Taxes, Regulations, and the Value of US Corporations: A Reassessment

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The Story Begins in 1995
The most important aspect of the real business cycle development is that it established a prototype and a set of tools for computing the equilibria of artificial economies and studying their empirical properties... The chapters show how to structure and address important questions by using these tools.

— Thomas F. Cooley
Fast Forward to December 1996
Campbell and Shiller

- Testified before Fed Board on 12/3/96
  - Price-dividend ratios historically high
  - Reversion to mean likely

- What were they seeing?

1870-1990 Average
Meanwhile

- Greenspan publicly worried about irrational exuberance
- Prescott privately worried he invested too much in stocks!
Fast Forward to 2001

- Campbell and Shiller updated their analysis
  - Price-dividend ratios were even higher
  - Reversion to mean very likely

- What were they seeing?
What would Campbell and Shiller conclude today?
S&P Price-Dividend Ratio, 1871:01–2023:03
Was/Is the Market Overvalued?
A Cooley Perspective
Using Theory

• Predictions of neoclassical theory:

(1) Value of corporations = value of fixed assets

(2) = present value of distributions

• Checking (1) is easier than (2)
Theory: Incorporating Intangibles

• Preferences:

\[ \sum_{t=0}^{\infty} \beta^t U(c_t, n_t) \]

• Corporate technology:

\[ y_t = f(k_{T,t}, k_{I,t}, z_t n_t) \]

• Variables:

\[ c = \text{consumption}, \ell = \text{leisure}, y = \text{output} \]

\[ k_I, k_T = \text{in/tangible capital}, n = \text{labor}, z = \text{technology} \]
Theory: Incorporating US Tax System

- Corporate income tax
- Distribution tax
- Labor income tax
- Sales/excise tax
- Property tax
Theory: Incorporating US Tax System

- Corporate income tax
- Distribution tax†
- Labor income tax
- Sales/excise tax
- Property tax

† Not included in “Is the Stock Market Overvalued?” (QR 2000)
The US Tax System

• and the Corporation:

$$\max \sum_{t=0}^{\infty} p_t \{ y_t - w_t n_t - x_{T,t} - x_{I,t} - \tau_{\text{corp}} [ y_t - w_t n_t - \delta_T k_{T,t} - \tau_{\text{prop}} k_{T,t} - x_{I,t} ]$$

$$- \tau_{\text{prop}} k_{T,t} + \tau_{T,\text{subs}} x_{T,t} + \tau_{I,\text{subs}} x_{I,t} \}$$

• and the Household:

$$\sum_{t=0}^{\infty} p_t \{ (1 + \tau_{\text{cons}}) c_t + v_t (s_{t+1} - s_t) \}$$

$$\leq \sum_{t=0}^{\infty} p_t \{ (1 - \tau_{\text{dist}}) d_t s_t + (1 - \tau_{\text{labor}}) w_t n_t + y_{\text{other},t} \}$$
Main Theoretical Results
$V = \text{Value of Corporate Capital } (k_T, k_I)$

$$V_t = (1 - \tau_{\text{dist}}) [(1 - \tau_{\text{T,subs}})k_{T,t+1} + (1 - \tau_{\text{corp}} - \tau_{\text{I,subs}})k_{I,t+1}]$$

$V$ aggregate value of corporate equities ($= \sum_i v_{it}s_{it}$)

$\tau_{\text{dist}}$ tax rate on corporate distributions

$\tau_{\text{corp}}$ tax rate on corporate income

$\tau_{\text{T,subs}}$ subsidy for tangible investments

$\tau_{\text{I,subs}}$ subsidy for intangible investments

$k_T$ tangible corporate capital stock

$k_I$ intangible corporate capital stock
Distribution Tax Relevance for \( V \)

\[
V_t = (1 - \tau_{\text{dist}}) \left[ (1 - \tau_{T,\text{subs}})k_{T,t+1} + (1 - \tau_{\text{corp}} - \tau_{I,\text{subs}})k_{I,t+1} \right] \\
\text{Not directly affected by } \tau_{\text{dist}}
\]

\[\implies\] If tax rate on distributions falls

- Corporate value-output ratio rises
- Capital-output ratios remain flat
Treatment of Capital Gains

• Previous work assumed tax on accrual, not realization:

\[ \tau_{\text{dist}} = 1 - \left( \frac{1 - \tau_{\text{pers}}}{1 - \tau_{\text{cg}}} \right) \]

• US taxes on realization:
  - \( \tau_{\text{dist}} = \tau_{\text{pers}} \) if distribution by dividends
  - \( \tau_{\text{dist}} = \tau_{\text{cg}} \) if distribution by buying back shares
Treatment of Tax Deferral

• If tax deferral through retirement accounts allowed

• Then:

\[ \tau_{\text{dist}} = 0 \]

• Intuition: invest $1

  ◦ Give up \((1 - \tau_{\text{pers}})\) today

  ◦ Get \((1 - \tau_{\text{pers}})(1 + i)^T\) in \(T\) periods
NIPA Profits and Corporate Capital

- If returns to tangible and intangible assets equated
- Then, on a balanced growth path:

\[
\text{NIPA profit} = \frac{i}{1 - \tau_{\text{corp}}} k_T + (i - g)k_I
\]

- Intuition:
  - Capitalize tangibles: \((r_T - \delta_T)k_T\)
  - Expense intangibles: \(r_I k_I - x_I\)

\[\Rightarrow \text{Estimates of } i, g, k_T \text{ can be used to infer } k_I\]
Rise in US Corporate Value

• Analyzed growth model with
  ○ NIPA data for 1960–2001
  ○ Profit relation to infer intangible stock

