Sweat Equity in U.S. Private Business

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Motivation

- Want framework to study business tax reforms
- Need to include private businesses
  - Significant net income
  - Different from public businesses
- Currently, little known about assets or tax effects
Private Businesses

- Earn 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
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

⇒ 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


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

• Data

• Theory

• Parameters

• Results
Data Motivating Analysis
Data Motivating Analysis

- Assets in selling businesses reported to IRS, ie,
  - Cash and deposit accounts
  - Government securities and publicly traded stocks
  - Debt instruments
  - Inventory
  - Fixed assets and land
  - Section 197 intangibles
  - Goodwill

- Buyers & sellers agree to allocation

- Allocation determines capital gains and amortizations
Data Motivating Analysis

- Assets in selling businesses reported to IRS, ie,
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- Allocation determines capital gains and amortizations
Evidence: 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

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>Mean</th>
<th>Median</th>
<th>StDev</th>
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<tbody>
<tr>
<td>S Corporations</td>
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<td>0.58</td>
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<td>Sole Proprietors</td>
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<td>0.57</td>
<td>0.64</td>
<td>0.31</td>
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<td>Partnerships</td>
<td>196</td>
<td>0.57</td>
<td>0.67</td>
<td>0.32</td>
</tr>
</tbody>
</table>

Furthermore, intensity high regardless of industry or size
Some Issues

- Pratt’s Stats dataset
  - Not representative
  - Excludes ongoing businesses

- Want measures for all US private business
Theory: Overview
Environment

- Two sectors: C-corp, Pass-through
Environment

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• Households of age $j$
  
  ○ Endowed with stochastic abilities $z, \epsilon$

  ○ Face occupational choice
Environment

- Two sectors: C-corp, Pass-through
- Households of age $j$
  - Endowed with stochastic abilities $z, \epsilon$
  - Face occupational choice
    - Work for someone else
    - Run own business
Environment

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

\[ \text{Work for someone else} \quad \text{Run own business} \]

Incomes:

\[
we - p z f_y(\kappa, k_p, h_y, n_p) - (r + \delta_k)k_p - w n_p - e
\]
Environment

- Two sectors: C-corp, Pass-through
- Households of age $j$
  - Endowed with stochastic abilities $z, \epsilon$
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    - 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 $z, \epsilon$
  - 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 $z, \epsilon$
  - Face occupational choice
    \[
    \Rightarrow \quad \text{Work for someone else} \\
    \Rightarrow \quad \text{Run own business}
    \]
    \[
    \text{incomes: } \ wage \quad pzf_y(\kappa, k_p, h_y, n_p) - (r + \delta_k)k_p - wn_p - e
    \]
  \[
  \uparrow
  \]
  Owner’s hours in production
Environment

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

  \[ \begin{array}{c}
  \leftarrow \quad \text{Work for someone else} \\
  \rightarrow \quad \text{Run own business}
  \end{array} \]

incomes: $w \epsilon$

\[ p z f_y(\kappa, k_p, h_y, n_p) - (r + \delta_k)k_p - wn_p - e \]

\[ \uparrow \]

Worker hours in production
Environment

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

\[ \text{Work for someone else} \quad \text{Run own business} \]

incomes: \( w \epsilon \)

\[ p z f_y(\kappa, k_p, h_y, n_p) - (r + \delta_k) k_p - w n_p - e \]

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

Owner’s hours to build sweat capital
Environment

- Two sectors: C-corp, Pass-through
- Households of age $j$
  - Endowed with stochastic abilities $z, \epsilon$
  - Face occupational choice
    
    $\leftarrow$ Work for someone else  $\rightarrow$ Run own business

incomes: $w\epsilon$

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

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

$\uparrow$

Expenses to build sweat capital
Environment

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

\[
\begin{align*}
\text{Work for someone else} & \quad \text{Run own business} \\
\text{incomes: } w\epsilon & \quad pz f_y(\kappa, k_p, h_y, n_p) - (r + \delta_\kappa)k_p - wn_p - e
\end{align*}
\]

\[
\begin{align*}
\kappa' &= (1 - \lambda)\kappa & \kappa' &= (1 - \delta_\kappa)\kappa + f_\kappa(h_\kappa, e) \\
\uparrow & \quad \uparrow & \quad \uparrow \\
\text{Sell for cash or keep, but depreciates if not in use}
\end{align*}
\]
Environment

