The Sources of Financing Constraints

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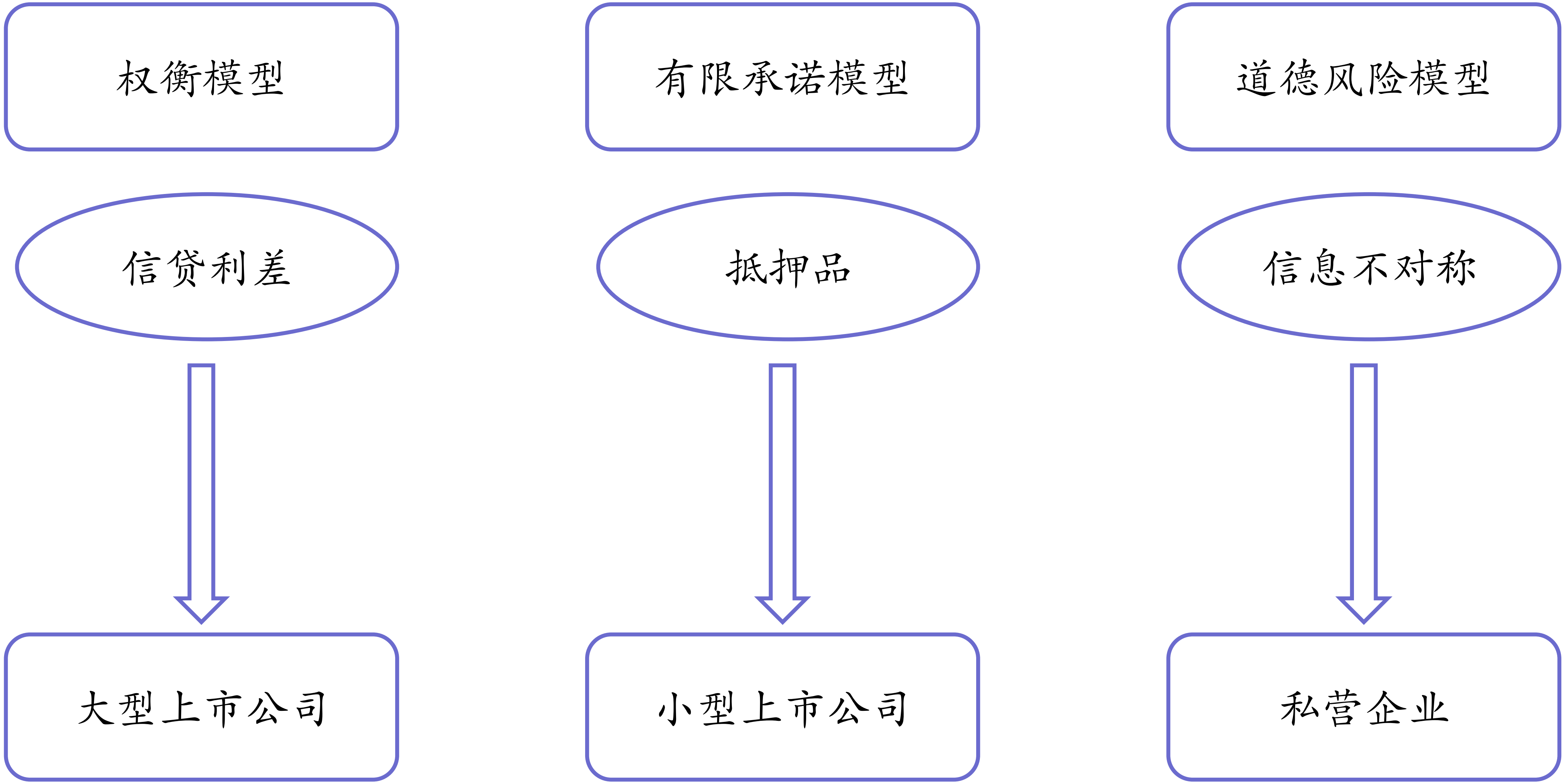

权衡模型
有限承诺模型
道德风险模型
信贷利差
抵押品
信息不对称
大型上市公司
小型上市公司
私营企业

2. A triplet of models

2.1. Technology and investment

- after-tax operating profits： $\pi(k_{it}, z_{it}, \eta_{it}) = (1-\tau)((z_{it}+\eta_{it})k_{it}^{\alpha} - f),$ (1)
- standard capital accumulation rule： $k_{it+1} = k_{it}(1-\delta) + i_{it},$ (2)
- capital adjustment costs： $\Psi(k_{it+1}, k_{it}) \equiv \frac{1}{2}\psi\left(\frac{i_{it}}{k_{it}}\right)^2 k_{it},$ (3)
- Decisions are taken at the end of period t about financing and investment expenditures occurring at the beginning of period t + 1.
- We refer to W(s_{it},z_{it}) as the firm values at the end of period t, that is after the realization of all the t shocks and production and before that of the time t + 1 shocks.

