Entrepreneurship, Agency Frictions and Redistributive Capital Taxation

Matthew Knowles ¹  Corina Boar ²

¹University of St Andrews
²Princeton University

August 23, 2017
Motivation

- Equity-efficiency tradeoff for capital taxation.
  - Still no consensus in literature.

- Literature focuses on effect of taxes on level of investment.
  - What about allocation of capital/efficiency of use.

- How should you tax capital? Capital income taxes? Wealth taxes?

- What about entrepreneurship?
  - Capital concentrated among poorly diversified business owners.
  - Do capital taxes discourage entrepreneurial activity/risk taking?
Outline

- Analytically tractable framework to look at these issues.

- Optimal linear capital taxation in a setting with...
  - Entrepreneurs (who own capital).
  - Workers (who do not own capital).

- Government seeks to redistribute from entrepreneurs to workers.
  - Can use multiple capital tax instruments and labor taxes.

- Financial markets are frictional:
  - Due to asymmetric information.
  - Entrepreneurs bear idiosyncratic risk.
  - Entrepreneurs must fund investment partly from own assets.
Preview of Results

- Capital taxes affect capital allocation and (therefore) TFP.
  - Affect entrepreneurs’ choices to put capital into ‘risky’ versus ‘risk free’ sector.
  - Affect degree to which capital is used by high productivity entrepreneurs.

- Taxes on capital income much less efficient than taxes on wealth.
  - Intuition: wealth taxes do not distort relative return of different capital uses. Income taxes do.

- Optimal to tax wealth (a lot) and subsidize investment.
  - Similar to results obtained without financial frictions.
  - Optimal to tax risky capital income much less than wealth.
Model: Agents

Continuum of four types of agent:

- **Households:**
  - **Entrepreneurs:** Own capital and produce intermediate goods. Measure 1.
  - **Workers:** Live hand to mouth. Supply labor. Measure $N$.

- **Competitive Firms:**
  - **Final goods producers:** Produce output using labor, capital and intermediate goods.
  - **Financial intermediaries:** Allocate finance between entrepreneurs.

Government levies taxes on agents and funds government spending $G$. 
Production Technology

- In each period $t = 1, \ldots$, each entrepreneur $i$:
  - uses some capital ($k_{it}^E$) to produce $Y_t^E$ intermediate goods (risky)
  - leases remainder ($k_{it}^F$) directly to final goods producers (risk free).

- Each worker supplies 1 unit of labor to final goods producers.

- Representative final goods producer:
  - Produces output according to $Y_t = F(Y_t^E, K_t^F, N)$
  - Pays each factor its marginal product, $r_{E,t}$, $r_{F,t}$, $w_t$ (profit maximization).
Entrepreneurs vary in ability. At start of each period, entrepreneur $i$ draws publicly observable ability $\theta_{it} \in [\underline{\theta}, \bar{\theta}]$, from the pdf $g(\theta) = \frac{A_1}{\theta^2}$.

Entrepreneur $i$ starts period with $k_{it}$ units of capital. Chooses $k^E_{it}, k^F_{it}$.

After choosing $k^E_{it}, k^F_{it}$, entrepreneur $i$ draws a stochastic shock $\epsilon_{it} \sim H(\epsilon)$.

Entrepreneur’s output of intermediate goods given by:

$$y_{it} = \theta_{it}\epsilon_{it}k^E_{it}$$
Entrepreneur $i$ may choose to borrow some $b_{it}$ from the financial intermediary at the start of period, to buy capital.

At the end of each period, entrepreneur $i$

- Agrees to repay $\hat{b}_{it}$ to the intermediary (state contingent).
- Pays taxes $\tau_E, \tau_F, \tau_W, \tau_I$.
- Divides remaining resources between consumption and investment.

