Sweat Equity in U.S. Private Business

Anmol Bhandari and Ellen McGrattan

December 2019

Motivation

- Private businesses earn more than 1/2 of US business net income
- Have few owners bearing substantial risks
- Use owner's time or *sweat* for business activities
  - Production
  - Building capital, eg, client lists, tradenames
- Face different tax policies than public firms
- Currently, little known about assets or tax effects

Theory of Sweat Equity

- GE model with heterogeneous agents choosing to
  - Work for someone else or
  - Run own private business and
    - Accumulate sweat equity
    - Produce goods & services
- Provides new framework to:
  - Measure private business activity and capital
  - Study business tax reforms (eg, TJCA17)

What's New?

- Standard analysis:
  - Based on Lucas span of control model
  - Extended to include financing frictions
  - Matched to survey data like SCF or PSID
- Our analysis:
  - Based on new framework with sweat
  - Found financing frictions not relevant for results
  - Matched to NIPA, IRS, Census data

$\Rightarrow$ Bigger capital stock, greater impact of tax policy

Main Findings

- Value of private business sweat equity (V_b)
  - Similar magnitude to value of fixed assets
  - Little dispersion in $V_b \Rightarrow$ high dispersion in returns
- Tax experiments show:
  - Large sectoral and aggregate effects
  - Abstracting from sweat leads to wrong answers

Related Literature

- Focuses on financing constraints
  (Evans and Jovanovic (1989), Quadrini (1999,2000), Li (2002), Meh (2005), Cagetti and DeNardi (2006), Buera (2009), Dyrda and Pugsley (2017))

- Assumes non-pecuniary benefits to business owners
  (Hamilton (2000), Hurst and Pugsley (2011, 2017), Moskowitz and Vissing-Jorgensen (2002))

- Uses evidence from household surveys
  (Too many to list...)

Outline

- Theory
- Parameters
- Results

Theory: Overview

Environment

- Two sectors: C-corp, Pass-through

Environment

- Two sectors: C-corp, Pass-through
- Households of age j
    - Endowed with stochastic abilities z, ϵ
    - Face occupational choice

Environment

- Two sectors: C-corp, Pass-through
- Households of age j
  - Endowed with stochastic abilities z, ϵ
  - Face occupational choice

Environment

- Two sectors: C-corp, Pass-through
- Households of age j
  - Endowed with stochastic abilities z, ϵ
  - Face occupational choice

↙	↘
Work for someone else	Run own business
incomes: $w\epsilon$	$pzf_y(\kappa, k_p, h_y, n_p) - (r + \delta_k)k_p - wn_p - e$

Environment

- Two sectors: C-corp, Pass-through
- Households of age j
  - Endowed with stochastic abilities z, ϵ
  - Face occupational choice

Work for someone else | Run own business

incomes: $w\epsilon$ | $pzf_y(\kappa, k_p, h_y, n_p) - (r + \delta_k)k_p - wn_p - e$

Sweat capital

Environment

- Two sectors: C-corp, Pass-through
- Households of age j
  - Endowed with stochastic abilities z, ϵ
  - Face occupational choice

Work for someone else | Run own business

incomes: $w\epsilon$ | $pzf_y(\kappa, k_p, h_y, n_p) - (r + \delta_k)k_p - wn_p - e$

Fixed assets

Environment

- Two sectors: C-corp, Pass-through
- Households of age j
  - Endowed with stochastic abilities z, ϵ
  - Face occupational choice

↙ ↘

Work for someone else — Run own business

incomes: $w\epsilon$ — $pzf_y(\kappa, k_p, h_y, n_p) - (r + \delta_k)k_p - wn_p - e$

↑

Owner's hours in production

Environment

- Two sectors: C-corp, Pass-through
- Households of age j
  - Endowed with stochastic abilities z, ϵ
  - Face occupational choice

↙ ↘

Work for someone else | Run own business

incomes: $w\epsilon$ | $pzf_y(\kappa, k_p, h_y, n_p) - (r + \delta_k)k_p - wn_p - e$

↑

Worker hours in production

Environment

- Two sectors: C-corp, Pass-through
- Households of age j
  - Endowed with stochastic abilities z, ϵ
  - Face occupational choice

↙ Work for someone else

incomes: $w\epsilon$

↘ Run own business

$$pzf_y(\kappa, k_p, h_y, n_p) - (r + \delta_k)k_p - wn_p - e$$

$$\kappa' = (1 - \delta_\kappa)\kappa + f_\kappa(h_\kappa, e)$$

↑ Owner's hours to build sweat capital

Environment

- Two sectors: C-corp, Pass-through
- Households of age j
  - Endowed with stochastic abilities z, ϵ
  - Face occupational choice

↙ ↘

Work for someone else — Run own business

incomes: $w\epsilon$ — $pzf_y(\kappa, k_p, h_y, n_p) - (r + \delta_k)k_p - wn_p - e$

$$\kappa' = (1 - \delta_\kappa)\kappa + f_\kappa(h_\kappa, e)$$

↑

Expenses to build sweat capital

Environment

- Two sectors: C-corp, Pass-through
- Households of age j
  - Endowed with stochastic abilities z, ϵ
  - Face occupational choice

↙ ↘

Work for someone else | Run own business

incomes: $w\epsilon$ | $pzf_y(\kappa, k_p, h_y, n_p) - (r + \delta_k)k_p - wn_p - e$

$\kappa' = (1 - \lambda)\kappa$ | $\kappa' = (1 - \delta_\kappa)\kappa + f_\kappa(h_\kappa, e)$

↑

Sell for cash or keep, but depreciates if not in use

Environment

- Two sectors: C-corp, Pass-through
- Households of age j
  - Endowed with stochastic abilities z, ϵ
  - Face occupational choice

↙ ↘

Work for someone else	Run own business
incomes: $w\epsilon$	$pzf_y(\kappa, k_p, h_y, n_p) - (r + \delta_k)k_p - wn_p - e$
$\kappa' = (1 - \lambda)\kappa$	$\kappa' = (1 - \delta_\kappa)\kappa + f_\kappa(h_\kappa, e)$