2.2. Trade-off

- They will charge a default premium Δ_{it} above the risk-free rate.
- We assume that firms have to repay debt commitments at the end of each period. At that point, the firm is solvent if and only if

$$(1-\tau)\pi(k_{it}, z_{it}, \eta_{it}) + (1-\delta)k_{it} + \tau\delta k_{it} - (1+(r+\Delta_{it-1})(1-\tau))b_{it-1} \geq 0, \quad (4)$$

- default set : $D_{it} \equiv \{(z_{it}, \eta_{it}, k_{it}, \Delta_{it-1}) \in \bar{Z} \times \bar{N} \times \mathcal{R}^{+} \times \mathcal{R}^{+} : \text{(4) does not hold}\}$
- the indicator function for default : $\mathcal{I}_{D,it}$

- Creditors break even in expectation if

$$E_{t-1}\left[(1+r+\Delta_{it-1})(1-\mathcal{I}_{D,it})+\frac{\xi(1-\delta)k_{it}}{b_{it-1}}\mathcal{I}_{D,it}\right]=1+r,$$

where ξ denotes the recovery rate in bankruptcy.

- Debt and internal resources can be used to fund investment expenditures or distributions d_{it} to shareholders.

$$d_{it} \equiv (1-\tau)\pi(k_{it}, z_{it}, \eta_{it}) - k_{it} + (1-\delta)k_{it} - \Psi(k_{it}, k_{it-1}) + \tau\delta k_{it} - (1+(r+\Delta_{it-1})(1-\tau))b_{it-1} + b_{it} \geq 0.$$

- Investment and financing policies are set to maximize firm value. Firm value W(k_{it-1} , b_{it-1} , z_{it-1}) satisfies the following Bellman equation:

$$
\begin{aligned}
&W(k_{it-1}, b_{it-1}, z_{it-1}) \\
&\quad \equiv \frac{1}{1+r}\max_{k_{it}, b_{it}} - k_{it} + (1-\delta)k_{it} - \Psi(k_{it}, k_{it-1}) + \tau\delta k_{it} \\
&\qquad + \tau(r+\Delta_{it-1})b_{it-1}\mathcal{I}_{1-D,it} \\
&\qquad - ((1-\xi)(1-\delta)k_{it} + \tau\delta k_{it})\mathcal{I}_{D,it} + E_{t-1} \\
&\qquad \times [(1-\tau)\pi(k_{it}, z_{it}, \eta_{it}) + W(k_{it}, b_{it}, z_{it})]
\end{aligned}
$$

subject to

$$
\begin{aligned}
&(1-\tau)\pi(k_{it}, z_{it}, \eta_{it}) - k_{it} \\
&\quad + (1-\delta)k_{it} - \Psi(k_{it}, k_{it-1}) + \tau\delta k_{it} \\
&\quad - (1+(r+\Delta_{it-1})(1-\tau))b_{it-1} + b_{it} \geq 0, \forall z_{it}, \eta_{it}
\end{aligned}
$$

$$
E_{t-1}\left[(1+r+\Delta_{it-1})(1-\mathcal{I}_{D,it}) + \frac{\xi(1-\delta)k_{it}}{b_{it-1}}\mathcal{I}_{D,it}\right] = 1+r.
$$

- Financing constraints arise from a pricing mechanism in that elevated leverage increases the default set and thus raises spreads on risky debt.

- 贝尔曼最优化原理:

一个最优策略具有如下性质：不论初始状态和初始决策（第一步决策）如何，以第一步决策所形成的阶段和状态作为初始条件来考虑时，余下的决策对余下的问题而言也必构成最优策略。

关于 v_* 的贝尔曼最优方程

$$v_*(s) = \max_a \left(\mathcal{R}_s^a + \gamma \sum_{s' \in S} \mathcal{P}_{ss'}^a v_*(s')\right)$$

$$\gamma E[v_*(s')]$$

2.3. Limited enforcement

- We now relax the perhaps slightly stark assumption that firms only source of external financing is one-period debt.

- Selling a portfolio at time t thus raises an amount $b_{it} \equiv \frac{1}{1+r}E_t[p_{z_{it+1},\eta_{it+1}} + b_{z_{it+1},\eta_{it+1}}]$

  where $\mathbf{p}_{\mathbf{z}_{\mathbf{it+1}}, \ \mathbf{\eta}_{\mathbf{it+1}}}$ is the cash flow transferred to the investors contingent on the realization of the two shocks and $\boldsymbol{b}_{\boldsymbol{z}_{\mathbf{it+1}}, \ \boldsymbol{\eta}_{\mathbf{it+1}}}$ is the residual present value of future promised repayments.

- We think of these state-contingent payments as repayments to a lender, which need to be fully collateralized.

$$p_{z_{it+1},\eta_{it+1}} + b_{z_{it+1},\eta_{it+1}} \leq \theta(1-\delta)k_{it+1}, \qquad \forall z_{it+1}, \eta_{it+1}$$

- We retain the assumption of limited liability on the shareholders' side, which requires that

$$d_{it} \equiv (1-\tau)\pi(k_{it}, z_{it}, \eta_{it}) - k_{it} + (1-\delta)k_{it} - \Psi(k_{it}, k_{it-1}) + \tau\delta k_{it} + \tau r b_{it-1} - p_{z_{it},\eta_{it}} \geq 0.$$

