

Competition in shareholders protection and portfolio diversification

Bruno M. Parigi

Loriana Pelizzon

University of Padova, Italy, and CESifo Germany

University of Venice, Italy

Ernst Ludwig Von Thadden

University of Mannheim, Germany

Prepared for seminar Université Paris Ouest La Défense Nanterre, December 11, 2009

Preliminary and incomplete

We thank Ludovic Cales for excellent research assistance

1 Motivation

1. Control benefits ↓ the amount of income that can be pledged to outsiders
 - control benefits = above mkt salaries, pet projects, transactions among affiliate companies at advantageous prices, etc.
 - limited pledgeability of income generates many pathologies
 - credit rationing (Williamson, Holmstrom-Tirole), loss of diversification (Holderness et al.)
 - demand for liquidity (Holmstrom-Tirole LAPM)
 - want to study impact of limited pledgeability of income on public risk-return profiles
 - presence of control benefits affects public risk-return trade-off? diversification opportunities? how?

2. Can competition for funds eliminate control benefits by inducing entrepreneurs seeking funds to adopt more shareholder friendly governance?
 - if the mkt penalizes share price of company for bad governance why not adopt measures that will make it more difficult to exploit minority shareholders?
 - can contracting ability of parties be sufficient to eliminate control benefits?

2 Model

- Pure exchange economy
- 2 assets $j = 1, 2$, sunk investments
- 2 entrepreneurs = investors, $i = 1, 2$
- No risk free asset
- Each investor i has a wealth W_i ($W_1 = 1$), which is 100% ownership of asset i
- Budget constraint of Mr i

$$\sum_{j=1}^2 x_{i,j} = 1 \quad (1)$$

- Ownership structure of asset j

$$\sum_{i=1}^2 \alpha_{i,j} = 1 \quad (2)$$

- Denote P_j the capitalization of asset j

$$\alpha_{i,j}P_j = x_{i,j}W_i \quad (3)$$

=> allows us to express the problem in terms of ownership structure

- Since initially entrepreneur i owns 100% of his asset $i \Rightarrow P_i = W_i \Rightarrow$ from (2), (3) we have

$$\alpha_{1,1} + \alpha_{1,2}P_2 = 1 \quad (4)$$

$$\alpha_{2,1} + \alpha_{2,2}P_2 = P_2 \quad (5)$$

- Cash flows; states of nature; probabilities

	State 1; prob.=p	State 2; prob.=1-p
Asset 1	H	0
Asset 2	0	H

- $p \neq 0, \neq 1, \neq 1/2$
- extreme assumption meant to capture diversification opportunities + simplify calculations
- $p \neq 1/2$ unique element of heterogeneity in this model; everything else is symmetric
- If I want to consume in both states of nature I need to buy a piece of the other asset =>
gives mkt power to the other entrepreneur

2.1 Limited pledgeability of income due to control benefits

- control benefits obtained only when cash flows are high
 - controlling shareholder (initial owner) can **commit** to divert fraction $0 \leq s_i \leq 1$ of cash flow of asset i regardless of one's ownership of asset
 - choosing s_i means to choose a level of expropriation (negative of protection) of minority shareholders
 - alternative modelling assumptions with no commitment
 - no control change
 - no asymmetric information
- Public return $H(1 - s_i)$

- Only fraction $0 \leq \lambda \leq 1$ of diverted part can benefit owner
 - rule of law; same for all firms/entrepreneurs in a country
 - makes it less convenient to expropriate minority shareholders
 - its modelling role is to put limit to control benefits

- Mean-variance preferences

2.2 Timing

- $t=1$; each entrepreneur i chooses and communicates his control benefits s_i unilaterally, taking into account the impact that this will have on the demand of his asset via the price that other is willing to pay
- $t=2$; each entrepreneur i chooses his portfolio unilaterally given the control benefits

2.3 Solving the problem from $t=2$

- Portfolio stage
 - Solve portfolio problem given control benefits s_1, s_2
 - find $\alpha_{2,2}^*(s_1, s_2), \alpha_{1,1}^*(s_1, s_2)$ via solution of a general equilibrium pure exchange economy
- Stage of control benefits
 - Cournot competition in control benefits - given the optimal portfolios, each entrepreneur chooses his control benefits to max his indirect utility function given the control benefits of the other entrepreneur