- Government collects taxes on incomes & products

Theory: Details

Household Maximization

- States:
  - j: stochastic age (y, o)
  - a: financial assets
  - κ: sweat capital
  - $\zeta = (z, \epsilon)$: productivity shocks to business, wages
- Value functions:

$$V_j(a, \kappa, \zeta) = \max\{ \underbrace{V_{j,p}(a, \kappa, \zeta)}_{\text{Run business}}, \quad \underbrace{V_{j,w}(a, \kappa, \zeta)}_{\text{Work for someone}} \}$$

Run Business

$$V_{y,p}(a,\kappa,\zeta) = \max_{\substack{c_c,c_p,h_y,h_\kappa,\\ k_p,n_p,e,a',\kappa'}} \{U_p(c,\ell) + \beta \sum_{\zeta'} \mu(\zeta'|\zeta) V(a',\kappa',\zeta')\}$$

Run Business

$$V_{y,p}(a,\kappa,\zeta) = \max_{\substack{c_c,c_p,h_y,h_\kappa,\\ k_p,n_p,e,a',\kappa'}} \{U_p(c,\ell) + \beta \sum_{\zeta'} \mu(\zeta'|\zeta) V(a',\kappa',\zeta')\}$$

$\uparrow$

value of running business when young

Run Business

$$V_{y,p}(a,\kappa,\zeta) = \max_{\substack{c_c,c_p,h_y,h_\kappa,\\ k_p,n_p,e,a',\kappa'}} \{U_p(c,\ell) + \beta \sum_{\zeta'} \mu(\zeta'|\zeta) V(a',\kappa',\zeta')\}$$

$$c = \text{ces}(c_c, c_p)$$

$c_c =$ C-corp goods

$c_p =$ private business goods

Run Business

$$V_{y,p}(a,\kappa,\zeta) = \max_{\substack{c_c,c_p,h_y,h_\kappa,\\ k_p,n_p,e,a',\kappa'}} \{U_p(c,\ell) + \beta \sum_{\zeta'} \mu(\zeta'|\zeta) V(a',\kappa',\zeta')\}$$

$$\nearrow$$

$$\ell = 1 - h_y - h_\kappa$$

$h_y =$ hours in production

$h_\kappa =$ hours accumulating sweat capital

Run Business

$$V_{y,p}(a,\kappa,\zeta) = \max_{\substack{c_c,c_p,h_y,h_\kappa,\\ k_p,n_p,e,a',\kappa'}} \{U_p(c,\ell) + \beta \sum_{\zeta'} \mu(\zeta'|\zeta) V(a',\kappa',\zeta')\}$$

$$\begin{aligned}
a' &= (1+r)a && \text{(financial returns)}\\
&\quad + py_p - (r+\delta_k)k_p - wn_p - e && \text{(business net income)}\\
&\quad - c_c - pc_p && \text{(consumption)}\\
&\quad - \text{ taxes} &&\\
&\quad \geq \chi p y_p && \text{(working capital)}
\end{aligned}$$

$$\kappa' = (1-\delta_\kappa)\kappa + f_\kappa(h_\kappa, e) \qquad \text{(sweat capital)}$$

$$y_p = z f_y(\kappa, k_p, h_y, n_p) \qquad \text{(private output)}$$

Example: Dental Office

- Assets:

  a: Financial assets (e.g., bank account, shares)

  k_p: Dental equipment (owned or leased)

  κ: Patient list

- Time use:

  h_y: Owner examines existing patients

  h_κ: Owner finds new patients

  n_p: Hygenists examine existing patients

- Expenses:

  e: Local advertising

Work for Someone Else

$$V_{y,w}(a,\kappa,\zeta) = \max_{\substack{c_C,c_p,n,\\ a',\kappa'}} \{U_w(c,\ell) + \beta \sum_{\zeta'} \mu(\zeta'|\zeta) V(a',\kappa',\zeta')\}$$

Work for Someone Else

$$V_{y,w}(a,\kappa,\zeta) = \max_{\substack{c_C, c_p, n, \\ a', \kappa'}} \{U_w(c,\ell) + \beta \sum_{\zeta'} \mu(\zeta'|\zeta) V(a', \kappa', \zeta')\}$$

$\uparrow$

value of employment when young

Work for Someone Else

$$V_{y,w}(a,\kappa,\zeta) = \max_{\substack{c_c,c_p,n,\\ a',\kappa'}} \{U_w(c,\ell) + \beta \sum_{\zeta'} \mu(\zeta'|\zeta) V(a',\kappa',\zeta')\}$$

$$c = \text{ces}(c_c, c_p)$$

$c_c =$ C-corp goods

$c_p =$ private business goods

Work for Someone Else

$$V_{y,w}(a,\kappa,\zeta) = \max_{\substack{c_c,c_p,n,\\ a',\kappa'}} \{U_W(c,\ell) + \beta \sum_{\zeta'} \mu(\zeta'|\zeta) V(a',\kappa',\zeta')\}$$

$$\nearrow$$

$$\ell = 1 - n$$

$$n = \text{hours in production}$$

Work for Someone Else

$$V_{y,w}(a,\kappa,\zeta) = \max_{\substack{c_c,c_p,n,\\ a',\kappa'}} \{U_w(c,\ell) + \beta \sum_{\zeta'} \mu(\zeta'|\zeta) V(a',\kappa',\zeta')\}$$

$$\begin{aligned} a' &= (1+r)a && \text{(financial returns)} \\ &\quad + w\epsilon n && \text{(compensation)} \\ &\quad - c_c - pc_p && \text{(consumption)} \\ &\quad - \text{ taxes} \\ &\quad \geq 0 \end{aligned}$$

$$\kappa' = (1-\lambda)\kappa \qquad \text{(sweat capital)}$$

Stochastic Aging

- Continuation value when young:

$$V(a', \kappa', \zeta') = \pi_y \sum_{\zeta'} \pi(\zeta'|\zeta) V_y(a', \kappa', \zeta') + (1 - \pi_y) \sum_{\zeta'} \pi(\zeta'|\zeta) V_o(a', \kappa', \zeta')$$

- When old:
  - Receive old-age transfers (T_r)
  - Hit by permanent productivity shock (ξ)

- When die:
  - Transfer a' and part of κ to descendants (φ)

