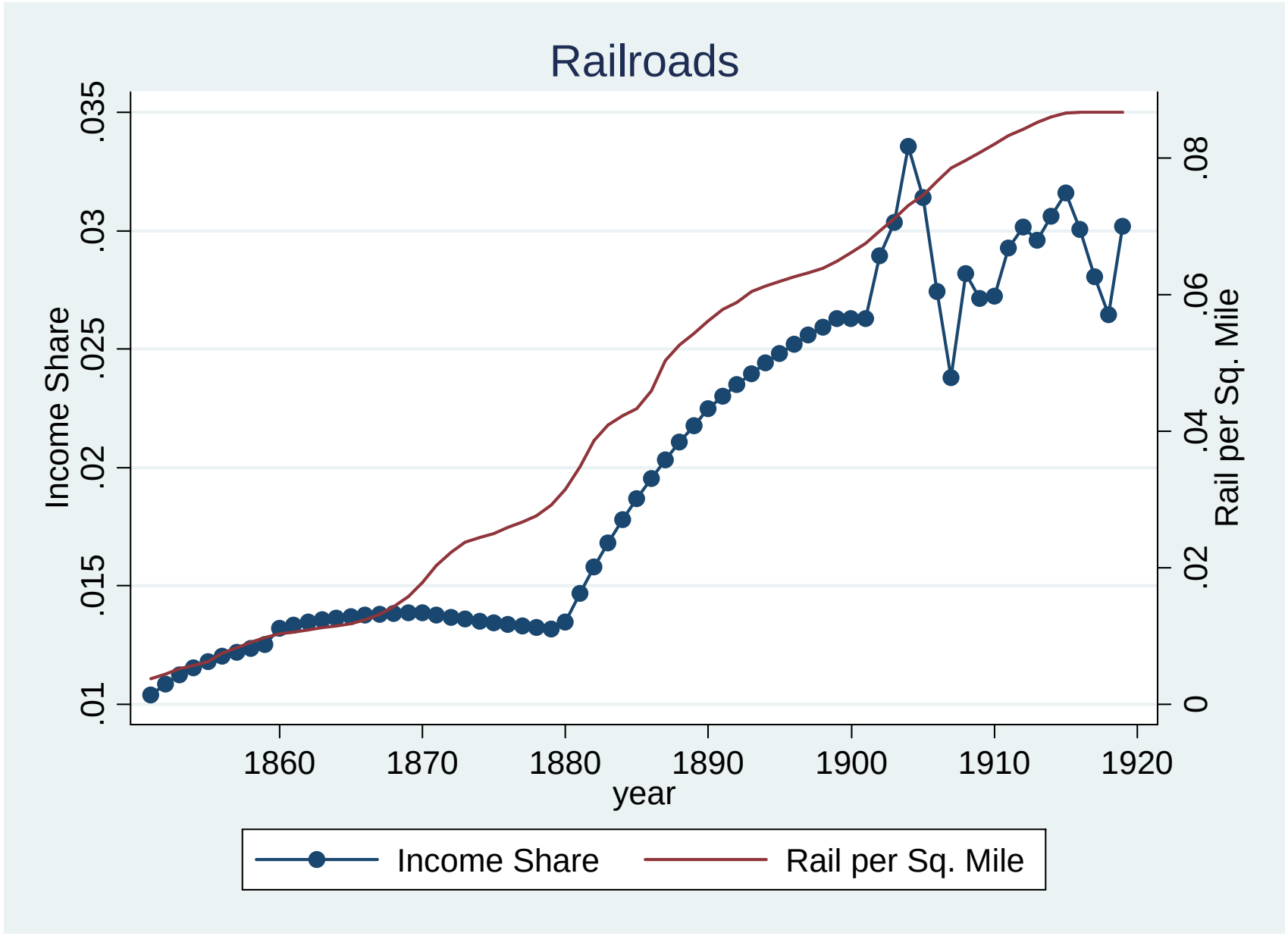


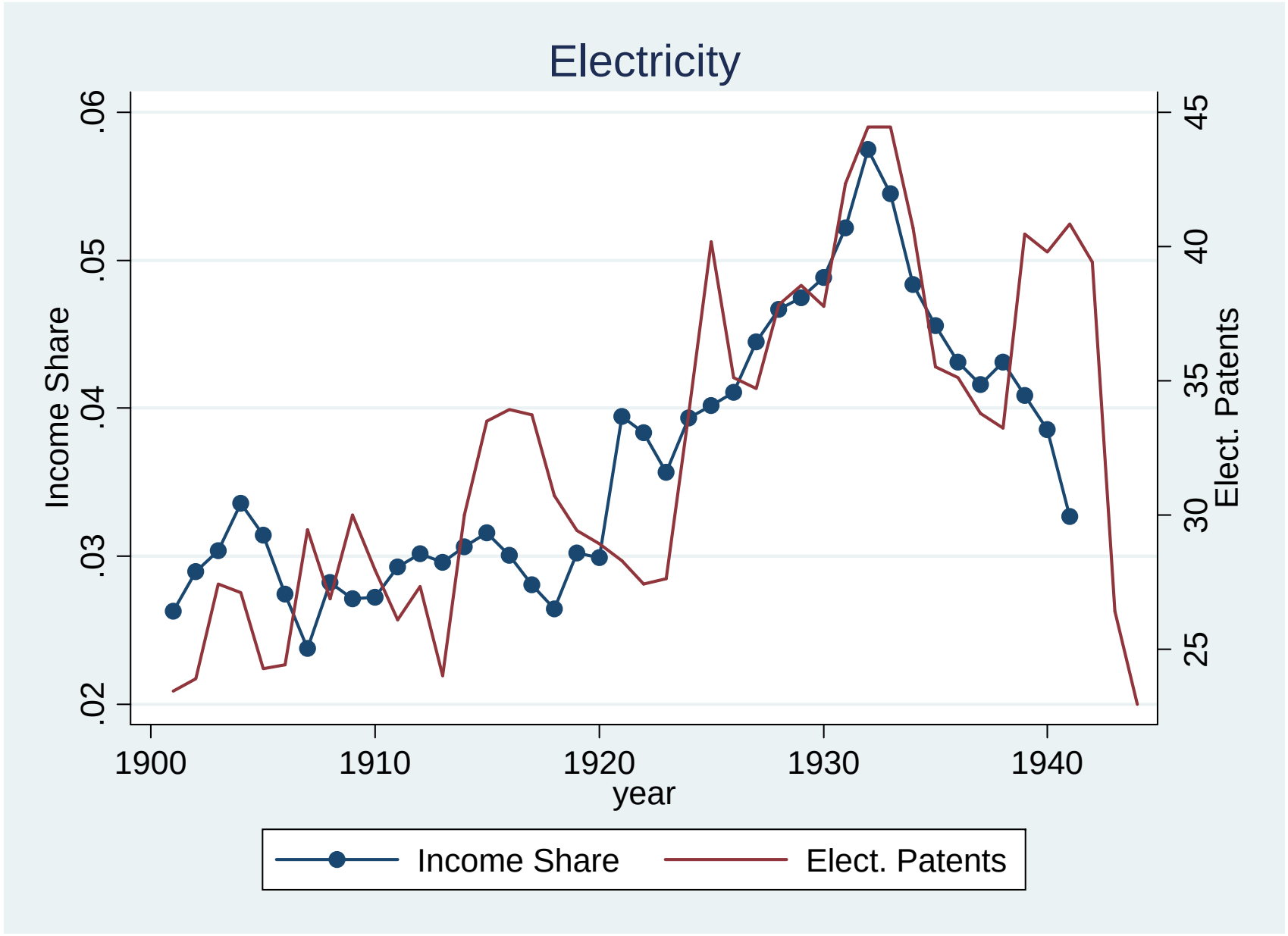
Notes: Corporate non financial credit market instruments from the Flow of Funds (1952-2006) over GDP. Before 1952, predicted value using total corporate debt from Historical Statistics of the United States. Predicted value constructed from estimated model using aggregate investment rate and s33 (investment share of low cash firms, and its predicted value before 1955) as inputs.


Inputs
s33
.1
.2
.3
.4
.5
ik
.02
.04
.06
.08
.1
.12
1860
1880
1900
1920
1940
1960
1980
2000
year
s33
ik


Demand Index
Demand Index
2.5
2
1.5
1
.5
1860
1880
1900
1920
1940
1960
1980
2000
year


Model Predictions
.08
.06
.04
.02
0
1860
1880
1900
1920
1940
1960
1980
2000
year
Income Share
Income Share - Predicted


Railroads
Income Share
.01
.015
.02
.025
.03
.035
Rail per Sq. Mile
0
.02
.04
.06
.08
1860
1870
1880
1890
1900
1910
1920
year
Income Share
Rail per Sq. Mile


Electricity
Income Share
.02
.03
.04
.05
.06
Elect. Patents
25
30
35
40
45
1900
1910
1920
1930
1940
year
Income Share
Elect. Patents