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

\[
\begin{align*}
\text{Work for someone else} & \quad \text{Run own business} \\
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\kappa' = (1 - \lambda)\kappa & \quad \kappa' = (1 - \delta_\kappa)\kappa + f_\kappa(h_\kappa, e)
\end{align*}
\]
- Government collects taxes on incomes & products
Theory: Details
Household Maximization

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

- Value functions:
  \[
  V_j(a, \kappa, \zeta) = \max \{ V_{j,p}(a, \kappa, \zeta), V_{j,w}(a, \kappa, \zeta) \}
  \]
  - Run business
  - Work for someone
\[ V_{y,p}(a, \kappa, \zeta) = \max_{c_c, c_p, h_y, h_\kappa, k_p, n_p, e, a', \kappa'} \{ U(c, \ell) + \beta \sum_{\zeta'} \mu(\zeta' | \zeta) V(a', \kappa', \zeta') \} \]
Run Business

\[
V_{y,p}(a, \kappa, \zeta) = \max_{c_c, c_p, h_y, h_\kappa, k_p, n_p, e, a', \kappa'} \left\{ U(c, \ell) + \beta \sum_{\zeta'} \mu(\zeta' | \zeta) V(a', \kappa', \zeta') \right\}
\]

↑

value of running business when young
Run Business

\[ V_{y,p}(a, \kappa, \zeta) = \max_{c_c, c_p, h_y, h_{\kappa}, k_p, n_p, e, a', \kappa'} \left\{ U(c, \ell) + \beta \sum_{\zeta'} \mu(\zeta'|\zeta) V(a', \kappa', \zeta') \right\} \]

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

\[ c_c = \text{C-corp goods} \]

\[ c_p = \text{private business goods} \]
Run Business

\[ V_{y,p}(a, \kappa, \zeta) = \max_{c_c, c_p, h_y, h_\kappa, k_p, n_p, e, a', \kappa'} \left\{ U(c, \ell) + \beta \sum_{\zeta'} \mu(\zeta' | \zeta) V(a', \kappa', \zeta') \right\} \]

\[ \ell = 1 - h_y - h_\kappa \]

\( h_y \) = hours in production

\( h_\kappa \) = hours accumulating sweat capital
Run Business

\[ V_{y,p}(a, \kappa, \zeta) = \max_{c_c, c_p, h_y, h_\kappa, k_p, n_p, e, a', \kappa'} \left\{ U(c, \ell) + \beta \sum_{\zeta'} \mu(\zeta' | \zeta) V(a', \kappa', \zeta') \right\} \]

\[ a' = (1 + r)a \]
\[ + py_p - (r + \delta_k)k_p - w n_p - e \] (financial returns)
\[ - c_c - p c_p \]
\[ - \text{taxes} \]
\[ \geq \chi p y_p \] (working capital)

\[ \kappa' = (1 - \delta_\kappa) \kappa + f_\kappa(h_\kappa, e) \] (sweat capital)

\[ y_p = z f_y(\kappa, k_p, h_y, n_p) \] (private output)
Example: Dental Office

- **Assets:**
  
  \[ a: \text{Financial assets (e.g., bank account, shares)} \]
  \[ k_p: \text{Dental equipment (owned or leased)} \]
  \[ \kappa: \text{Patient list} \]

- **Time use:**
  
  \[ h_y: \text{Owner examines existing patients} \]
  \[ h_{\kappa}: \text{Owner finds new patients} \]
  \[ n_p: \text{Hygenists examine existing patients} \]

- **Expenses:**
  
  \[ e: \text{Local advertising} \]
$V_{y,w}(a, \kappa, \zeta) = \max_{c_c, c_p, n, a', \kappa'} \{ U(c, \ell) + \beta \sum_{\zeta'} \mu(\zeta' | \zeta) V(a', \kappa', \zeta') \}$
Work for Someone Else

\[ V_{y,w}(a, \kappa, \zeta) = \max_{c_c, c_p, n, a', \kappa'} \left\{ U(c, \ell) + \beta \sum_{\zeta'} \mu(\zeta' | \zeta) V(a', \kappa', \zeta') \right\} \]