Rest of Model

- C corporation maximization

$$\max_{k_c, n_c} \; A k_c^{\theta} n_c^{1-\theta} - w n_c - (r_c + \delta_k) k_c$$

- All markets clear

- Government budget balances

$$g + (r - \gamma) b = \tau_c \left(\int c_{ci} \, di + \int p c_{pi} \, di \right) + \int T^w (w \epsilon_i n_i) \, di$$

$$+ \int T^b (p y_{pi} - (r + \delta_k) k_{pi} - w n_{pi} - e_i) \, di + \tau_p (y_c - w n_c - \delta_k k_c)$$

$$+ \tau_d (y_c - w n_c - (\gamma + \delta_k) k_c - \tau_p (y_c - w n_c - \delta_k k_c))$$

Model National Accounts

Income shares:

Sweat income	$\int (py_{pi} - (r + \delta_k)k_{pi} - wn_{pi} - e_i)\, di$
Pass-thru labor	$w \int n_{pi}\, di$
Pass-thru capital	$(r + \delta_k) \int k_{pi}\, di$
C corp labor	wn_c
C corp capital	$(r_c + \delta_k)k_c$

Product shares:

Private consumption	$\int (c_{ci} + pc_{pi})\, di$
Pass-thru investment	$\int x_{pi}\, di$
C corp investment	x_c
Govt consumption	g

Note: Nonbusiness activity added separately

Parameters

Disciplining the Theory

- NIPA with private/public business categorized separately
- Census survey of business owners (SBO)
  - Age of business
  - Hours of owners
  - Financing requirements
- IRS panel of W-2s and business net incomes
- Pratts Stats brokered sales of private businesses

Disciplining the Theory

- NIPA with private/public business categorized separately
- Census survey of business owners (SBO)
  - Age of business
  - Hours of owners
  - Financing requirements
- IRS panel of W-2s and business net incomes
- Pratts STats brokered sales of private businesses

Next: Show how data used to identify key parameters

Functional forms

- Preferences:

$$\begin{aligned} U_w(c,\ell) &= (c\ell^{\psi})^{1-\sigma}/(1-\sigma) \\ U_p(c,\ell) &= (c\ell^{\psi})^{1-\sigma}/(1-\sigma)+\zeta \\ c(c_c,c_p) &= c_c^{\eta}c_p^{1-\eta} \end{aligned}$$

- Technologies:

$$\begin{aligned} F(k_c,n_c) &= k_c^{\theta}n_c^{1-\theta} \\ f_{\kappa}(h_{\kappa},e) &= h_{\kappa}^{\vartheta}e^{1-\vartheta} \\ f_y(\kappa,k_p,h) &= \kappa^{\phi}k_p^{\alpha}h^{1-\phi-\alpha} \\ h(h_y,n_p) &= (\omega h_y^{\rho}+(1-\omega)n_p^{\rho})^{\frac{1}{\rho}} \end{aligned}$$

- Fiscal policy:

$T^b(\cdot)$, $T^w(\cdot)$: piecewise linear

- Shocks:

(z,ϵ): finite state Markov process

Baseline Model Parameters

Parameter	Value	Source
Discount factor (β)	0.98	Risk-free rate 4%
Inverse IES (σ)	1.5	
Leisure weight (ψ)	1.38	BLS hours
C-corp good share (η)	45.6	NIPA income shares
FA shares & depr. (θ, α, δ_k)	50.7,30,4.1	NIPA
CES hours (ω, ρ)	64,0.5	NIPA, IRS, LBD
Sweat share & depr. ($\phi, \lambda, \delta_\kappa$)	15,70,4.1	SBO age profile
Sweat accumulation (ϑ)	41.8	BEA IO table
Transition matrix for (z, ϵ)	see text	IRS panel data
Life cycle ($\pi_y, \pi_o, \xi, \varphi$)	98,93,50,90	Census,SBO

Government policies

Parameter	Value	Source
Spending shares:		
Government consumption (g/y)	13.3	NIPA
Old-age transfers (T_r/y)	6.4	NIPA
Tax rates:		
Consumption (τ_c)	6.5	NIPA
Dividends (τ_d)	13.3	IRS, FOF
C-corporate profits (τ_p)	36.0	NIPA, KPMG
Tax schedules	see text	IRS

Private Business Sales

- *Pratt's Stats*: transaction level broker data
  - 27,000 acquired private businesses
  - Seller and sale details
  - Income and balance sheet data
  - Purchase price allocation for IRS Form 8594
- Main finding: these businesses are intangible intensive

Intangible Intensity

$$\text{Intensity} = \frac{\text{Section 197 intangibles} + \text{goodwill}}{\text{Total asset value}}$$

Note: total assets is purchase price net of assumed debts

Intangible Intensity by Legal Structure

	Count	Mean	Median	StDev
S Corporations	5,519	0.58	0.64	0.32
Sole Proprietors	1,140	0.57	0.64	0.31
Partnerships	196	0.57	0.67	0.32

Furthermore, intensity high regardless of industry or size

Intangible Intensity: Model

In the model, we compute the intangible intensity $\text{ii}(s)$ for a business with state s as follows:

$$\text{ii}(s) = \frac{v_\kappa(s)}{v_\kappa(s) + k_p(s)}$$

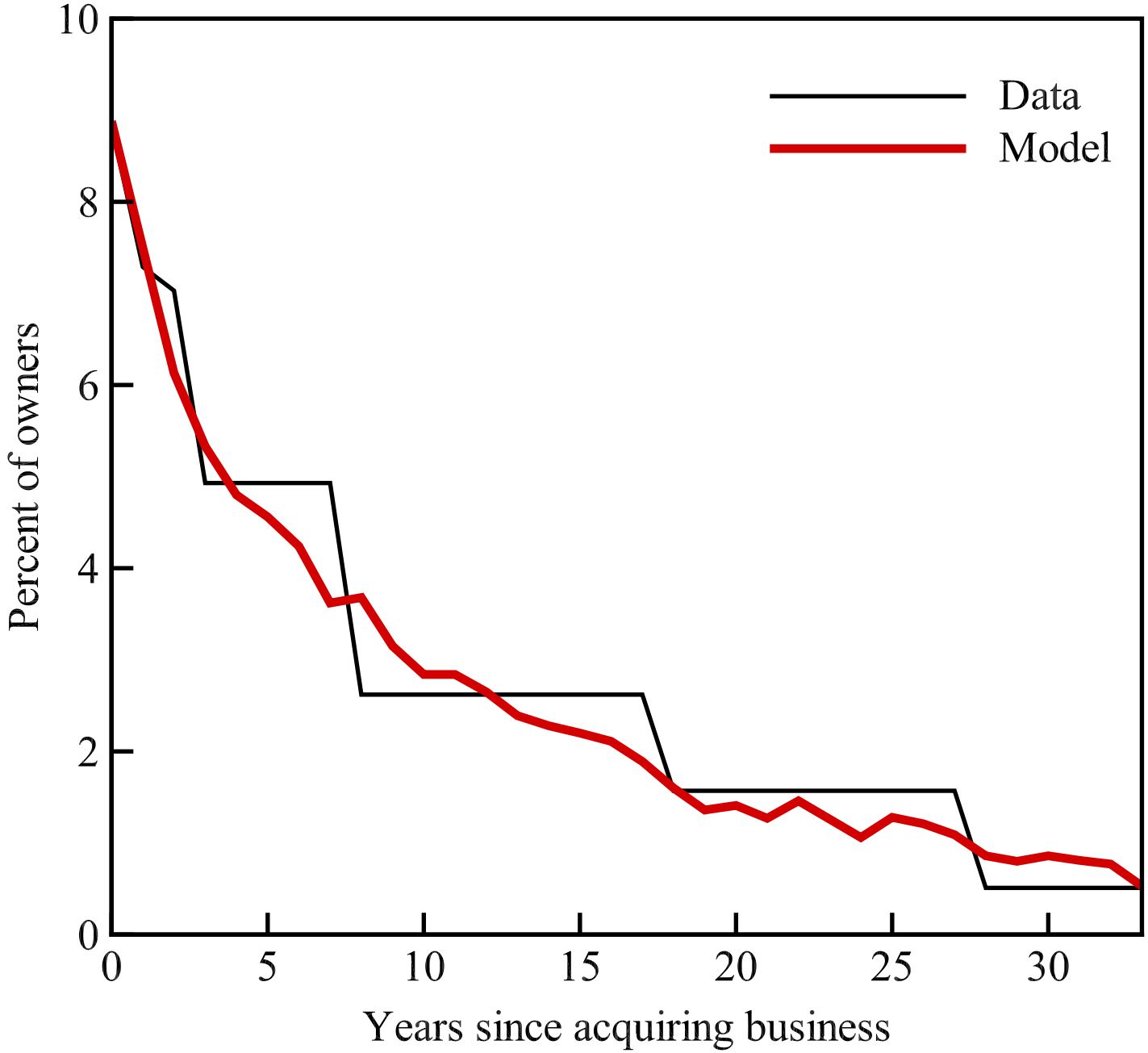
where $v_\kappa(s)$ is the amount of cash needed to leave a business owner indifferent between continuing in business with sweat capital κ and selling it, that is, $v_\kappa(s)$ satisfies:

$$V_{j,p}(s) = V_{j,w}(a + v_\kappa(s), 0, \epsilon, z).$$

In effect, $v_\kappa(s)$ is the value of transferable intangible assets.

We use ii to discipline ϕ

Business Age Profile: Data and Model



Measuring Sweat Equity

Measurement Concepts

- Sweat dividend

$$d = \underbrace{\text{factor share of } \kappa \times \text{output}}_{\text{rents to sweat capital}} - \text{expenses}$$

- Sweat equity

$$V_b(a, \kappa, \zeta) = d + \sum_{\zeta'} \mu(\zeta'|\zeta) M(s'|s) V_b(a', \kappa', \zeta')$$

with $M(\zeta'|\zeta) = \beta \frac{U_c(c', \ell')}{U_c(c, \ell)}$ or $\frac{(1+g)}{(1+r)}$

Measuring Aggregate Sweat Equity

- Total sweat equity

$$\int V_{bi}\, di = 0.93 \text{ to } 1.1 \times \text{GDP}$$

- Back of the envelope:
  - Divide NIPA pass-thru income by $r - g$
  - Adjust for share of sweat capital ($\approx 1/3$) and risk

Measuring Aggregate Sweat Equity

- Total sweat equity

$$\int V_{bi}\, di = 0.93 \text{ to } 1.1 \times \text{GDP}$$

- Some comparisons:
  - Fixed assets used in pass-thrus about $1 \times$ GDP
  - Non-sweat intangibles about $1.4 \times$ GDP

Measuring Aggregate Sweat Equity

- Total sweat equity

$$\int V_{bi}\, di = 0.93 \text{ to } 1.1 \times \text{GDP}$$

- Some comparisons:
  - Fixed assets used in pass-thrus about $1 \times$ GDP
  - Non-sweat intangibles about $1.4 \times$ GDP

What about the distribution?

Distributional Statistics

	Intangible Intensity	Sweat Equity	Gross Return	Dividend Yield	Measured ln TFP	Measured Markups
Mean						
Stdev						
25th						
50th						
75th						
99th						

Only "young" businesses included

Distributional Statistics

	Intangible Intensity	Sweat Equity	Gross Return	Dividend Yield	Measured ln TFP	Measured Markups
Mean Stdev 25th 50th 75th 99th	Salient features: • Significant intensities throughout • Little dispersion in equity, much in returns • Little dispersion in TFPs, much in markups					

Only "young" businesses included

Distributional Statistics

	Intangible Intensity	Sweat Equity	Gross Return	Dividend Yield	Measured ln TFP	Measured Markups
Mean	0.60	1.59	13.2	2.1	0.79	15.6
Stdev	0.36	0.67	29.0	12.7	0.10	58.1
25th	0.20	1.02	0.0	0.0	0.69	−15.9
50th	0.60	1.36	11.0	0.0	0.83	41.2
75th	1.00	2.27	18.7	10.7	0.89	59.6
99th	1.00	2.90	117.4	17.6	0.99	78.9

Only "young" businesses included

Distributional Statistics

	Intangible Intensity	Sweat Equity	Gross Return	Dividend Yield	Measured ln TFP	Measured Markups
Mean	0.60	1.59	13.2	2.1	0.79	15.6
Stdev	0.36	0.67	29.0	12.7	0.10	58.1
25th	0.20	1.02	0.0	0.0	0.69	−15.9
50th	0.60	1.36	11.0	0.0	0.83	41.2
75th	1.00	2.27	18.7	10.7	0.89	59.6
99th	1.00	2.90	117.4	17.6	0.99	78.9

Only "young" businesses included

How do measured TFP, markups compare to true?