- Firm value W(k_{it-1} , b_{it-1} , z_{it-1}) satisfies the following Bellman equation:

$$W(k_{it-1}, b_{it-1}, z_{it-1}) = \frac{1}{1+r} \max_{k_{it}, b_{z_{it},\eta_{it}}, p_{z_{it},\eta_{it}}} -k_{it} + (1-\delta)k_{it} - \Psi(k_{it}, k_{it-1}) + \tau\delta k_{it} + \tau r b_{it-1} + E_{t-1}[(1-\tau)\pi(k_{it}, z_{it}, \eta_{it}) + W(k_{it}, b_{z_{it},\eta_{it}}, z_{it})]$$

subject to

$$b_{it-1} \equiv \frac{1}{1+r} E_{t-1}[p_{z_{it},\eta_{it}} + b_{z_{it},\eta_{it}}] \quad (5)$$

$$(1-\tau)\pi(k_{it}, z_{it}, \eta_{it}) - k_{it} + (1-\delta)k_{it} - \Psi(k_{it}, k_{it-1}) + \tau\delta k_{it} + \tau r b_{it-1} - p_{z_{it},\eta_{it}} \geq 0, \forall z_{it}, \eta_{it} \quad (6)$$

$$p_{z_{it},\eta_{it}} + b_{z_{it},\eta_{it}} \leq \theta(1-\delta)k_{it}, \forall z_{it}, \eta_{it}. \quad (7)$$

- Financing constraints here arise from the enforcement or collateral constraints in expressions (7) that tie firms' debt capacity to tangible assets.

2.4. Moral hazard

- We assume that η_{it} is observable by shareholders but is unobservable by lenders.

- An optimal contract between shareholders and lenders maximizes the firm value W_{it} , subject to incentive constraints, promise keeping, and limited liability constraints.

- incentive constraints :

$$d_{z_{it},\eta_{it}} + V_{z_{it},\eta_{it}} \geq d_{z_{it},\hat{\eta}_{it}} + V_{z_{it},\hat{\eta}_{it}} + \mathcal{D}(k_{it}, z_{it}, \eta_{it}, \hat{\eta}_{it}), \quad \forall z_t, \quad \forall \hat{\eta}_{it},$$

- promise keeping :

$$V_{it-1} = \frac{1}{1+r} E_{t-1}[d_{z_{it},\eta_{it}} + V_{z_{it},\eta_{it}}],$$

- limited liability constraints :

$$d_{z_{it},\eta_{it}} \geq 0, \quad \forall z_{it}, \forall \eta_{it},$$

$$V_{z_{it},\eta_{it}} \geq 0, \quad \forall z_{it}, \forall \eta_{it}, .$$

- The firm value function satisfies

$$
\begin{aligned}
&W(k_{it-1}, V_{it-1}, z_{it-1}) \\
&\quad = \max_{k_{it}, V_{z_{it},\eta_{it}}, d_{z_{it},\eta_{it}}} \frac{1}{1+(1-\tau)r} \\
&\quad \times [-k_{it} - \Psi(k_{it}, k_{it-1}) + (1-\delta)k_{it} + \tau\delta k_{it} - r\tau V_{it-1} \\
&\quad + E_{t-1}[(1-\tau)\pi(k_{it}, z_{it}, \eta_{it}) + W(k_{it}, V_{z_{it},\eta_{it}}, z_{it})]]
\end{aligned}
$$

subject to

$$V_{it-1} = \frac{1}{1+r} E_{t-1}[d_{z_{it},\eta_{it}} + V_{z_{it},\eta_{it}}], \tag{8}$$

$$
\begin{aligned}
&d_{z_{it},\eta_{it}} + V_{z_{it},\eta_{it}} \geq d_{z_{it},\hat{\eta}_{it}} + V_{z_{it},\hat{\eta}_{it}} + \mathcal{D}(k_{it}, z_{it}, \eta_{it}, \hat{\eta}_{it}), \\
&\quad \forall z_t, \quad \forall \hat{\eta}_{it},
\end{aligned} \tag{9}
$$

$$d_{z_{it},\eta_{it}} \geq 0, \quad \forall z_{it}, \forall \eta_{it}, \tag{10}$$

$$V_{z_{it},\eta_{it}} \geq 0, \quad \forall z_{it}, \forall \eta_{it}, . \tag{11}$$

- Financing constraints arise from asymmetric information between financiers and insiders.

2.5. Nesting models

- We adopt an implementable approach to model nesting in the spirit of Bayesian model averaging that allows for different weights on the underlying candidate models and infers those from the data.

- Our approach to nesting models entails assigning weights w_{TO} to the trade-off model, w_{LE} to the limited enforcement model, and w_{ML} to the moral hazard model.

- The weights have a natural interpretation as a measure of the incidence of each friction.

3. Model computation and estimation

3.1. Solution method: linear programming

- The three models can be formulated as LP problems as follows:

$$\min_{W_{k,u,z}} \sum_{k=1}^{nk} \sum_{u=1}^{nu} \sum_{z=1}^{nz} W_{k,u,z} \quad (12)$$

$$s.t. W_{k,u,z} \geq R_{k,u,z,a} + \sum_{z'=1}^{nz} \beta Q_z(z, z') W_{k'(a),u'(a),z'} \quad \forall k, u, z, a, \quad (13)$$

u denotes the promised utility variable, namely b_{it} for the trade-off and the limited commitment model and v_{it} for the moral hazard model; nk, nu, and nz are the number of grid points on the grids for k_{it},u_{it}, and z_{it}, respectively; $w_{k,u,z}$ is the value function on the grid point indexed by k, u, and z; a is an index for a feasible action on the grid for both capital, promised utility, and payouts, and $R_{k,u,z,a}$ denotes the return function corresponding to the action a starting from the state indexed by k, u, and z; β is the appropriate discount rate; Q_z(z, z') is the transition matrix of the Markov chain driving profitability shocks; and k'(a) and u'(a) denote the future values for the state variables given the current firm's decisions.