Entrepreneur $i$ faces budget constraints:

$$\hat{b}_{it} + c_{it} + l_{it} \leq r_t^E y_{it} (1 - \tau_E) + r_t^F k_{it}^F (1 - \tau_F)$$

$$- \tau_W (1 - \delta) (k_{it}^E + k_{it}^F) - \tau_I l_{it}$$

$$k_{i,t+1} = l_{it} + (1 - \delta) (k_{it}^E + k_{it}^F)$$
Demographics and Preferences

- Fraction $\gamma$ of entrepreneurs and workers die at end of period.
  - Replaced by newborn entrepreneurs and workers.
  - Capital of dead redistributed between newborn entrepreneurs.

- Each agent $i$ values consumption according to:

$$U_i = \sum_t \beta^t (1 - \gamma)^t \log(c_{i,t})$$
Financial Contract

- Entrepreneur writes one-period contract with intermediary.
  - Contract specifies $b_{it}$ & state contingent $\hat{b}_{it}$.
  - Maximizes entrepreneur’s expected present discounted utility subject to constraint that intermediary breaks even.

**However:**
- Entrepreneur’s realization of $\epsilon_{it}$ is private information.
- Entrepreneur can falsely under-report $\epsilon_{it}$ and can secretly hide intermediate goods and convert into units of final output.
Agency Frictions

- For each unit of intermediate goods the entrepreneur hides, she can convert this into $\rho \in (0, 1)$ units of final output for herself.

\[
\frac{\partial \hat{b}_{it}}{\partial \epsilon_{it}} \leq (1 - \rho) \frac{\partial y_{it}}{\partial \epsilon_{it}}
\]

- Agency friction $\Rightarrow$ entrepreneur cannot fully diversify risk:
  - $\Rightarrow$ discourages from choosing high $k^E_{it}$.
- Entrepreneur’s $k^E_{it}$ depends on initial wealth.
Effects of Taxes

- Taxes affect both the level and the allocation of capital.

- In particular, taxes affect:
  - How much entrepreneurs allocate capital to the risky sector versus the risk-free sector.
  - How much capital in the risky sector is held by high $\theta$ entrepreneurs.

\[ \therefore \text{Taxes affect both aggregate } K \text{ and aggregate measured TFP.} \]
Government’s Problem

- Government chooses constant tax rates $\tau_E, \tau_F, \tau_W, \tau_I$.
  - To maximize steady state utility of workers.
  - Results similar if government cares about entrepreneurs a little.

- Government choices must satisfy:
  - $\tau_W \leq \bar{\tau}_W$.
  - Budget balance in steady state (with no debt).
Optimal Tax Scheme

- **Proposition:** If a positive measure of entrepreneurs chooses $k_i^E = 0$ in the steady state, then the optimal tax policy entails:
  - $\tau_W = \bar{\tau}_W$
  - $\tau_E \in (0, 1 - \frac{\rho}{r^E}]$
  - $\tau_F \in (0, 1)$
  - $\tau_I \in (-1, 0)$

- **Intuition:**
  - Wealth taxes do not distort relative return of different capital uses. Income taxes do.
  - Gov. can use $\tau_I < 0$ to counteract effect of taxes on investment.
  - So nothing wrong with confiscatory taxes on wealth.
Properties of Optimal Tax Scheme

- Optimal taxes can be written as functions of $r_E, r_F, K_E, K_F$ etc.
  - In calibration, optimal $\tau_E \leq 0.32$.

- Consumption tax or gov. bonds can replicate one of these taxes.
Conclusion

- Study redistributive capital taxation with financial frictions.
  - Government seeks to redistribute from entrepreneurs to workers.

- Taxes affect capital allocation and TFP.

- Financial frictions limit taxation on risky capital income.
  - Lower than without financial frictions.
  - But financial frictions do not counteract desire for confiscatory wealth taxes, with investment subsidies.
Calibration of $\tau_E$

- Optimal $\tau_E$ depends on degree of financial frictions, $\rho$.

- To calibrate $\rho$, we use that optimal financial contract looks like combination of equity and debt:
  - Entrepreneur retains $\frac{\rho}{(1-\tau_E) r_E}$ equity in her business.
  - Find this to be 0.84 on average in Survey of Consumer Finances.

- Calibration implies optimal $\tau_E \in (0, 0.32)$
  - roughly in line with current US levels.