↑

value of employment when young
Work for Someone Else

\[ V_{y,w}(a, \kappa, \zeta) = \max_{a', \kappa', c, c_p, n} \{ U(c, \ell) + \beta \sum_{\zeta'} \mu(\zeta' | \zeta) V(a', \kappa', \zeta') \} \]

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

\[ c_c = \text{C-corp goods} \]

\[ c_p = \text{private business goods} \]
Work for Someone Else

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

\[ \ell = 1 - n \]

\[ n = \text{hours in production} \]
Work for Someone Else

\[ V_{y,w}(a, \kappa, \zeta) = \max_{c, c', n, a', \kappa'} \left\{ U(c, \ell) + \beta \sum_{\zeta'} \mu(\zeta' | \zeta) V(a', \kappa', \zeta') \right\} \]

\[ a' = (1 + r)a \quad \text{(financial returns)} \]
\[ + w\epsilon n \quad \text{(compensation)} \]
\[ - c_c - p c_p \quad \text{(consumption)} \]
\[ - \text{taxes} \]
\[ \geq 0 \]

\[ \kappa' = (1 - \lambda)\kappa \quad \text{(sweat capital)} \]
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 \((\xi)\)

- When die:
  - Transfer \(a'\) and part of \(\kappa\) to descendants \((\varphi)\)
Rest of Model

- C corporation maximization

\[
\max_{k_c, n_c} A k_c^\theta n_c^{1-\theta} - wn_c - (r_c + \delta_k)k_c
\]

- All markets clear

- Government budget balances

\[
g + (r - \gamma)b = \tau_c \left( \int c_{ci} di + \int p_{pi} di \right) + \int w^w (w e_i n_i) di \\
+ \int T^b (p y_{pi} - (r + \delta_k)k_{pi} - wn_{pi} - e_i) di + \tau_p (y_c - wn_c - \delta_k k_c) \\
+ \tau_d (y_c - wn_c - (\gamma + \delta_k)k_c - \tau_p (y_c - wn_c - \delta_k k_c))
\]
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
Disciplining the Theory

- NIPA with private/public business categorized separately
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Next: Show how data used to identify key parameters
Functional forms

- Preferences:
  \[ U(c, \ell) = (c\ell^\psi)^{1-\sigma}/(1 - \sigma) \]
  \[ c(c_c, c_p) = c_c^\eta c_p^{1-\eta} \]

- Technologies:
  \[ F(k_c, n_c) = k_c^\theta n_c^{1-\theta} \]
  \[ f_\kappa(h_\kappa, e) = h_\kappa^\vartheta e^{1-\vartheta} \]
  \[ f_y(\kappa, k_p, h) = \kappa^{\phi} k_p^{\alpha} h^{1-\phi-\alpha} \]
  \[ h(h_y, n_p) = (\omega h_y^\rho + (1 - \omega) n_p^\rho)^{1/\rho} \]

- Fiscal policy:
  \[ T^b(\cdot), T^w(\cdot): \text{piecewise linear} \]