Constraint generation

- First, we solve a relaxed problem with the same objective function.
- Second, we use the current solution to identify the constraints it violates.
- Third, we add one of the violated constraints, namely the most violated one, to the relaxed problem.
- We iterate the procedure until all constraints are satisfied.

3.2. Estimation method

3.2.1. Empirical policy functions

- A policy function is an association between an optimal choice of the firm and its currently observable state. We write the policy function as

$$\mathbf{w} = P(\mathbf{x}), \tag{14}$$

x is a vector of (possibly transformed) state variables

w is a vector of policy variables of the model.

- We now characterize the empirical counterpart of the policy function w = P(x).

$$\mathbf{w}_{it}^{n} = P^{n}(\mathbf{x}_{it}) + \mathbf{u}_{it}^{n}, \tag{15}$$

n is the nth element of the policy vector W_{it}^{n}

$\boldsymbol{u_{it}^{n}}$ is the specification error with $E[u_{it}^{n}|X_{it}] = 0$

- We use a series approximation functions $p_j(X_{\mathrm{it}})$, where j = 1, . . . J, to estimate the policy function P(X_{it}). In particular, as J → ∞, the expected mean square difference between the P(X_{it}) and a linear combination of $p_j(X_{\mathrm{it}})$, approaches zero; i.e.

$$\lim_{J\to\infty} E\left(\sum_{j=1}^{J} h_j p_j(\mathbf{x}_{it}) - P(\mathbf{x}_{it})\right)^2. \qquad (16)$$

3.2.2. Structural estimation: indirect inference

- Empirical policy functions constitute a natural candidate for an auxiliary model.
- We define the estimating equation as

$$g(\mathbf{v}_{it}, \beta) = \frac{1}{nT} \sum_{i=1}^{n} \sum_{t=1}^{T} \left[\mathbf{h}(\mathbf{v}_{it}) - \frac{1}{S} \sum_{s=1}^{S} \mathbf{h}(\mathbf{v}_{it}^{s}(\beta)) \right], \qquad (17)$$

h(.) is the parameter vector from Eq. (16) defining the empirical policy functions.

$\mathbf{V}_{it} \equiv (W_{it}, X_{it})$: the vector of observed data

$\mathbf{V}_{it}^{s}$: the vector of simulated data , s = 1, . . ., S is the number of times we simulate the model

- The II estimator for β is given by

$$\hat{\beta} = \arg\min_{\beta} g(\mathbf{v}_{it}, \beta)' \widehat{W}_{nT} g(\mathbf{v}_{it}, \beta),$$

where $\widehat{W}_{nT}$ is a positive definite weighting matrix that converges in probability to a deterministic positive definite matrix W.

3.2.3. Testing and model selection

- single candidate frictions : whether pairs of models are statistically distinguishable given the data ?

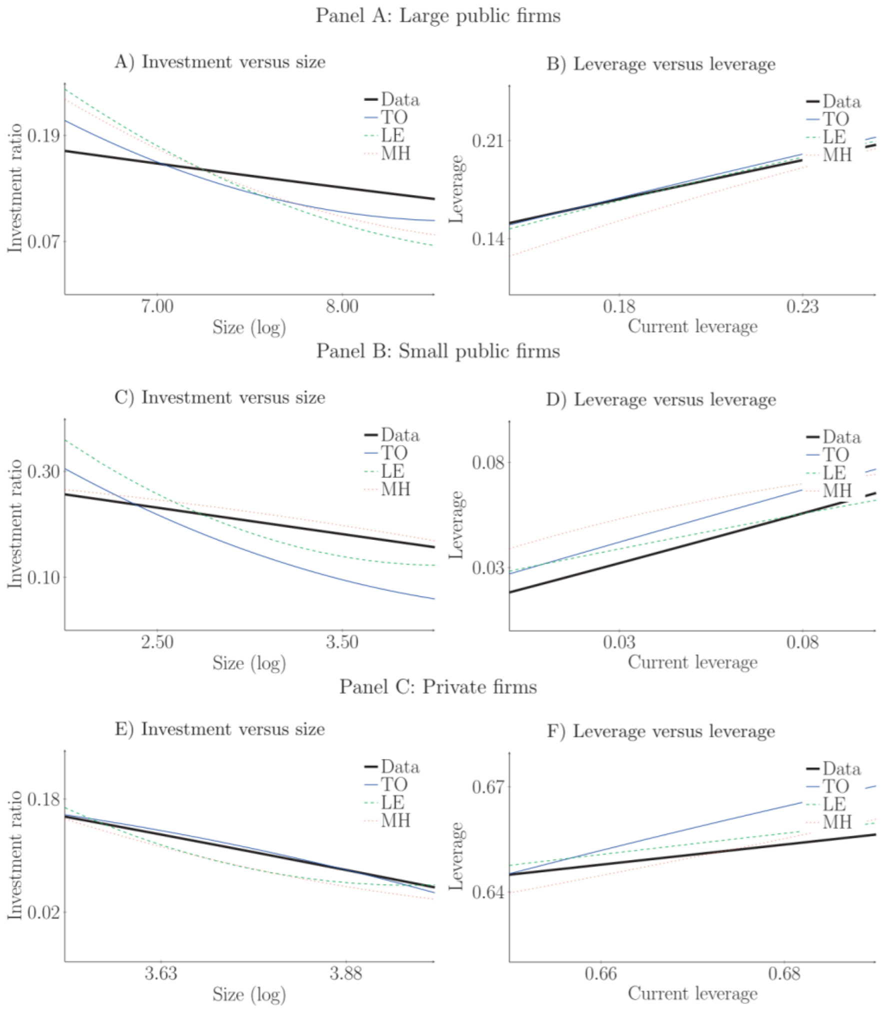
  tests developed in Rivers and Vuong (2002)： The tests precisely allow us to evaluate the relative fit of pairs of nonnested models estimated using the method of moments.

