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Death and Taxes
Does Taxation Matter for Firm Survival?

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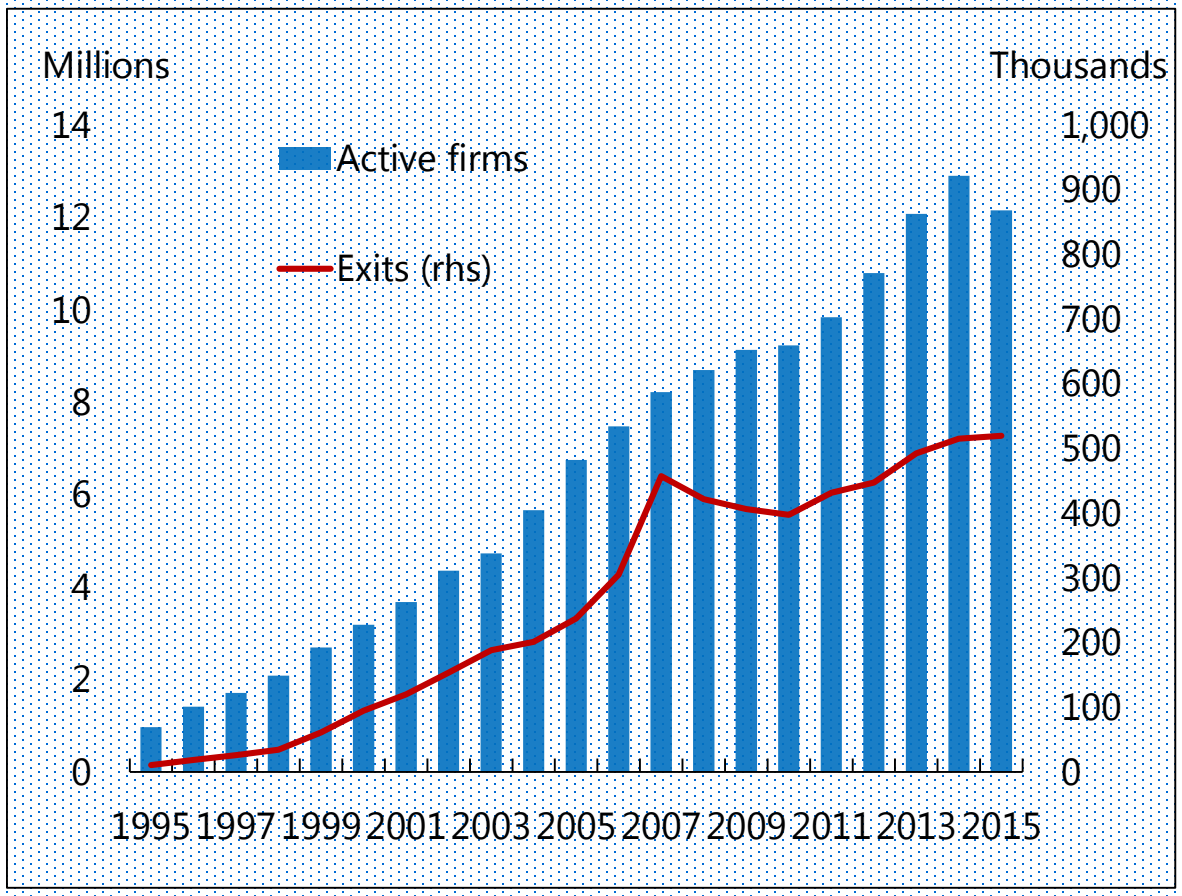
Shedding light on how taxation affects firm survival