3 Portfolio stage

Utility functions

$$u_1 = \overbrace{\alpha_{1,1}pH(1-s_1) + pHs_1\lambda + \alpha_{1,2}(1-p)H(1-s_2)}^{\text{mean}} - \frac{\gamma}{2} \underbrace{p(1-p)H^2 \left\{ [\alpha_{1,1}(1-s_1) + s_1\lambda]^2 - 2[\alpha_{1,1}(1-s_1) + s_1\lambda]\alpha_{1,2}(1-s_2) + \alpha_{1,2}^2(1-s_2)^2 \right\}}_{\text{variance}}$$

$$u_2 = \alpha_{2,1}pH(1-s_1) + \alpha_{2,2}(1-p)H(1-s_2) + (1-p)Hs_2\lambda$$

$$- \frac{\gamma}{2} p(1-p)H^2 \left\{ \alpha_{2,1}^2(1-s_1)^2 - 2\alpha_{2,1}(1-s_1)[\alpha_{2,2}(1-s_2) + s_2\lambda] + [\alpha_{2,2}(1-s_2) + s_2\lambda]^2 \right\}$$

3.1 Looking for optimal α 's as a function of P_2

- From (4) $\alpha_{1,2} = \frac{1-\alpha_{1,1}}{P_2}$ replacing $\alpha_{1,2}$ in u_1 , we can re-write it in terms of $\alpha_{1,1}$

$$u_1 = \alpha_{1,1}pH(1-s_1) + pHs_1\lambda + \frac{1-\alpha_{1,1}}{P_2}(1-p)H(1-s_2)$$
$$-\frac{\gamma}{2}p(1-p)H^2 \left\{ \begin{array}{l} [\alpha_{1,1}(1-s_1) + s_1\lambda]^2 - 2[\alpha_{1,1}(1-s_1) + s_1\lambda] \frac{1-\alpha_{1,1}}{P_2}(1-s_2) \\ + \left(\frac{1-\alpha_{1,1}}{P_2}\right)^2 (1-s_2)^2 \end{array} \right\}$$

- Derivating u_1 w.r.t $\alpha_{1,1}$ the F.O.C. leads to the following optimal share

$$\begin{aligned} & \alpha_{1,1}^* \left(s_1, s_2, P_2, \underbrace{\lambda, p, H, \gamma}_{\text{parameters}} \right) = & (6) \\ = & \frac{\gamma p(p-1)H[-1 + s_2 + P_2(s_1 - 1)](s_1\lambda P_2 - 1 + s_2) + P_2[pP_2(s_1 - 1) + (p-1)(s_2 - 1)]}{\gamma p(p-1)H[P_2(s_1 - 1) - 1 + s_2]^2} \end{aligned}$$

- In the same way, by replacing $\alpha_{2,1} = P_2(1 - \alpha_{2,2})$ (5) in u_2 and by derivating it w.r.t $\alpha_{2,2}$, the F.O.C. leads to the following optimal share:

$$\begin{aligned} & \alpha_{2,2}^*(s_1, s_2, P_2, \lambda, p, H, \gamma) = & (7) \\ = & \frac{\gamma p(p-1)H[s_2 - 1 + P_2(s_1 - 1)][P_2(s_1 - 1) + s_2\lambda] + (1-p)(s_2 - 1) + pP_2(1 - s_1)}{\gamma p(p-1)H[(s_2 - 1 + P_2(s_1 - 1))^2]} \end{aligned}$$

- Looking for price P_2 that clears assets mkt

- from (4), (5) (2) =>

$$\alpha_{1,1} + P_2(1 - \alpha_{2,2}) = 1 \quad (8)$$

- Solving (8) using the optimals α 's in (6) and (7), we have equilibrium price as a function of control benefits

$$P_2 \left(s_1, s_2, \underbrace{\lambda, p, H, \gamma}_{\text{parameters}} \right) = -\frac{(p-1)(s_2-1)[\gamma p H (s_1 - s_2)(\lambda - 1) + 2]}{p(s_1-1)[\gamma H (s_1 - s_2)(p-1)(\lambda - 1) + 2]} \quad (9)$$