- Shocks:
  \[ (z, \epsilon): \text{finite state Markov process} \]
### Baseline Model Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>Discount factor ($\beta$)</td>
<td>0.98</td>
<td>Risk-free rate 4%</td>
</tr>
<tr>
<td>Inverse IES ($\sigma$)</td>
<td>1.5</td>
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<tr>
<td>Leisure weight ($\psi$)</td>
<td>1.38</td>
<td>BLS hours</td>
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<tr>
<td>C-corp good share ($\eta$)</td>
<td>45.6</td>
<td>NIPA income shares</td>
</tr>
<tr>
<td>FA shares &amp; depr. ($\theta, \alpha, \delta_k$)</td>
<td>50.7, 30, 4.1</td>
<td>NIPA</td>
</tr>
<tr>
<td>CES hours ($\omega, \rho$)</td>
<td>64, 0.5</td>
<td>NIPA, IRS, LBD</td>
</tr>
<tr>
<td>Sweat share &amp; depr. ($\phi, \lambda, \delta_k$)</td>
<td>15, 70, 4.1</td>
<td>SBO age profile</td>
</tr>
<tr>
<td>Sweat accumulation ($\vartheta$)</td>
<td>41.8</td>
<td>BEA IO table</td>
</tr>
<tr>
<td>Transition matrix for ($z, \epsilon$)</td>
<td>see text</td>
<td>IRS panel data</td>
</tr>
<tr>
<td>Life cycle ($\pi_y, \pi_o, \xi, \varphi$)</td>
<td>98, 93, 50, 90</td>
<td>Census, SBO</td>
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## Government policies

<table>
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<th>Parameter</th>
<th>Value</th>
<th>Source</th>
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<td><strong>Spending shares:</strong></td>
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</tr>
<tr>
<td>Government consumption ( (g/y) )</td>
<td>13.3</td>
<td>NIPA</td>
</tr>
<tr>
<td>Old-age transfers ( (T_r/y) )</td>
<td>6.4</td>
<td>NIPA</td>
</tr>
<tr>
<td><strong>Tax rates:</strong></td>
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<tr>
<td>Consumption ( (\tau_c) )</td>
<td>6.5</td>
<td>NIPA</td>
</tr>
<tr>
<td>Dividends ( (\tau_d) )</td>
<td>13.3</td>
<td>IRS, FOF</td>
</tr>
<tr>
<td>C-corporate profits ( (\tau_p) )</td>
<td>36.0</td>
<td>NIPA, KPMG</td>
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<tr>
<td>Tax schedules</td>
<td>see text</td>
<td>IRS</td>
</tr>
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</table>
Measuring Sweat Equity
Measurement Concepts

- Sweat dividend

\[ d = \text{factor share of } \kappa \times \text{output} - \text{expenses} \]

\[ \text{rents to sweat capital} \]

- Sweat equity

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

with \[ M(\zeta' | \zeta) = \beta \frac{U_c(c', \ell')}{U_c(c, \ell)} \text{ or } \frac{(1+g)}{(1+r)} \]
Measuring Aggregate Sweat Equity

- Total sweat equity

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

- 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 \( 1 \times \text{GDP} \)
  - Non-sweat intangibles about \( 1.4 \times \text{GDP} \)
Measuring Aggregate Sweat Equity

• Total sweat equity

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

• 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

<table>
<thead>
<tr>
<th>Mean</th>
<th>Intangible Intensity</th>
<th>Sweat Equity</th>
<th>Gross Return</th>
<th>Dividend Yield</th>
<th>Measured \ln TFP</th>
<th>Markups</th>
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<tbody>
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<td>Stdev</td>
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<td>50th</td>
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<td>75th</td>
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<td>99th</td>
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Only “young” businesses included
## Distributional Statistics

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**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

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<th>Measured Markups</th>
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<tr>
<td>Mean</td>
<td>0.60</td>
<td>1.59</td>
<td>13.2</td>
<td>2.1</td>
<td>0.79</td>
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<td>78.9</td>
</tr>
</tbody>
</table>

Only “young” businesses included
## Distributional Statistics

<table>
<thead>
<tr>
<th></th>
<th>Intangible Intensity</th>
<th>Sweat Equity</th>
<th>Gross Return</th>
<th>Dividend Yield</th>
<th>( \ln ) TFP</th>
<th>Measured Markups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.60</td>
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Only “young” businesses included

How do measured TFP, markups compare to true?
# Distributional Statistics

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</table>

Only “young” businesses included

Answer: Measured and true are completely different
Sort Businesses by Sweat Capital