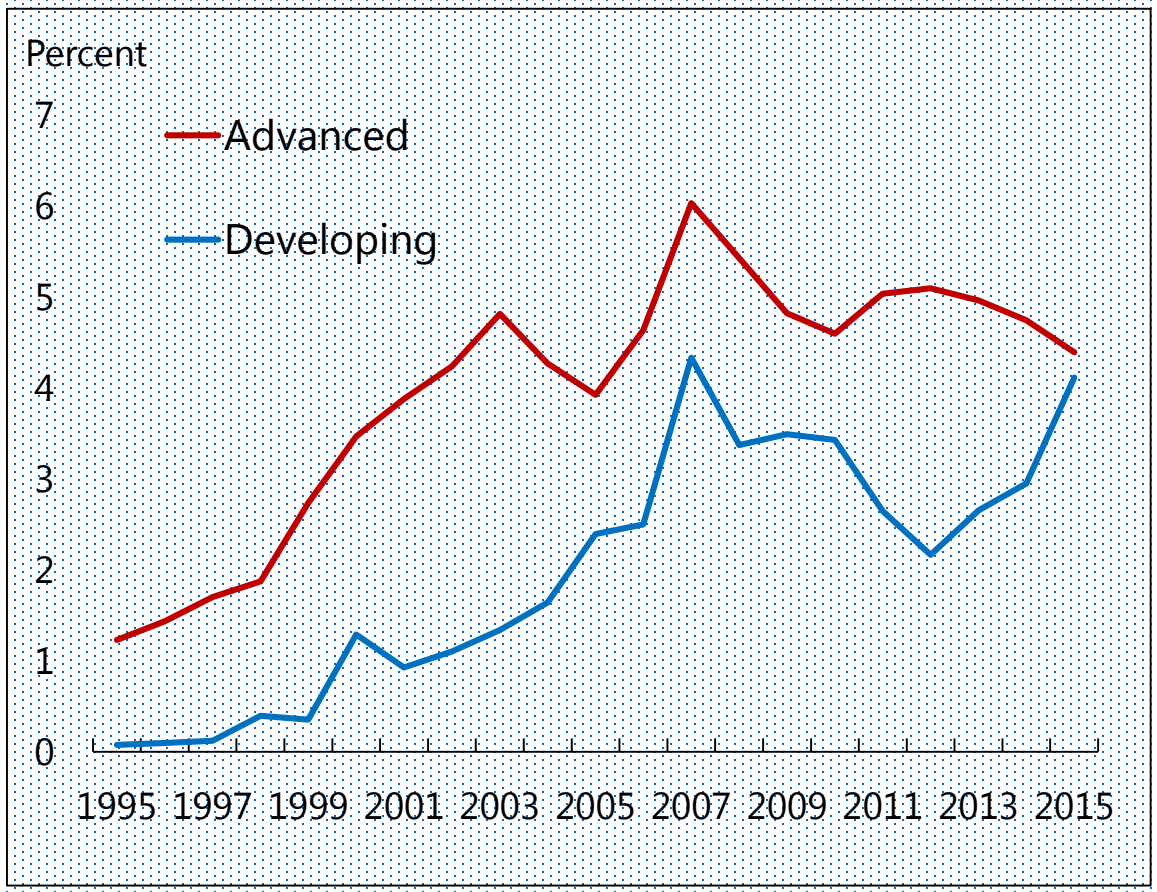
- Corporate dynamism is critical for the vitality and sustainability of competitiveness, innovation and growth.
- There is a vast literature on firm survival:
  - Firm-level characteristics
  - Macroeconomic conditions
  - Institutional features
- Taxation is found to influence firm behavior and performance (i.e., investment and growth), but no study has analyzed the impact of taxation on firms' survival prospects.

Comprehensive coverage of firms across the world



- We obtain harmonized firm-level financial data from the Orbis database:
  - Public and private firms
  - Large and small enterprises
  - Advanced and developing countries
- The average failure rate among nonfinancial firms from 167 countries is 3.5 percent during the period 1995-2015.

Converging firm failure rates across AEs and EMs



- The average failure rate of 4 percent in advanced economies is higher than the average of 2 percent in developing countries.
- But the failure rates have converged in recent years, with a significant increase in EMs.