Distributional Statistics

	Intangible Intensity	Sweat Equity	Gross Return	Dividend Yield	True ln TFP	True Markups
Mean	0.60	1.59	13.2	2.1	0.30	0.0
Stdev	0.36	0.67	29.0	12.7	0.59	0.0
25th	0.20	1.02	0.0	0.0	0.00	0.0
50th	0.60	1.36	11.0	0.0	0.42	0.0
75th	1.00	2.27	18.7	10.7	0.84	0.0
99th	1.00	2.90	117.4	17.6	0.84	0.0

Only "young" businesses included

Answer: Measured and true are completely different

Sort Businesses by Sweat Capital

	Business Income	Owner Hours	Fin. Assets	Fixed Assets	Measured ln TFP	Measured Markups
Q1	0.01	0.01	6.6	0.1	0.89	−16.1
Q2	0.08	0.10	7.2	1.4	0.84	12.2
Q3	0.15	0.17	5.7	2.7	0.81	13.4
Q4	0.39	0.22	6.2	5.2	0.76	28.2
Q5	0.70	0.31	5.2	8.6	0.72	40.4

Only "young" businesses included

Sort Businesses by Sweat Capital

	Business Income	Owner Hours	Fin. Assets	Fixed Assets	Measured ln TFP	Measured Markups
Q1	0.01	0.01	6.6	0.1	0.89	−16.1
Q2	0.08	0.10	7.2	1.4	0.84	12.2
Q3	0.15	0.17	5.7	2.7	0.81	13.4
Q4	0.39	0.22	6.2	5.2	0.76	28.2
Q5	0.70	0.31	5.2	8.6	0.72	40.4

Only "young" businesses included

Proxies for κ: incomes, hours, tangibles, measured markups

Tax Policy Experiments

Tax Policy Experiments

- Lower tax rates ($\Delta \log(1-\tau_{\text{AMTR}}) = 15\%$):
  - Private pass-through business net income
  - C corporate profits
  - Wages
- Comparable to TJCA17 change in corporate rates
- Show key margins missed with existing framework, eg,
  - Lucas span of control ($y_p = z k_p^{\alpha} n_p^{\nu}$)

Lower Rates on Businesses (% Changes)

	Private Businesses		All Businesses	
Private Activity	Baseline	No Sweat	Baseline	No Sweat
Output				
Sales				
Owner hours, production				
Owner hours, sweat				
Sweat capital				
Fixed asset investment				
Employee hours				
Measured TFP				
Measured markups				
Average business age				

Lower Rates on Businesses (% Changes)

	Private Businesses		All Businesses	
Private Activity	Baseline	No Sweat	Baseline	No Sweat
Output	2.8			
Sales	−0.1			
Owner hours, production	13.8			
Owner hours, sweat	11.1			
Sweat capital	8.5			
Fixed asset investment	0.3			
Employee hours	−3.9			
Measured TFP	5.4			
Measured markups	4.0			
Average business age	8.0			

Significant % of change is intensive margin

Lower Rates on Businesses (% Changes)

	Private Businesses		All Businesses	
Private Activity	Baseline	No Sweat	Baseline	No Sweat
Output	2.8	0.1		
Sales	−0.1	−0.5		
Owner hours, production	13.8	–		
Owner hours, sweat	11.1	–		
Sweat capital	8.5	–		
Fixed asset investment	0.3	−0.5		
Employee hours	−3.9	−0.6		
Measured TFP	5.4	0.6		
Measured markups	4.0	0.0		
Average business age	8.0	−2.1		

Small effects because T^b doesn't impact intensive margin

Lower Rates on Businesses (% Changes)

	Private Businesses		All Businesses	
Private Activity	Baseline	No Sweat	Baseline	No Sweat
Output	2.8	0.1	5.4	2.0
Sales	−0.1	−0.5	8.2	8.0
Owner hours, production	13.8	–	13.1	–
Owner hours, sweat	11.1	–	10.2	–
Sweat capital	8.5	–	12.6	–
Fixed asset investment	0.3	−0.5	8.7	8.0
Employee hours	−3.9	−0.6	−4.9	−1.4
Measured TFP	5.4	0.6	6.0	−0.6
Measured markups	4.0	0.0	4.2	0.0
Average business age	8.0	−2.1	1.3	−7.6

Large differences in effects on time use and age

Lower Rates on Businesses (% Changes)

	Private Businesses		All Businesses	
	Baseline	No Sweat	Baseline	No Sweat
C corporations				
Output	0.3	−0.7	13.5	12.7
Employee hours	−0.3	−0.7	3.2	3.0
Fixed asset investment	0.3	−0.1	24.4	23.1
Other aggregates				
Wage rate	0.6	0.0	10.0	9.5
Interest rate	−0.9	−0.1	−14.2	−13.5
GDP	−0.1	−0.5	8.1	7.9
Total hours	1.5	−0.7	2.8	2.0