- Finding the optimal ownership structure: replace P_2 in (6) and (7)

$$\begin{aligned}
& \alpha_{1,1}^* \left(s_1, s_2, \underbrace{\lambda, p, H, \gamma}_{\text{parameters}} \right) = & (10) \\
& = \frac{\gamma p(1-p)H(s_1 - s_2)(\lambda - 1)[(\lambda - 1)(s_1 + s_2) + 2] + 2(\lambda - 1)(1-p)(s_1 + s_2) + 4(s_1 - p)}{4(s_1 - 1)}
\end{aligned}$$

$$\begin{aligned}
& \alpha_{2,2}^* (s_1, s_2, \lambda, p, H, \gamma) = & (11) \\
& = \frac{\gamma p(p-1)(\lambda-1)(s_1 - s_2)H[(\lambda-1)(s_1 + s_2) + 2] + 2p(s_1 + s_2)(\lambda-1) + 4(p-1 + s_2)}{4(s_2 - 1)}
\end{aligned}$$

4 Control benefits stage

- We know optimal $\alpha_{1,1}^*$ and $\alpha_{2,2}^*$ in terms of s_1 and s_2 , and parameters
- Insert $\alpha_{1,1}^*$ and $\alpha_{2,2}^*$ from (10) and (11) in u_i
- Each entrepreneur i

$$\max_{s_i \geq 0} u_i(s_i, \bar{s}_j), \quad i \neq j$$

- Yields the optimal $s_1^*(\gamma, p, H, \lambda, s_2)$; $s_2^*(\gamma, p, H, \lambda, s_1)$
- Best response functions

$$s_1^* = \frac{\gamma(1-p)H(2 + s_2(1-\lambda)) - 4}{3\gamma(1-p)H(1-\lambda)} \quad (12)$$

$$s_2^* = \frac{\gamma p H(2 + s_1(1-\lambda)) - 4}{3\gamma p H(1-\lambda)} \quad (13)$$

$$\frac{ds_1^*}{ds_2} > 0; \frac{ds_2^*}{ds_1} > 0 \quad (14)$$

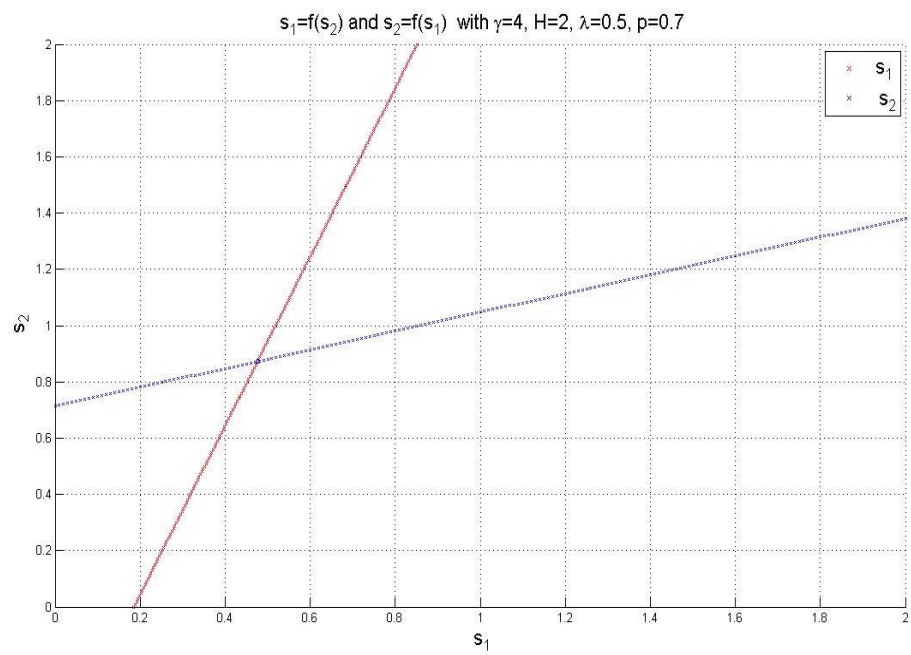


Figure 1:

strategic complementarities of control benefits

Solving

$$s_1^* = \frac{2\gamma p(1-p)H - (2p-1) - 2}{2\gamma p(1-p)H(1-\lambda)} \quad (15)$$

$$s_2^* = \frac{2\gamma p(1-p)H + (2p-1) - 2}{2\gamma p(1-p)H(1-\lambda)} \quad (16)$$