- nesting models : whether two weights on two models are identical against the alternative hypotheses that one weight is larger than the other ?

  Wald tests : The tests allow us to statistically evaluate, for all subsamples of firms, the differences in estimated weights for the three types of financial frictions.

4. Empirical results

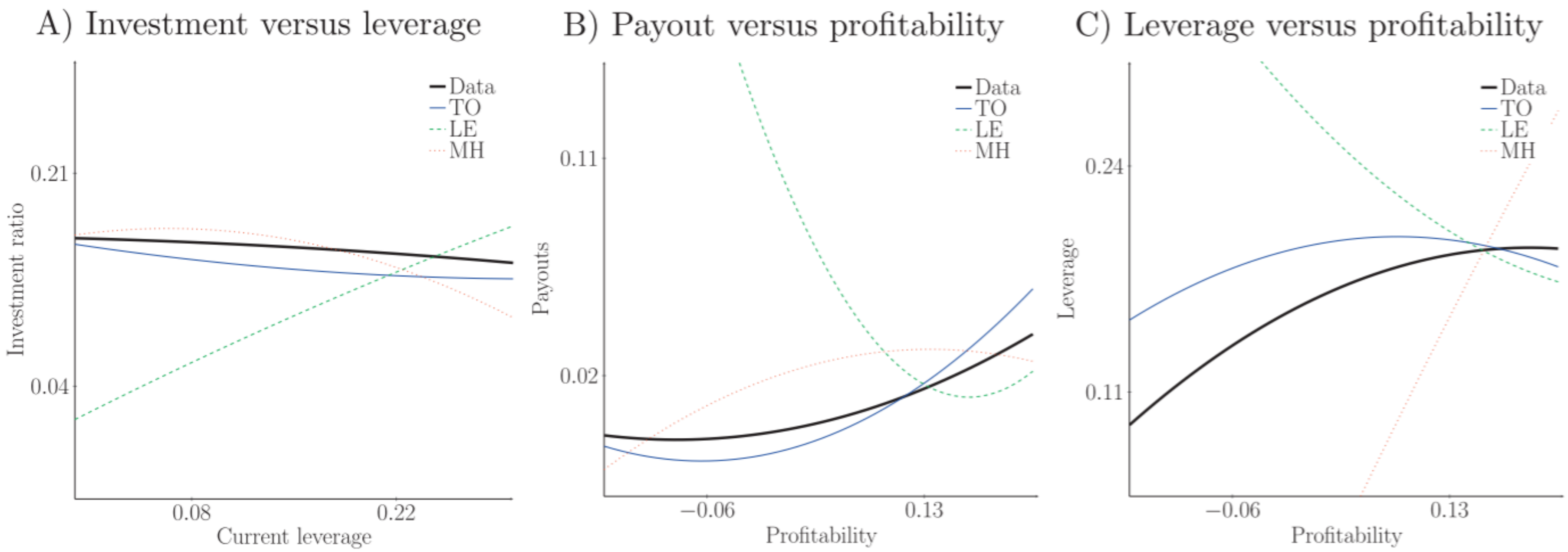
4.2.2. Model comparison: empirical policy functions



- It plots the mappings between investment and size and future leverage and Current leverage, respectively, across samples and models.
- These results show that our models have the potential to rationalize relevant aspects of the dynamic behavior of firms.
- These particular benchmarks are not informative about the nature of financial frictions at work in the data.

4.3. Estimation results

4.3.1. Large public firms



- The figure suggests qualitatively that policy functions estimated from a trade-off model can, by and large, account for the dynamic behavior of large, public firms most adequately.