Tax on C-corporate profits most relevant for aggregates

Taxing Labor

- Large differences in
  - Effective tax rates
  - Effects of tax changes

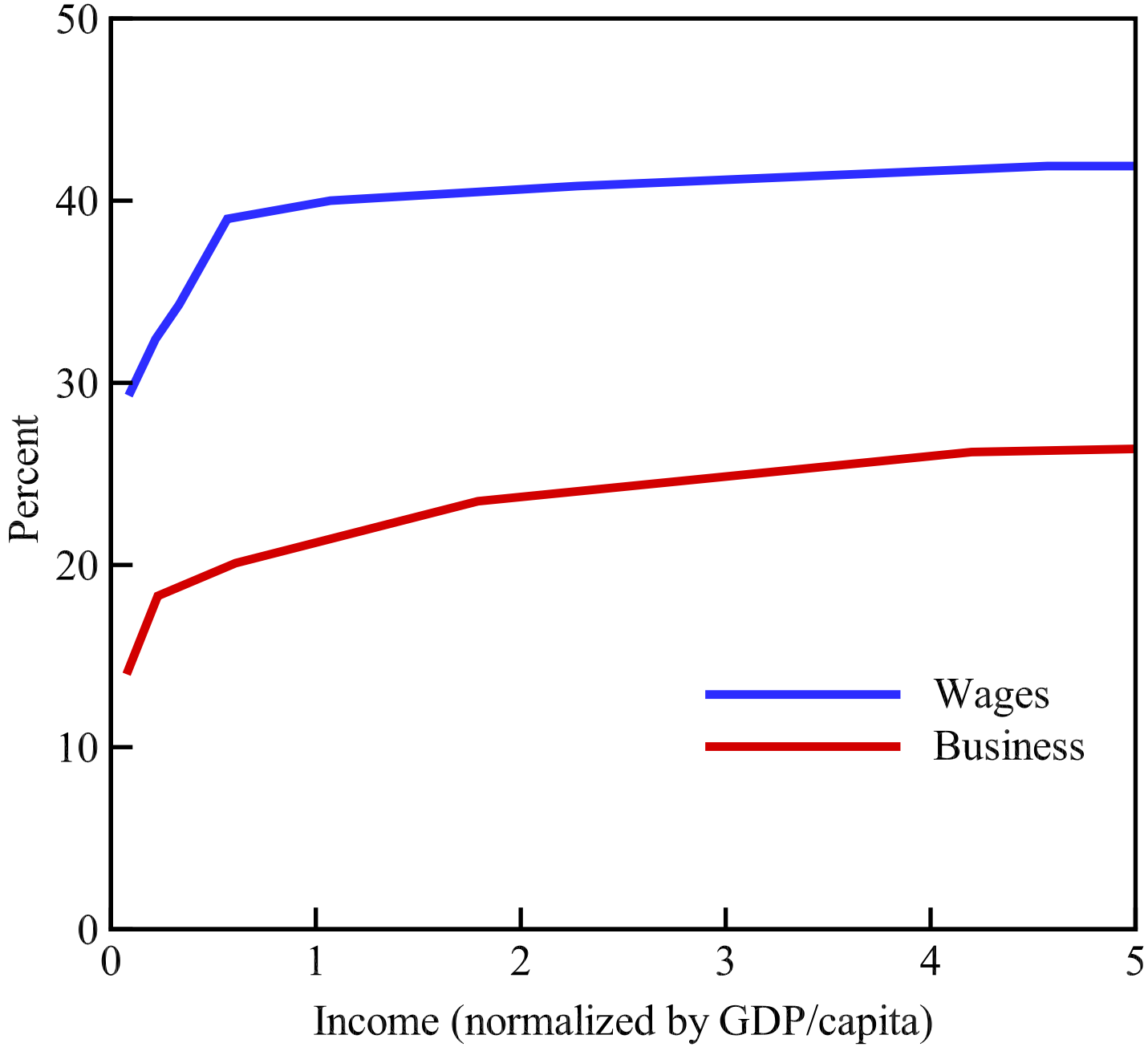
  across labor inputs (owners vs. employees)

Effective Rates on Labor

- Estimates of tax misreporting
  - 57% for sole proprietors
  - 53% for partnerships
  - 18% for S corporations

$\Rightarrow$ Large pecuniary benefits to business ownership

Marginal Rates on Labor



Lower Rates on Businesses vs. Wages

	Lower Tax Rates on:	
	Owners	Employees
Self-employment rate	7.9	−18.1
Total employee hours	−3.4	16.8
Private business	−5.8	18.4
C-corporate	−1.3	11.9
Total owner hours	15.7	−11.1
Production	17.5	−13.0
Sweat building	8.6	−3.9
Wage rate	0.5	0.7

Sensitivity of Main Results

Statistics (%)	Baseline Model	Extended to include: Financial Frictions	Superstar Owners	Brokered Sales
Agg. sweat equity/GDP	101	102	115	103
Intangible intensity	57.9	57.9	55.5	52.3
Gross return	7.7	7.7	10.4	6.5

Sensitivity of Main Results

Statistics (%)	Baseline Model	Extended to include: Financial Frictions	Superstar Owners	Brokered Sales
Effects of lower T^b:				
Owner hours	15.7	15.5	24.2	16.7
Superstar hours	14.4	14.2	0.2	15.4
Employee hours	−5.8	−5.8	−10.6	−5.8
Effects of lower T^w:				
Owner hours	−11.1	−11.4	−28.9	−10.3
Superstar hours	−10.2	−10.5	0.1	−9.1
Employee hours	18.4	17.7	26.8	18.3

Summary

- Value of private business sweat equity (V_b)
  - Similar magnitude to value of fixed assets
  - Little dispersion in $V_b \Rightarrow$ high dispersion in returns
- Tax experiments show:
  - Large sectoral and aggregate effects
  - Abstracting from sweat leads to wrong answers

Appendix

Evidence from Widely-Used Surveys

- Bhandari, Birinci, McGrattan, & See (2018) analyzed:
  - Survey of Consumer Finances (SCF)
  - Panel Surveys of Income Dynamics (PSID)
  - Survey of Income and Program Participation (SIPP)
  - Current Population Survey (CPS)
- Found inconsistent with IRS, across surveys, across years

SCF

- Can compare survey responses directly to IRS data
  - Total adjusted gross incomes (AGI) match
  - Business net incomes do not