We restrict $s_1^*, s_2^* \geq 0 \Leftrightarrow 2\gamma p(1-p)H - (2p-1) - 2 \geq 0$

- Remark: competition for funds may fail to eliminate control benefits

- Intuition:
 - return complementarity of the two assets give mkt power to each controlling shareholder

 - you will invest in my company even if my minority shareholder protection is lousy
because I offer you valuable **diversification opportunities**

 - even if I can commit not consume control benefits it may be not in my best interest to
consume zero benefits

5 Empirical strategy

5.1 What the model tells us

Public cash flows, state of nature, probabilities

State 1; prob.= p State 2; prob.= $1 - p$

Asset 1	$H(1 - s_1^*)$	0
Asset 2	0	$H(1 - s_2^*)$

1. Levels

- $p < 1/2 \Rightarrow s_1^* > s_2^*$ and $\beta_1 < \beta_2$
- Companies with low β have a bad governance (high s_i^*).
- If you offer a security whose return differs from the other you can extract more control benefits; mkt power effect

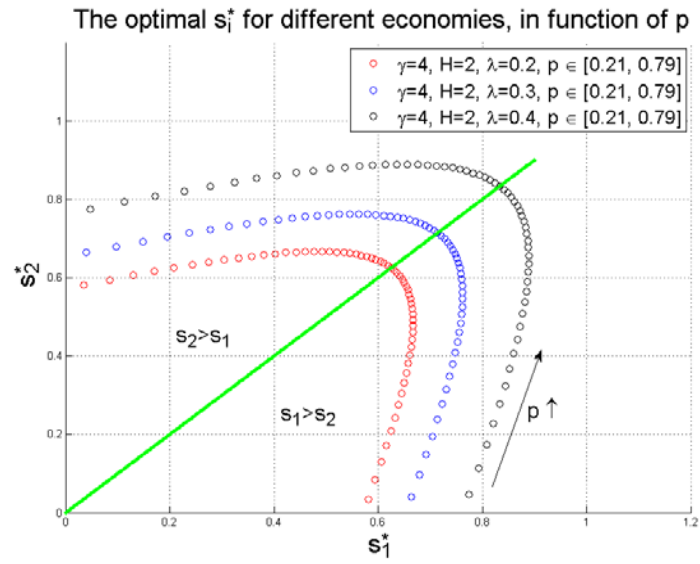


Figure 2:

Mapping of equilibrium points

2. variable changes

- you obtain control benefits only in the successful state of nature; the higher the control benefits the more the 2 assets return similar cash flows in a given state => assets are more "similar" to the mkt => their returns are better explained by the mkt return in the CAPM regression

$$r_i - r_f = x_i + \beta_i(r_m - r_f) + \epsilon_i$$

=> $\epsilon_i \downarrow \Rightarrow \sigma_{\epsilon_i}^2 \downarrow$ = i.e. idiosyncratic volatility \downarrow

- higher control benefits have different impact on good/bad governance companies

good: \uparrow eq. control benefits $\Leftrightarrow \uparrow \beta$

bad: \uparrow eq. control benefits $\Leftrightarrow \downarrow \uparrow \beta$

5.2 Data description

- The empirical counterparty of equilibrium control benefits s_i^* is Gompers, Ishii, and Metrick (QJE 2003) index (GIM Index)
- Measure of anti-takeover provisions; measure of governance
 - 24 provisions: staggered board, poison pill, supermajority voting requirement, limits to amend bylaws, limits to amend charters, golden parachute, etc.
 - From 1 to 19. Re-scaled: 0,1,2,3,4,5
 - 0 = best governance, 5 = worse
 - Available for 4,017 U.S. companies; for 1990, 1993, 1995, 1998, 2000, 2002, 2004 and 2006. We linearly interpolate for missing years