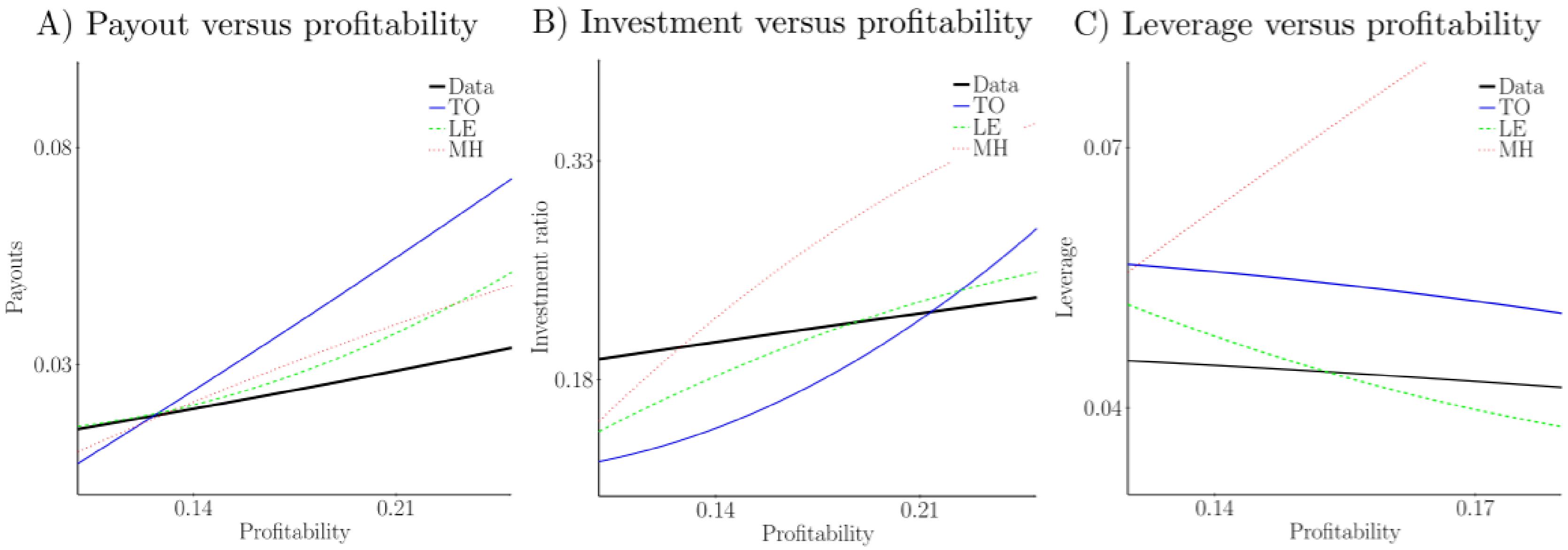
Parameter estimates: large public firms				
	TO	LE	MH	Weighted
α	0.778	0.808	0.741	0.775
	(0.001)	(0.001)	(0.001)	(0.001)
f	0.704	0.776	0.670	0.717
	(0.943)	(0.112)	(0.028)	(0.024)
ρ_z	0.834	0.779	0.834	0.818
	(0.001)	(0.001)	(0.001)	(0.002)
σ_z	0.292	0.305	0.364	0.320
	(0.002)	(0.001)	(0.002)	(0.003)
δ	0.169	0.126	0.188	0.161
	(0.001)	(0.001)	(0.001)	(0.001)
ψ	0.130	0.132	0.162	0.141
	(0.005)	(0.001)	(0.001)	(0.003)
η	0.312	0.329	0.260	0.300
	(0.005)	(0.006)	(0.003)	(0.003)
ξ	0.600			0.600
	(0.007)			(0.014)
θ		0.727		0.733
		(0.005)		(0.011)
λ			0.039	0.039
			(0.000)	(0.002)
Weight TO				0.610
				(0.013)
Weight LE				0.327
				(0.010)
Weight MH				0.063
				(0.014)
Obj. fun.	2.805	5.233	26.536	1.460

- single benchmark estimation results： trade-off model provides the best relative fit across the candidate models.

- joint estimation： The best overall fit is obtained in case of about a 60% weight on the trade-off specification.

- This sample can be represented by a panel of firms, 60% of whose capital structure decisions are primarily shaped by the profit shielding benefits of defaultable debt, while one-third of firms are constrained by the availability of collateral, and just a few firms are impacted by the possibility of cash flow diversion.