- Households with business income asked

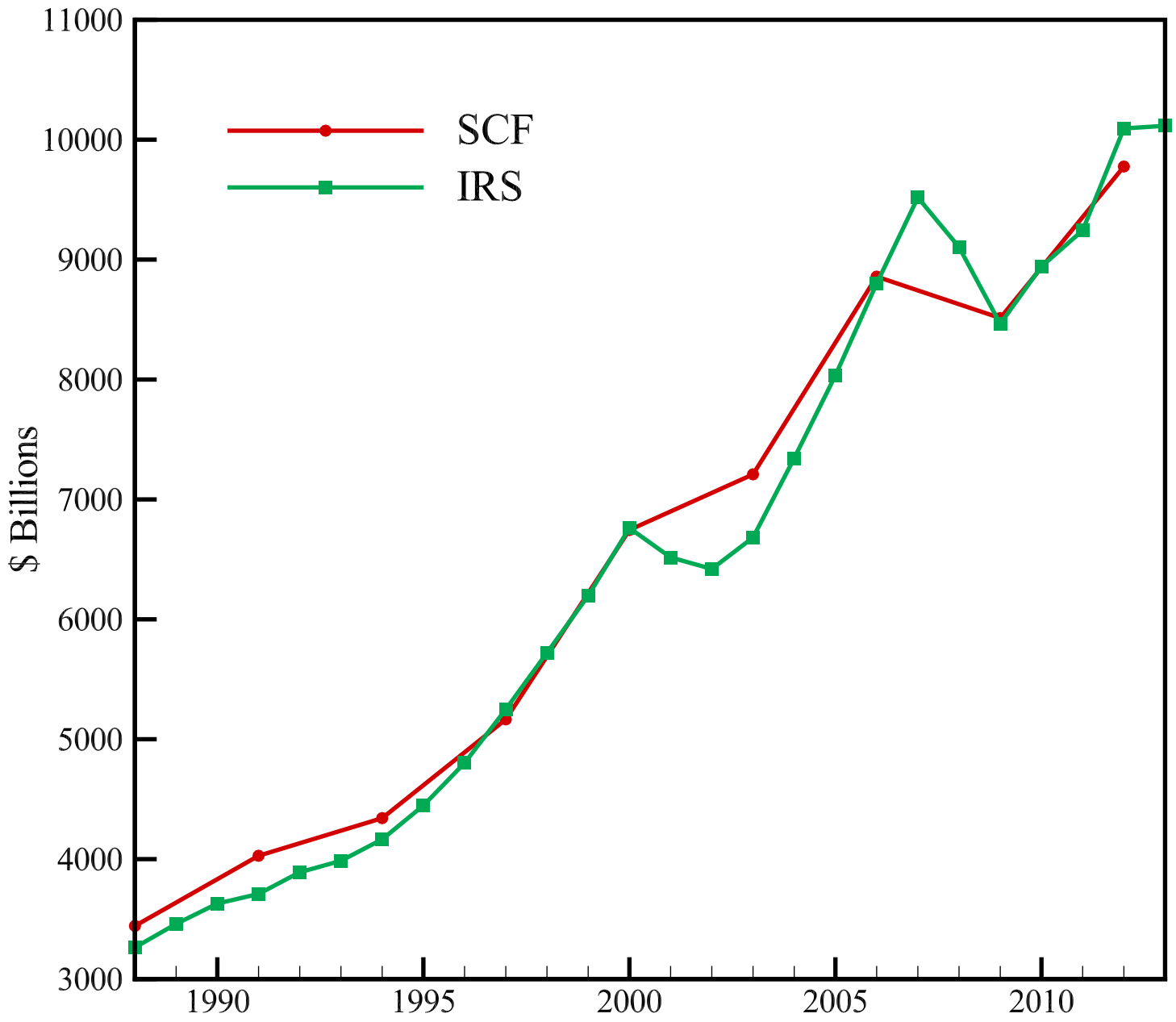
  What was the business's total net income before taxes?

  Partnership: IRS Form 1065, Line 22

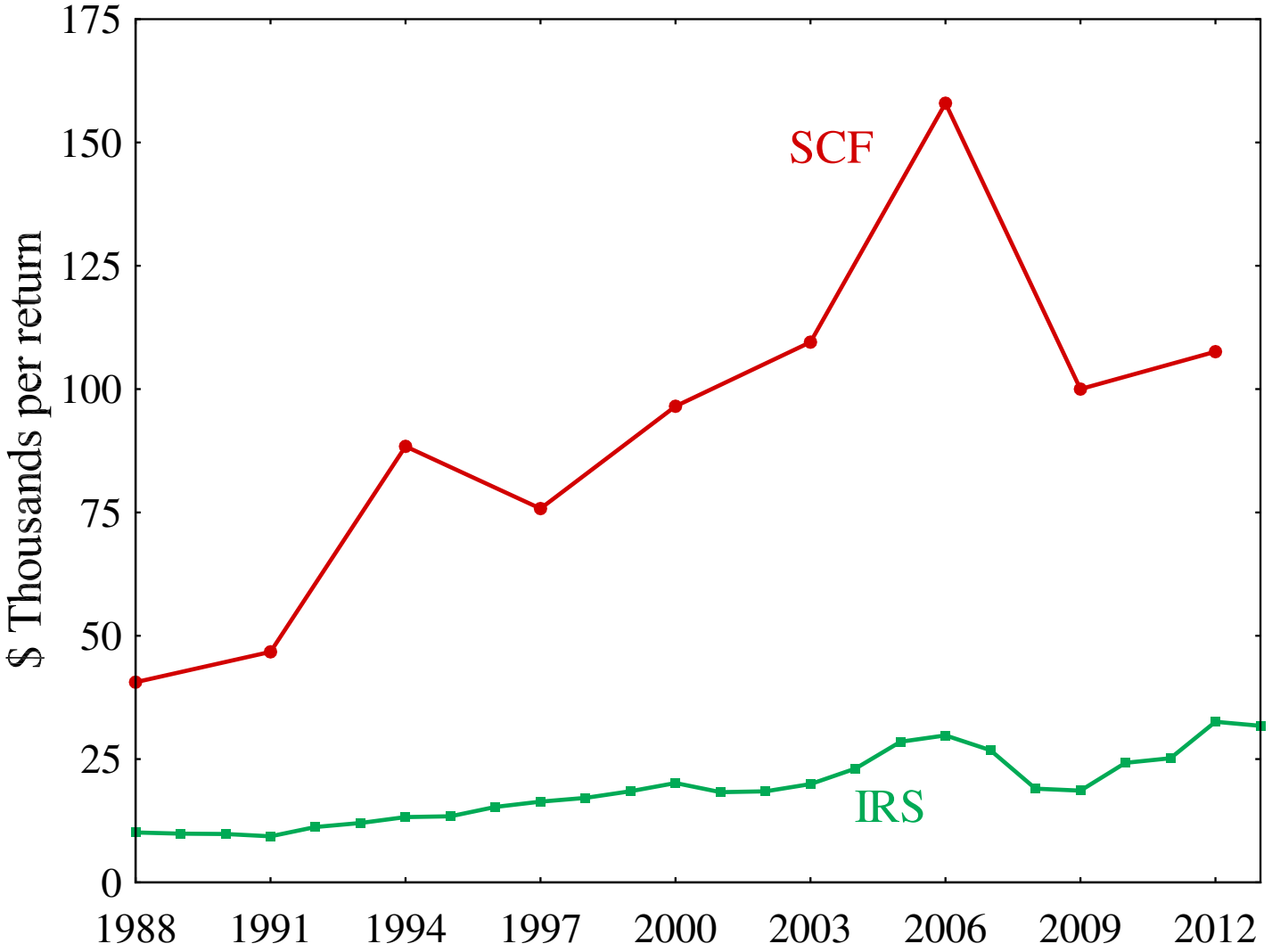
  Sole proprietorship: IRS Form 1040, Sch. C, Line 31