<table>
<thead>
<tr>
<th></th>
<th>Business Income</th>
<th>Owner Hours</th>
<th>Fin. Assets</th>
<th>Fixed Assets</th>
<th>ln TFP</th>
<th>Measured Markups</th>
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<tbody>
<tr>
<td>Q1</td>
<td>0.01</td>
<td>0.01</td>
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<tr>
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<td>0.08</td>
<td>0.10</td>
<td>7.2</td>
<td>1.4</td>
<td>0.84</td>
<td>12.2</td>
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<tr>
<td>Q3</td>
<td>0.15</td>
<td>0.17</td>
<td>5.7</td>
<td>2.7</td>
<td>0.81</td>
<td>13.4</td>
</tr>
<tr>
<td>Q4</td>
<td>0.39</td>
<td>0.22</td>
<td>6.2</td>
<td>5.2</td>
<td>0.76</td>
<td>28.2</td>
</tr>
<tr>
<td>Q5</td>
<td>0.70</td>
<td>0.31</td>
<td>5.2</td>
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Only “young” businesses included

Proxies for $\kappa$: incomes, hours, tangibles, measured markups
Tax Policy Experiments
Tax Policy Experiments

- Lower tax rates ($\Delta \log(1 - \tau_{AMTR}) = 15\%$):
  - 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)

<table>
<thead>
<tr>
<th>Private Activity</th>
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</tr>
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<tbody>
<tr>
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</tr>
<tr>
<td>Output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner hours, production</td>
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<td></td>
</tr>
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Significant % of change is intensive margin
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Small effects because $T^b$ doesn’t impact intensive margin
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Large differences in effects on time use and age
### Lower Rates on Businesses (% Changes)

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<tr>
<td></td>
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<td></td>
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<td></td>
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<tr>
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<td>0.3</td>
<td>−0.7</td>
<td>13.5</td>
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<tr>
<td>Employee hours</td>
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<td>3.2</td>
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<tr>
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<td>10.0</td>
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<td>−0.1</td>
<td>−14.2</td>
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<tr>
<td>GDP</td>
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<td>−0.5</td>
<td>8.1</td>
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<tr>
<td>Total hours</td>
<td>1.5</td>
<td>−0.7</td>
<td>2.8</td>
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</tbody>
</table>

Tax on C-corporate profits most relevant for aggregates
Decompose Private Business Tax Changes

- Sort population by $a$, $\kappa$, or $z$

- Compute contributions of tax change for subgroups

$\Rightarrow$ Results differ significantly
Example: Decompose $\Delta n_p / \Delta T^b'$

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Assets ($a$)</th>
<th>Sweat ($\kappa$)</th>
<th>Productivity ($z$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-1.10</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>-0.53</td>
<td>0.07</td>
<td>0.00</td>
</tr>
<tr>
<td>3</td>
<td>-1.38</td>
<td>-3.10</td>
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</tr>
<tr>
<td>4</td>
<td>-1.37</td>
<td>-6.04</td>
<td>-0.05</td>
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<tr>
<td>5</td>
<td>0.43</td>
<td>5.12</td>
<td>-3.89</td>
</tr>
<tr>
<td>Total</td>
<td>-3.94</td>
<td>-3.94</td>
<td>-3.94</td>
</tr>
</tbody>
</table>

- In Lucas, top ($a, z$) owners contribute most to decline
- Here, low-$a$, mid-$\kappa$, high-$z$ owners do
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

⇒ Large pecuniary benefits to business ownership
Marginal Rates on Labor

![Graph showing marginal rates on labor]
Lower Rates on Businesses vs. Wages

- Effects on private businesses:

<table>
<thead>
<tr>
<th></th>
<th>Lower $T^{b'}$</th>
<th>Lower $T^{w'}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-employment</td>
<td>3.3</td>
<td>−9.5</td>
</tr>
<tr>
<td>Employee hours</td>
<td>−3.9</td>
<td>14.2</td>
</tr>
<tr>
<td>Owner time producing</td>
<td>13.8</td>
<td>−6.2</td>
</tr>
<tr>
<td>Owner time building</td>
<td>11.1</td>
<td>0.4</td>
</tr>
</tbody>
</table>

- $T^{b'}$ ↓: More owners doing more of both tasks
- $T^{w'}$ ↓: Fewer owners running larger-scale businesses
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
• 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*
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
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  - 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
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- *Bottom line*: Need theory to derive implications