4.3.2. Small public firms

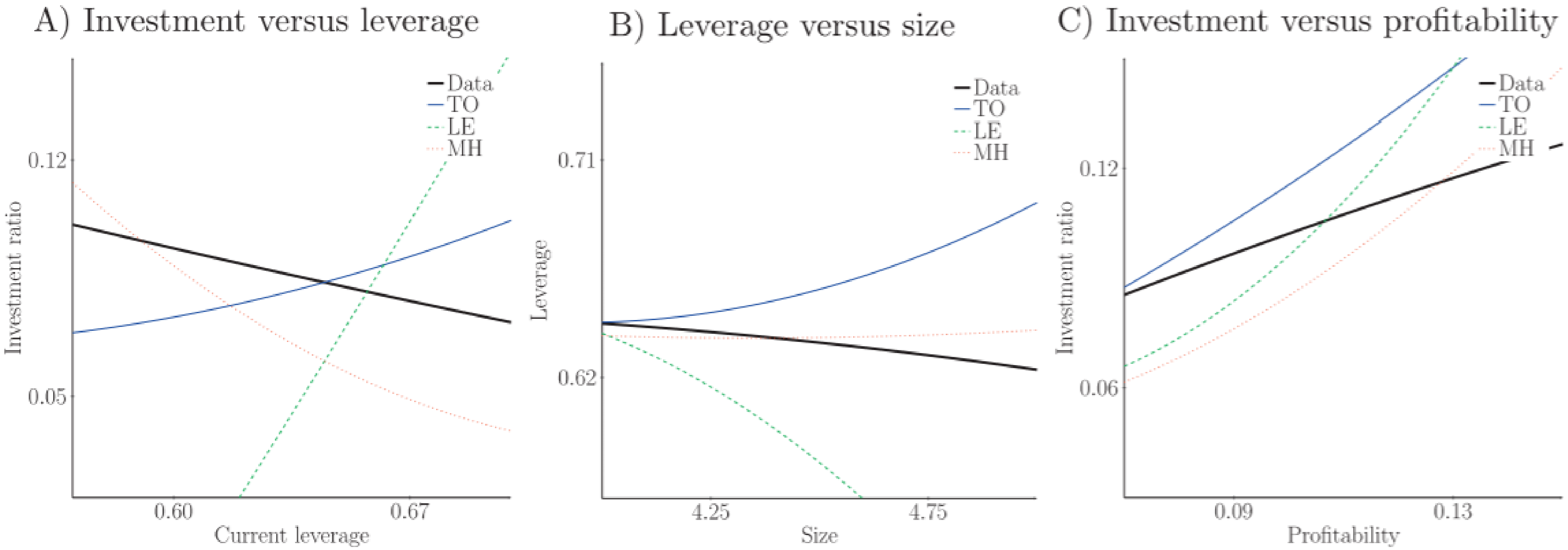


- The rightmost panel shows that the empirical link between profitability and leverage is negative.
- The policies estimated from a limited enforcement model provide the closest approximation of the empirical benchmarks.

Parameter estimates: small public firms				
	TO	LE	MH	Weighted
α	0.765	0.764	0.772	0.767
	(0.004)	(0.002)	(0.002)	(0.004)
f	0.897	0.837	0.880	0.871
	(0.641)	(0.130)	(0.011)	(0.032)
ρ_z	0.813	0.774	0.775	0.788
	(0.004)	(0.002)	(0.003)	(0.003)
σ_z	0.313	0.312	0.286	0.304
	(0.006)	(0.004)	(0.002)	(0.003)
δ	0.182	0.182	0.187	0.184
	(0.002)	(0.003)	(0.001)	(0.003)
ψ	0.155	0.151	0.139	0.148
	(0.004)	(0.003)	(0.001)	(0.004)
η	0.263	0.250	0.230	0.247
	(0.007)	(0.012)	(0.001)	(0.003)
ξ	0.547			0.558
	(0.013)			(0.015)
θ		0.647		0.647
		(0.011)		(0.019)
λ			0.021	0.021
			(0.000)	(0.003)
Weight TO				0.388
				(0.014)
Weight LE				0.440
				(0.011)
Weight MH				0.173
				(0.014)
Obj. fun.	5.108	4.552	11.453	2.340

- single benchmark estimation results ： limited enforcement model
- joint estimation ： small firms' capital structures are driven not just by lack of collateral but also by profitability and tax concerns.
- The parameter estimates suggest that firms can collateralize around 60% of their assets in this sample.

4.3.3. Private firms



- Investment responds negatively to leverage, as documented in the leftmost panel.
- Leverage is largely unaffected by size, as the middle and rightmost graphs show.
- The policies estimated from a moral hazard model provide the closest approximation of the empirical benchmarks.

Parameter estimates: Private firms				
	TO	LE	MH	Weighted
α	0.569 (0.001)	0.605 (0.002)	0.630 (0.002)	0.692 (0.001)
f	5.012 (0.064)	5.287 (0.052)	5.176 (0.736)	4.676 (0.041)
ρ_z	0.796 (0.001)	0.745 (0.001)	0.745 (0.001)	0.867 (0.001)
σ_z	0.240 (0.002)	0.309 (0.001)	0.309 (0.005)	0.373 (0.002)
δ	0.089 (0.000)	0.058 (0.001)	0.058 (0.000)	0.083 (0.001)
ψ	0.174 (0.005)	0.202 (0.003)	0.203 (0.003)	0.198 (0.003)
η	0.486 (0.003)	0.423 (0.004)	0.391 (0.007)	0.527 (0.001)
ξ	0.449 (0.001)			0.413 (0.000)
θ		0.541 (0.014)		0.590 (0.004)
λ			0.130 (0.002)	0.143 (0.006)
Weight TO				0.329 (0.010)
Weight LE				0.100 (0.010)
Weight MH				0.571 (0.020)
Obj. fun.	7.140	7.587	5.129	4.060

- single benchmark estimation results ： moral hazard model
- joint estimation ： the joint estimation assigns a weight of close to 60% to firms constrained by moral hazard； concerns regarding profitability and tax benefits are still rather prevalent in Private firms
- Observed policies imply that insiders could divert 13 cents on a dollar profits unless given incentives to do otherwise by the optimal contract.