  S-corporation: IRS Form 1120S, Line 21

AGI: SCF vs IRS



Pass-through Net Income: SCF vs IRS



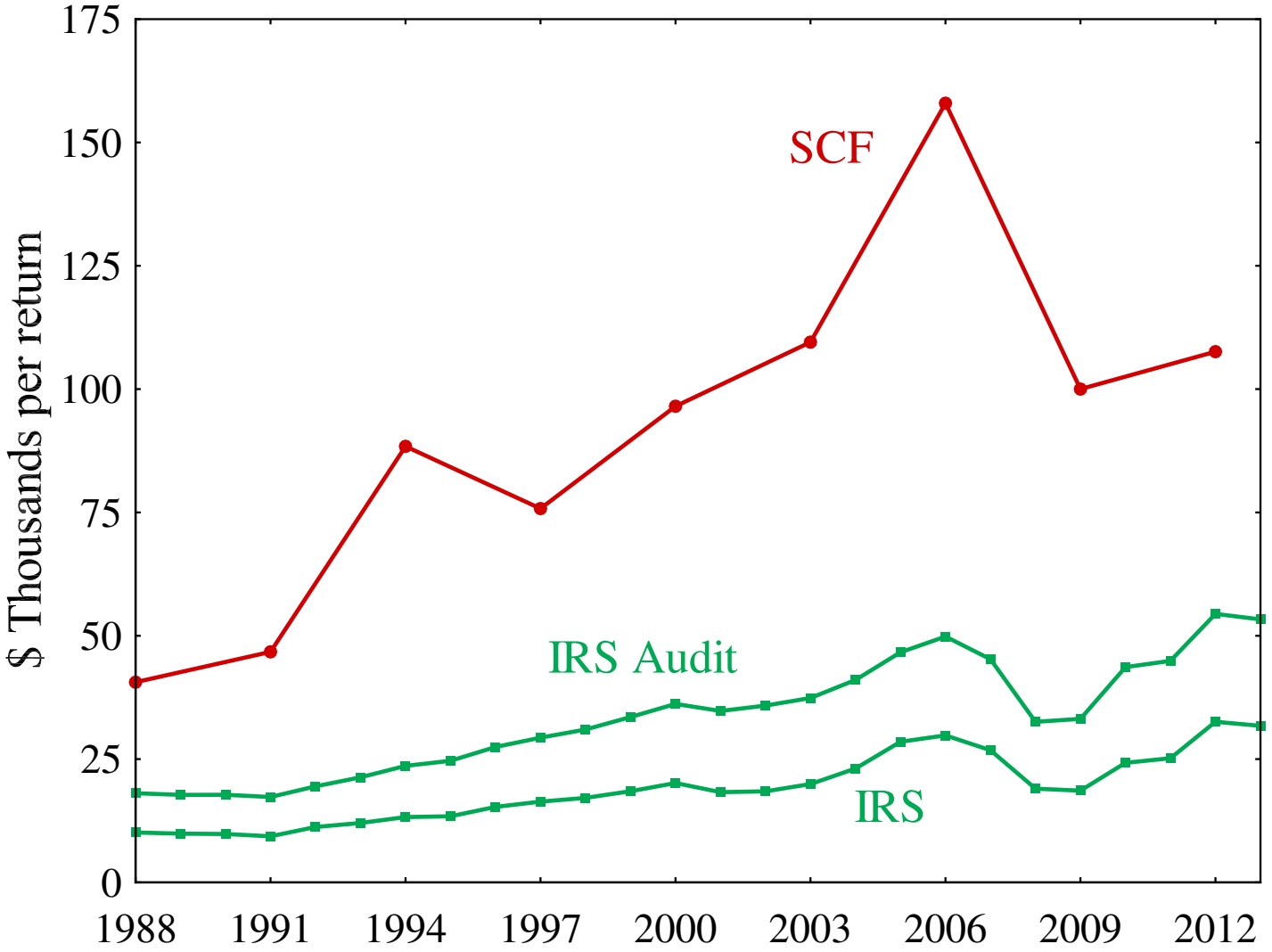
Standard Arguments for Overstatement

- Many business owners:
  - Do hardly anything
  - Lie on taxes but not on surveys
  - Confuse Schedules C, E, and F
- If true, no issues with current survey designs

Standard Arguments for Overstatement

- Many business owners:
  - Do hardly anything
  - Lie on taxes but not on surveys
  - Confuse Schedules C, E, and F
- If true, no issues with current survey designs
- But, all can be rejected

Eg, Adjusting for Misreporting



Implications for Valuations & Returns

- SCF owners asked for value of ongoing businesses
- Value-weighted income yields:
  - 19% SCF
  - 8% CRSP, all firms
  - 2% Pratt's Stats
  - −8% CRSP, lowest asset quintile
- Value-weighted capital gains: not comparable

Implications for Valuations & Returns

- SCF owners asked for value of ongoing businesses
- Value-weighted income yields:
  - 19% SCF
  - 8% CRSP, all firms
  - 2% Pratt's Stats
  - −8% CRSP, lowest asset quintile
- Value-weighted capital gains: not comparable
- *Bottom line*: Need theory to derive implications