



Intercorporate Guarantees, Leverage and Taxes

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Motivation

- Holding companies routinely support Subsidiaries through *guarantees*
 - Bodie & Merton,92; Khanna et al,00; Deloof et al, 06
- Which is the effect of guarantees on the joint value of H+S?
 - Gains to S offset by costs for H, or value increase?
 - Because of diversification?
- Do guarantees affect optimal debt?
- Should firms both receive and provide support?
- If not, which type of firm should provide support?

Set Up

- We add the choice of guarantees to Leland 2007
 - Endogenous debt with costly bankruptcy and taxation
 - Diversification potential but no non-financial synergies
 - symmetric information
- We focus on *conditional* guarantees: H rescues S only if both survive, because of corporate limited liability
 - Emery et al., 05; Dewaelheyns et al. 06; Gopalan et al. 07; Hadden 86
- Two benchmarks:
 - stand alone case SA => no guarantee
 - merger case M => unconditional guarantee

Main Results

Conditional guarantees, relative to the stand alone case:

- increase the joint value of H+S
 - Value \approx tax savings - default costs
 - Guarantee is an option to save on default costs that enhances tax savings
 - Works even with equal cash flows that are perfectly correlated, thanks to different debt levels
- increase the joint level of debt, under a sufficient condition
 - S debt rises, because of reduced bankruptcy costs
 - H debt falls, in order to enhance the provision of support

Literature

- Compares Mergers to Stand Alone Companies:
 - Lewellen (1971): a Merger reduces default costs thanks to coinsurance, increasing debt, tax gains and value
 - We show that conditional guarantees don't need imperfect correlation to generate value
 - Leland (2007): if cash flows can be negative, M reduces value when loss of limited liability exceeds tax gains generated by coinsurance
 - Conditional guarantees allow to preserve limited liability
- Emphasizes corporate limited liability in Groups
 - Cestone et al (2005) and Bianco et al (2006) study how limited liability affects effort and risk shifting
 - No taxes and no endogenous debt, that are crucial here
- Prices guarantees like a put option, taking debt as exogenous (Merton (1977))
 - We endogenize debt

Model

- Entrepreneur owns two activities
 - $i=1,2$ if no guarantee; $i=H,S$ if conditional guarantee
- With future cash flows X_i , distributed with F_i
- Chooses the face value of zero-coupon debt, $P_i \geq 0$,
- So as to max the no-arbitrage value of the firm
 - given tax rate $\tau_i > 0$
 - default when after-tax cash flow at T is lower than P;
proportional bankruptcy costs $\alpha_i X_i$, with $0 < \alpha_i < 1$

$$\sum_i V_{0i} = \sum_i D_{0i} + E_{0i} = \sum_i V_{0i} + TS_i - DC_i$$

Tax Bankruptcy Trade Off

- $TS_i = \text{tax savings} = \tau_i \varphi[EX_i^+ - E(X_i - X_i^Z)^+]$
 – where $X_i^Z = \text{tax shield} = P_i - D_{0i}$
- $DC_i = \alpha_i \varphi[EX_i 1_{\{0 < X_i < X_i^d\}}]$
 – where $X_i^d = \text{default threshold} = P_i + \frac{\tau_i}{1 - \tau_i} D_{0i}$
- $DC_s = \alpha_s \varphi[EX_s 1_{\{0 < X_s < X_s^d; X_H < h(X_s)\}}]$
 – where $X_h > h(X_s)$ if excess cash flow is H exceeds S cash needs

What is affected by Guarantees

- The market value of debt, D , depends on guarantees for any given principal.
 - Hence both the tax shield and default threshold differ across guarantees, affecting both Tax Savings and Default Costs.
- Default costs also vary because they are directly affected by the provision of support.

Results on Unilateral conditional guarantees

- *Th 1: conditional guarantees are value increasing*
 - Expected savings in default costs are positive because $P_s^* > 0$.

$$\Gamma(P_H, P_S) \triangleq DC_2(P_S) - DC_S(P_H, P_S) = \alpha \phi \mathbb{E} \left[X_S \mathbf{1}_{\{0 < X_S < X_S^d, X_H > h(X_S)\}} \right]$$

Results on Unilateral conditional guarantees

- *Th 2: i) $P_H^* = 0$; ii) $P_S^* > P_1^* + P_2^*$ if and only if the ratio of default costs to the tax rate is bounded above by a constant Q*
- i) expected savings in total default costs fall in P_H because H is more likely to default and is less likely to support S
- ii) tax savings increase in Subsidiary's debt.
 - But increasing P_S may reduce H ability to support S, thus increasing default costs.
 - The Q condition ensures that marginal tax gains exceed marginal default costs at $P_S = P_1^* + P_2^*$.
 - Concave objective required.