4.3.4. Full sample estimation

Parameter estimates: public firms				
	TO	LE	MH	Weighted
α	0.765	0.797	0.814	0.792
	(0.001)	(0.000)	(0.000)	(0.001)
f	0.666	0.823	0.849	0.786
	(0.047)	(0.030)	(0.008)	(0.027)
ρ_z	0.853	0.649	0.732	0.699
	(0.001)	(0.002)	(0.001)	(0.002)
σ_z	0.334	0.349	0.277	0.320
	(0.000)	(0.002)	(0.000)	(0.001)
δ	0.160	0.141	0.180	0.161
	(0.000)	(0.001)	(0.000)	(0.001)
ψ	0.135	0.195	0.165	0.170
	(0.004)	(0.002)	(0.000)	(0.005)
η	0.319	0.216	0.243	0.259
	(0.002)	(0.002)	(0.001)	(0.004)
ξ	0.577			0.578
	(0.000)			(0.006)
θ		0.706		0.711
		(0.007)		(0.011)
λ			0.028	0.028
			(0.000)	(0.010)
Weight TO				0.461
				(0.007)
Weight LE				0.397
				(0.006)
Weight MH				0.141
				(0.006)
Obj. fun.	2.879	3.779	18.388	1.980

- This results partially reflects an estimated recovery rate, ξ , of around 0.57, which, reassuringly, falls between the corresponding estimate in the cases of smaller and larger public firms.
- The trade-off model statistically provides the best representation of the dynamic behavior of a typical firm in Compustat.
- Collateral constraints play a relevant role in shaping the capital structures of Compustat firms.

4.4. Model selection: statistical tests

4.4.1. Nonnested model selection tests

	Comparison			
	TO vs LE	TO vs MH	LE vs MH	Best Fit
Large	TO***	TO***	LE***	TO
	(−3.42)	(−30.42)	(−99.67)	
Small	LE***	TO***	LE***	LE
	(3.05)	(−4.92)	(−4.16)	
Private	TO*	MH***	MH***	MH
	(−1.46)	(2.77)	(2.39)	
High leverage	TO***	TO***	LE*	TO
	(−42.94)	(−3.77)	(−1.54)	
Low leverage	LE*	MH*	LE*	LE
	(1.34)	(1.38)	(−1.62)	
High profitability	TO***	TO***	LE***	TO
	(−2.73)	(−9.35)	(−32.27)	
Low profitability	TO***	MH**	MH***	MH
	(−8.15)	(3.77)	(4.36)	
All public firms	TO***	TO***	LE***	TO
	(−2.19)	(−21.84)	(−121.95)	

- For all pairs of models and all subsamples, we reject the null hypothesis of asymptotically equivalent models at the 10% significance level.

- Large public firms： trade-off model
  Small public firms： limited enforcement model
  Private firms： moral hazard model

4.4.2. Nested model selection tests

	Null hypothesis		
	Weight TO = Weight LE	Weight TO = Weight MH	Weight LE = Weight MH
Large	520.5**	976.9**	327.5**
Small	11.5	137.7*	339.7**
Private	9976.6***	123.5*	467.3**
High leverage	180.0*	28.8	62.2*
Low leverage	1.9	0.0	1.8
High profitability	125.7**	3116.1**	1401.7**
Low profitability	201.0**	41.3	559.1**
All public firms	55.5*	1603.7**	1549.4**

- Although our point estimates indicate that the limited enforcement friction is more relevant than the trade-off friction (w_{TO}= 38.8%, w_{LE}= 44%), their difference is not statistically significant at the 10% level.

4.5. Counterfactuals

- Does identifying the most relevant sources of financing constraints matter for firm valuation?
- Fix the relevant estimated parameters for the best fitting model.

  Change only the financial frictions parameters, ξ , θ, and λ.

  Assess the resulting firm valuations by means of Tobin's Q.

Counterfactuals: Tobin's Q			
	Large firms	Small firms	Private firms
TO	1.88	2.35	2.03
LE	1.19	3.52	2.21
MH	1.02	1.00	3.91

- The valuations for the model that fits a sample best are highest, valuations obtained under models with poorer fit are substantially different.

- This observation corroborates the importance of identifying the most relevant financial frictions and sources of financing constraints for a given sample to provide reliable guidance for firm valuation.

- To infer the costs of financing constraints across models and samples.
- Comparing firm valuations from models in which financing is constrained by one of our candidate frictions, to counterfactual specifications in which external financing is (i) entirely unconstrained in that firms can costlessly access equity markets and is (ii) maximally constrained in that no external financing is available and all expenditures need to be financed using internal funds.

Counterfactuals: Tobin's Q			
	Large firms: TO	Small firms: LE	Private firms: MH
Autarky	0.84	1.07	1.04
Baseline	1.88	3.52	3.91
Unconstrained	2.70	4.40	4.76

29% 20% 18%

- Access to external financing, even subject to financial frictions in any of the forms considered, creates substantial value as Tobin's Q raises significantly.
- Financing constraints give rise to substantial costs in terms of valuations, with a fair amount of heterogeneity again.

5. Conclusion

- Our tests, based on empirical policy function benchmarks, favor trade-off models for larger Compustat firms, limited commitment models for smaller Compustat firms, and moral hazard models for Private firms.

- Regarding cash flow diversion, our results indicate that to rationalize observed corporate policies for Private firms, firm owners need to be able to divert about 13 cents on the dollar of profits.

- Firms can collateralize about 60% of their assets in limited commitment models.

- The observation corroborates the importance of identifying the most relevant sources of financing constraints for a given sample to provide reliable guidance for firm valuation.