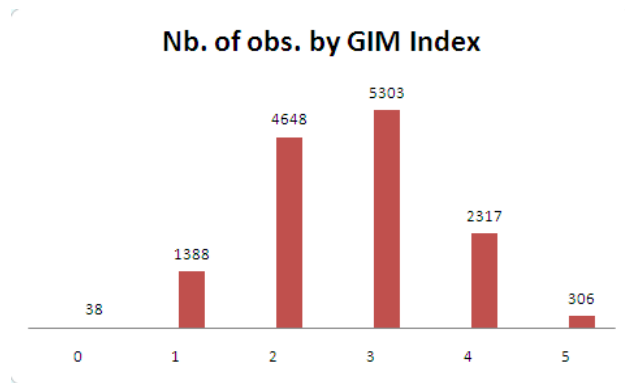


Figure 3:

companies by governance measure

5.3 Beta and Idiosyncratic Volatility

- Using CAPM for each stock i and each year, we regress stock's daily returns. Stocks data from Center for Research in Stock Prices (CRSP) and S&P Compustat

$$r_i - r_f = \alpha_i + \beta_i (r_m - r_f) + \epsilon_i$$

where

- r_i daily total returns of stock i in USD
- r_m daily returns of value weighted index of stocks in our dataset
- r_f 3-month T-Bills

We obtain

- β_i yearly beta of asset i
- $VR_i = \frac{\sigma_{e,i}^2}{\sigma_{Mkt}^2}$ yearly normalized idiosyncratic volatility of asset i = intrinsic risk of asset i ,
used as proxy for information flow, i.e.transparency
 - $\sigma_{e,i}^2$ volatility of the residuals in CAPM regression
 - σ_{Mkt}^2 market volatility
- x_i yearly excess return of asset i

Table 1: Beta and idiosyncratic volatility

Averages, with standard deviation in parenthesis			
	Obs	Beta	\sqrt{VR}
All companies	24940	0,994 (0,570)	2,685 (2.213)
g=0,1,2 Good governance	10673	1,034 (0,588)	2,910 (2.332)
g=3,4,5 Bad governance	14267	0,964 (0,555)	2,516 (2.105)
g=0	64	1,024 (0,561)	2,575 (1.384)
g=1	2485	1,003 (0,641)	3,020 (2.456)
g=2	8124	1,044 (0,570)	2,879 (2.298)
g=3	9497	0,975 (0,542)	2,586 (2.041)
g=4	4240	0,953 (0,594)	2,373 (2.209)
g=5	530	0,856 (0,448)	2,414 (2.301)
two-means t-test		9,520	13,736
Companies with better governance have higher beta than companies with poor governance and a higher idiosyncratic volatility than companies with poor governance			

5.4 Literature

- Jin and Myers, JFE 2006
 - Lack of transparency drives R^2 of stock returns higher in a cross-country study
 - * Stocks are affected by one market factor (observable to everyone) and 2 idiosyncratic factors, only one of which is observable also to outsiders
 - * The fact that the other factor is observable only to insiders (lack of transparency) allows them to steal from the cash flows when they are high
 - This implies that less idiosyncratic risk is impounded in the stock price and thus that the stock has higher comovement with the market

- Ferreira and Laux, JF 2007
 - Using GIM index Generalize Jin and Myers, JFE 2006 at U.S. company level
 - Worsening in governance drives a decrease in transparency; i.e. a lower idiosyncratic volatility

- Informational interpretation of idiosyncratic volatility
 - high levels of idiosyncratic volatility
 - * more efficient capital allocation (Durnev, Morck, and Yeung 2004)
 - * stock prices more informative about future earnings (Durnev et al. 2003)
 - low levels of idiosyncratic volatility
 - * in emerging markets w.r.t developed markets (Morck, Yeung, and Yu 2000)
 - * poor country-level governance and opaque accounting (Jin and Myers JFE 2006)