• Predicted that \( V/GDP \) should have roughly doubled
  ○ Large decline in tax on distributions
  ○ Large rise in outward FDI

† See McGrattan and Prescott (Restud 2005)
Taxes, Regulations, and the Value of US and UK Corporations
Corporate Value to GDP, 1960–2001

Value to GDP

Total
Equity

## Predicted and Actual US Corporate Values

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Predicted Fundamental Values</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic tangible capital</td>
<td>.563</td>
<td>.838</td>
</tr>
<tr>
<td>Domestic intangible capital</td>
<td>.229</td>
<td>.350</td>
</tr>
<tr>
<td>Foreign capital</td>
<td>.086</td>
<td>.379</td>
</tr>
<tr>
<td><strong>Total Relative to GDP</strong></td>
<td>.877</td>
<td>1.567</td>
</tr>
<tr>
<td><strong>Actual Market Values†</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporate equities</td>
<td>.898</td>
<td>1.576</td>
</tr>
<tr>
<td>Net corporate debt</td>
<td>.041</td>
<td>.028</td>
</tr>
<tr>
<td><strong>Total Relative to GDP</strong></td>
<td>.940</td>
<td>1.604</td>
</tr>
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</table>

† Peaked in 1999 at 1.9 GDP
What are we seeing now?
C-Corporate Valuations

Value to GDP

Total
Equity
Updates
Updates

- Theory:
  - Incorporate nonrival intangibles of multinationals
  - Distinguish S- and C-corporations

- Data:
  - Tax reforms (eg, JGTRRA03, NIIT13, TCJA17)
  - Intellectual property products (IPP) introduced in 2013
Treatment of Nonrival Intangible Assets

- If some intangibles used at home and abroad

- Then:

\[ V_{US}^t = (1 - \tau_{dist}) \left[ \sum_i V_{it}^{US} + (1 - \tau_{corp}) M_{t+1}^{US} \right] \]

where

- \( V_{it}^{US} \) are values of location-specific assets (as above)
- \( M_{t+1}^{US} \) is nonrival US R&D, brands, etc.
Treatment of S- versus C-corp Activity

- S corporations are *pass-through* entities
- If there are no investment subsidies, then
  - S-corp profits, dividends, values:
    \[
    \pi_{st} = d_{st} = p_{st} y_{st} - w_{t} n_{st} - \delta_T k_{T,st} - x_{I,st}
    \]
    \[
    V_{st} = k_{T,s,t+1} + (1 - \tau_{\text{dist}}) k_{I,c,t+1}
    \]
  - C-corp profits, dividends, values:
    \[
    \pi_{ct} = p_{ct} y_{ct} - w_{t} n_{ct} - \delta_T k_{T,ct} - x_{I,ct}
    \]
    \[
    d_{ct} = (1 - \tau_{\text{corp}}) \pi_{ct} - k_{T,c,t+1} + k_{T,ct}
    \]
    \[
    V_{ct} = (1 - \tau_{\text{dist}}) \{k_{T,c,t+1} + (1 - \tau_{\text{corp}}) k_{I,c,t+1}\}
C-Corporate Valuations: Booms and Busts

Value to GDP

- Total
- Equity

Key Events:
- Tech boom and bust
- Great Recession
- Covid bust and boom

Years:
- 1960
- 1965
- 1970
- 1975
- 1980
- 1985
- 1990
- 1995
- 2000
- 2005
- 2010
- 2015
- 2020
Tax Reforms: Distributions
Tax Reforms: Corporate income
How Does the Analysis Change?
Changes in Analysis

- Profits
  - Use national profits
  - Subtract S-corporate profits

- Distributions
  - Subtract S-corporate distributions
  - Align data with BEA definitions

- Capital stocks and investment
  - Use C-corporate structures and equipment for tangibles
  - Infer total intangible capital measure as before
Corporate Distributions to GDP, 1960–2019

- Green line: All Corporations, IRS
- Blue line: C Corporations, IRS
- Red line: C Corporations, BEA

Shareholder Distributions to GDP

Year:
- 1960
- 1965
- 1970
- 1975
- 1980
- 1985
- 1990
- 1995
- 2000
- 2005
- 2010
- 2015
- 2020
Corporate Investment to GDP, 1960–2021

- Total, All Corporations
- Total, C Corporations
- Tangible, C Corporations
Results
Assume:

- Real GDP growth of 3%
- Discount factor of 0.98
- Average tangible capital of 1.22 times GDP

What are the implied intangible contributions to $\pi, V$?
## Estimated Intangible Contributions

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<th>Shares</th>
<th>Corporate Income Tax Rate (%)</th>
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<td>8</td>
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<td>Tangible capital</td>
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What does this imply for the bottom line?
Bottom Line: A Visual Summary
C-Corporate Total Value

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<th>$V_t/GDP$</th>
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<tr>
<td>.35</td>
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<tr>
<td>.30</td>
<td>.68</td>
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<tr>
<td>.25</td>
<td>1.02</td>
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<tr>
<td>.21</td>
<td>1.29</td>
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Was the Stock Market Overvalued in 2000-2019?

- Reasons for answering no:
  - Investments were steady through 2001-02 & 2008-09
  - Distributions were steady through 2001-02 & 2008-09
  - Taxes on distributions were low
  - Outward FDI continued rising

⇒ Mostly undervalued relative to theory
Is the Stock Market Overvalued in 2023?

• Reasons for answering no:
  ○ Large decline in corporate tax rate, $\tau_{\text{corp}}$
  ○ Multinationals have had time to figure out TCJA
  ○ Taxes on distributions have remained low
  ○ Outward FDI still rising

⇒ Revising current estimate upward based on theory
Thank you Ed and Tom!