Motivation and strategy

- We focus on how taxation affects the survival prospects of nonfinancial firms:
  - Using hazard models for the estimations:
    - Baseline: Cox proportional
    - Robustness: Accelerated failure time
  - Covering over 4 million nonfinancial firms from 21 countries (14 advanced and 7 developing) with a total of 21.5 million firm-year observations during the period 1995–2015.

- **Main variable of interest:** Effective marginal tax rate (**EMTR**) for each firm, rather than using the statutory CIT rate.

- **Controlling for key firm characteristics:** age, size, profitability, capital intensity, leverage, and productivity.

Calculating firm-specific EMTR

- EMTR—based on the user cost of capital concept—is the difference between the expected pre-tax (gross) rate of return and the expected post-tax (net) rate of return on a marginal investment, divided by the pretax rate of return (Devereux and Griffith 1998; 2003).
  - EMTR is therefore a consolidated indicator of the various tax factors that affect the cost of capital relative to a normal rate of return.
  - When the tax code allows for changes in tax rates and allowances according to sector- and firm-level differences, EMTR shows considerable variation across firms and over time.
- We calculate EMTR using firm-specific information and a set of parameters including the statutory CIT rate, depreciation rules, inflation, the nominal interest rate, and the real before-tax return on equity in each country, which are assumed to be constant across all firms.
  - We adopt the key parameters proposed by Egger and others (2009) and use different rates of economic depreciation for different types of assets.

Estimating the probability of failure

- We trace the span of survival for each firm over the sample period, and define the survival function as the probability of failure between time t and t+1 divided by the probability of surviving at least until t, for a given set of covariates.
  - In line with the literature, we consider a firm as failed in a given year when its status is that of receivership, liquidation, or dissolved.
  - The observation period takes into account both left truncation and right censoring since firms may remain in operation beyond the sample period.
  - We use the year of first appearance in the dataset as the time at which a firm becomes at risk of failure, and exclude observations when a firm drops out of the database.
- Baseline estimation: the Cox proportional hazard model in a complementary log-log form.
  - Capturing the exact time of failures.
  - Dealing with the potential right-censoring bias and the endogeneity problem arising from simultaneity between the dependent and explanatory variables.

Firm characteristics determine the probability of failure

Variables	All Countries	Advanced	Emerging
Dependent variable: Probability of failure			
Age	-0.297***	-0.296***	-0.214***
	[0.002]	[0.002]	[0.008]
Size	-0.035***	-0.044***	0.054***
	[0.002]	[0.002]	[0.005]
Profitability	-1.494***	-1.803***	-0.741***
	[0.017]	[0.023]	[0.013]
Capital Intensity	-0.089***	-0.095***	-0.061***
	[0.001]	[0.001]	[0.004]
TFP	-0.130***	-0.088***	-0.418***
	[0.003]	[0.003]	[0.007]
Leverage	0.401***	0.361***	0.143***
	[0.008]	[0.009]	[0.028]
EMTR	3.951***	3.943***	3.927***
	[0.097]	[0.113]	[0.404]

- We control for main firm characteristics comprising age, size, profitability, leverage, capital intensity, and productivity.
- First, firm survival increases with age and size, as indicated by the negative coefficients.
  - Older and larger firms are better positioned to weather shocks.
- Second, firm survival is dependent on the financial health as measured by profitability and leverage.
  - Failure rate diminishes with profitability, but increases with indebtedness.
- Third, greater scale economies and efficiency gains matter for firm survival.
  - Capital intensity and TFP play a significant role in reducing failure rate.