Ordered probit.						
Dependent variable: entrenchment index GIM; $g = 0, 1, 2, 3, 4, 5$						
Ferreira-Laux proxy for opacity (comovement): $-e^\psi = -\frac{1-R^2}{R^2} = -\frac{VR}{\beta^2}$						
$\sqrt{VR} = \sqrt{\frac{\sigma_{ic}^2}{\sigma_m^2}}$ = idiosyncratic volatility = negative of opacity						
Good Gov = 0,1,2; $\beta > \beta_{AVG} = 1$; Bad Gov. = 2,3,4; $\beta < \beta_{AVG} = 1$						
	Good	Bad	All	Good	Bad	All
	Ferreira-Laux			Our results		
$-\psi = -\ln \frac{VR}{\beta^2}$ opacity	+	+	+			
$-\sqrt{VR}$ opacity				+	+	+
β				+	-	-
Market value		+		+	+	
Price/Book Value						
Dividend yield		-	+		-	+
N. Observations	10670	14264	24934	10670	14264	24934
Pseudo R ²	0.005	0.0019	0.0022	0.0037	0.003	0.0041
Further controls: sectorial dummies, year dummies.						
Only statistically significant coefficients are reported.						

- 10 sectorial dummies: oil&gas, basic materials, non-cyclical, cyclical, health care, financial services, technology, telecom, utilities

Table 2: Ordered Probit

Factors	Estimates (t-stat)			Us		
	Good	F.&L. Bad	All	Good	Bad	All
$-\psi$	0.047 (5.64)	0.026 (3.38)	0.049 (10.40)			
β				0.068 (2.96)	-0.058 (-1.66)	-0.071 (-3.20)
$-\sqrt{VR}$				0.013 (2.44)	0.024 (2.74)	0.040 (7.60)
lnmv	-0.009 (-1.11)	0.016 (2.54)	0.006 (1.39)	-0.010 (-1.25)	0.015 (2.33)	0.004 (1.07)
ptbv	0.000 (1.25)	0.000 (0.25)	0.000 (0.67)	0.000 (1.21)	0.000 (0.20)	0.000 (0.47)
dy	0.406 (0.97)	-0.562 (-1.99)	0.046 (2.09)	0.348 (0.85)	-0.615 (-2.04)	0.039 (2.09)
eps	0.004 (1.15)	0.000 (0.12)	0.002 (1.19)	0.004 (1.10)	0.000 (0.06)	0.001 (1.01)
Nb. Obs.	10670	14264	24934	10670	14264	24934
Pseudo- R^2	0.005	0.002	0.002	0.004	0.003	0.004

5.5 Comments on our results

- we find general effect that \uparrow control benefits is associated with \uparrow comovement (as in literature)
 - \downarrow idiosyncratic volatility (\uparrow opacity)
 - $\uparrow \beta$
- we also find that for companies with bad governance there is a mitigating effect going in the opposite direction:
 - lower beta is associated with a higher control benefits
 - * interpretation: mkt power effect; if you have a security that offers valuable diversification opportunities you can afford to extract more control benefits
 - * visible for companies with bad governance because they have a low beta to start with

- How did we reach this conclusion?
- We disentangled Ferreira and Laux measure of idiosyncratic volatility $\psi = \ln\left(\frac{VR}{\beta^2}\right)$

$$VR = \frac{\sigma_{i\epsilon}^2}{\sigma_m^2} = \text{volatility ratio}$$

- VR ; remains our measure of idiosyncratic volatility, provides the same results as literature
- β ; provides a new effect: market power for bad governance companies

6 Conclusions

- Competition in protection of minority shareholders generally fails to eliminate expropriation, even if not all expropriated cash flow can be enjoyed
- Mkt power effect from offering diversification opportunities
- Limited amount of cash flow that can be paid to outsiders affects public risk-return profiles
- ...and it is also affected by the mkt power bestowed to companies with low comovement with the mkt
- Extensions
 - richer model to avoid pitfall of $p = 1/2$
 - ownership structure data
 - address endogeneity issues

$$\Rightarrow [2\gamma p(1-p)H - (2p-1) - 2] > 0$$

\Rightarrow

$$\frac{ds_1^*}{d\lambda} = \frac{2\gamma p(1-p)H - (2p-1) - 2}{2\gamma p(1-p)H(1-\lambda)^2} > 0$$

If protection of minority shareholder worsens equilibrium control benefits \uparrow

$$\beta_1 = \frac{2[1 - \gamma p(1-p)H\lambda]}{2p-1} = -\beta_2$$