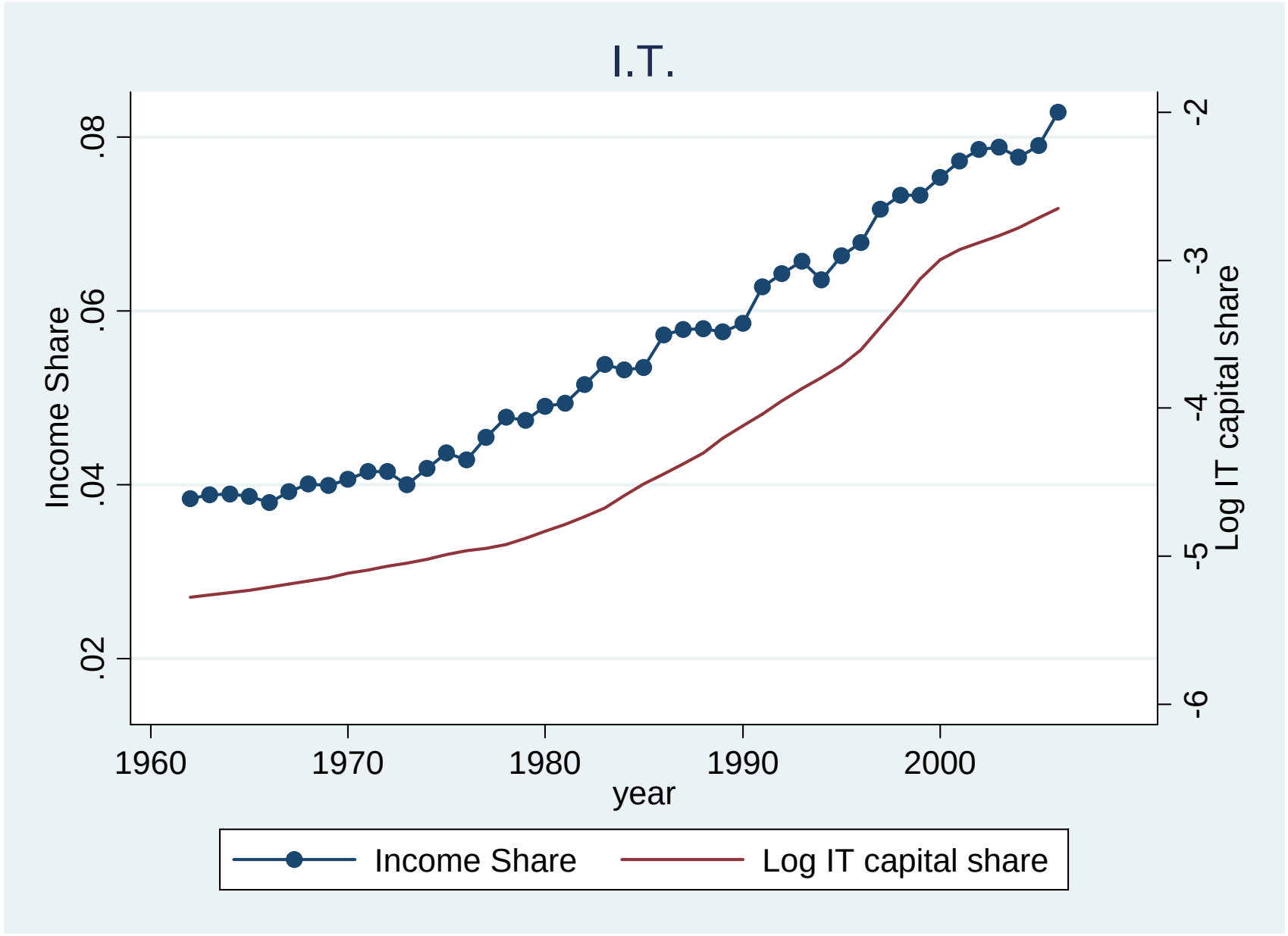

I.T.
Income Share
.02
.04
.06
.08
Log IT capital share
-2
-3
-4
-5
-6
1960
1970
1980
1990
2000
year
Income Share
Log IT capital share

Table 4: Counter- Factual Experiments

	μ/π	α^{θ}	Corporate Finance Income Share	Fraction of Constrained Firms
Starting Values (from model)	4.22	1.27	2.26%	9.04%
Final Values (from model)	4.90	0.76	4.44%	6.47%
Predicted by demand shift only	4.22	0.76	3.90%	13.91%
Predicted by efficiency gains only	4.90	1.27	2.60%	4.61%

Notes: Starting values correspond to 1956-1965. Final values correspond to 1996-2005. See Table 3. The model is non linear, so the effects are not additive.

Conclusion

- Financial services in equilibrium
  - Time varying needs
- A macro view on credit constraints
- Next steps
  - Dynamic model with endogenous growth
  - Open economy
  - Households
  - Efficiency of allocation