The tax burden matters for firm survival

Variables	All Countries	Advanced	Emerging
Dependent variable: Probability of failure			
Age	-0.297***	-0.296***	-0.214***
	[0.002]	[0.002]	[0.008]
Size	-0.035***	-0.044***	0.054***
	[0.002]	[0.002]	[0.005]
Profitability	-1.494***	-1.803***	-0.741***
	[0.017]	[0.023]	[0.013]
Capital Intensity	-0.089***	-0.095***	-0.061***
	[0.001]	[0.001]	[0.004]
TFP	-0.130***	-0.088***	-0.418***
	[0.003]	[0.003]	[0.007]
Leverage	0.401***	0.361***	0.143***
	[0.008]	[0.009]	[0.028]
EMTR	**3.951*** **	**3.943*** **	**3.927*** **
	[0.097]	[0.113]	[0.404]

- All variables have the expected sign with a high degree of statistical significance.
- The coefficient on the firm-specific EMTR exerts a positive effect on the probability of failure.
  - A lower level of effective marginal tax rate increases the survival probability.
- This finding is not only statistically but also economically important, and remains robust when we partition the sample into country subgroups.
- We run the estimation on separate samples and find that the effect of taxation on firm survival is significantly greater in developing countries than advanced economies.

Higher the EMTR, the greater the impact on firm survival

Variables	All Countries	Advanced	Emerging
Dependent variable: Probability of failure			
Control variables	Yes	Yes	Yes
EMTR	-5.913***	-6.976***	4.064***
	[0.436]	[0.354]	[0.802]
$EMTR^2$	20.122***	22.182***	-0.242
	[0.904]	[0.626]	[1.576]

- *P.S. The limited number of observations in developing countries may cause estimation problems. 267,249 firms from developing countries compared to almost 2.3 million from advanced economies.*

- Digging deeper into the tax sensitivity of firm survival reveals a nonlinear relationship:
  - The coefficient on EMTR turns negative when we include its squared value;
  - And the EMTR squared is positive with greater economic magnitude.
  - This implies that taxation becomes a detriment to firm survival at higher levels.

Impact of taxation varies with firm types

Variables	Young	Old	Small	Large
Dependent variable: Probability of failure				
Age	-0.285***	-0.187***	-0.216***	-0.378***
	[0.004]	[0.006]	[0.003]	[0.004]
Size	-0.016***	-0.055***	-0.125***	0.079***
	[0.002]	[0.002]	[0.005]	[0.005]
Profitability	-1.455***	-1.562***	-1.089***	-4.698***
	[0.015]	[0.018]	[0.012]	[0.045]
Capital Intensity	-0.094***	-0.082***	-0.048***	-0.087***
	[0.002]	[0.002]	[0.002]	[0.003]
TFP	-0.081***	-0.184***	-0.154***	-0.023***
	[0.004]	[0.004]	[0.005]	[0.006]
Leverage	0.318***	0.519***	0.267***	0.526***
	[0.010]	[0.012]	[0.011]	[0.017]
EMTR	1.458***	6.494***	3.472***	4.132***
	[0.149]	[0.149]	[0.185]	[0.192]

- We explore more in detail whether the impact of taxation differs when we differentiate between types of firms.
  - First, we classify a firm as young (or old) if its age falls into the bottom (or top) half of the age distribution of all firms operating in the same industry in that year.
    - Tax burden has a greater effect on firm survival as companies age over time.
  - Second, we split the sample into small and large firms by classifying companies with total assets in the lowest quartile as small and those in the highest quartile as large.
    - Tax burden has a greater effect on firm survival among larger firms.

Conclusion

- Analyzing over 4 million companies from 21 countries during the 1995–2015 period, we find that the firm-specific tax burden exerts a highly significant adverse effect on firms' survival prospects.
  - Put differently, a lower level of EMTR increases the survival probability.

- This finding has important policy implications for the design of tax systems. The challenge for policymakers is not simply reducing the statutory CIT rate, but to level the playing field for all enterprises across sectors and types of firm by:
  - Reducing legal uncertainty;
  - Cutting the costs of compliance;
  - Facilitate entrepreneurship and innovation;
  - Eliminating distortions in resource allocation;
  - Encouraging alternative sources of financing by addressing the corporate debt bias.