Unilateral or Mutual Guarantees?

- *Th 3: There exists a proportional default cost α^* below which unilateral guarantees are the only optimal guarantees.*
- Why not two options to save on default costs?
 - With mutual guarantees each firm should both increase its debt - since it receives support - and decrease it - in its quality of guarantor.
 - This tension is not profitable, resulting in lower total debt and tax savings, if default costs are moderate.

Which Firm Provides Support?

- *Theorem 5: If $X_1 = X_2$ in distribution, then 1 supports 2 if - other things being equal - $\alpha_1 > \alpha_2$ and/or $\tau_1 < \tau_2$;*
 - the guarantor is the firm that levers up less even as stand alone, because of higher default costs or lower tax rates

Holding-Subsidiary and Mergers

- *Theorem 4: Value HS > Value M if either*
 1. *cash flows are equal in distribution and perfectly correlated, or*
 2. *cash flow correlation is high and either volatilities differ or volatility is high*
 1. In M each activity is unable to rescue the other because of equal debt. In HS lower debt in H preserves rescue.
 2. By Th.1 HS have higher value than SA. But Leland (07) shows that SA dominate M under condition 2.

Stylized facts on HS, debt and taxes

- **HS are pervasive:** business groups, multinationals, private equity, SPV, LBOs...
- **Groups** have *larger debt* than Stand Alone counterparts
 - Masulis et al. 2008; Bae et al., 2002; Chang, 2003; Dewaelheyns et al., 07; de Jong et al., 2009
- **Thin Capitalization Rules** in most countries
- H.M.Revenue & Customs:

“Thin capitalisation can arise where funding is provided to a company by a third party, but with guarantees to the lender by another group company (typically the overseas Parent). The effect of funding with Parentally- guaranteed debt is, potentially, excessive interest deductions.”

Numerical Results

- Leland Base case (BBB calibrated, $\rho=0.2$)
- Identical, and Gaussian, cash flow distributions

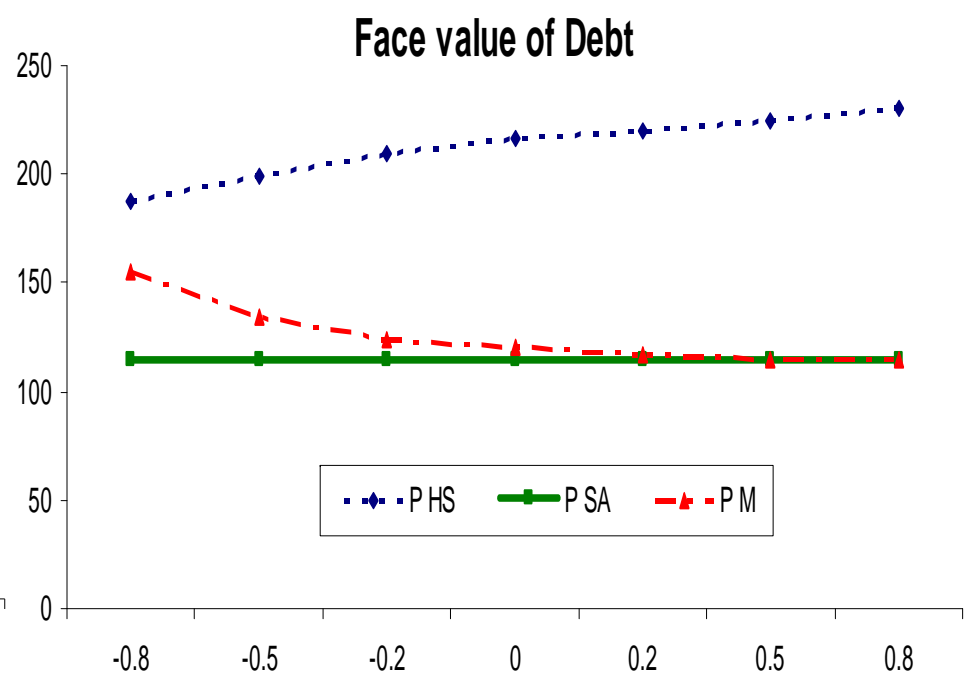
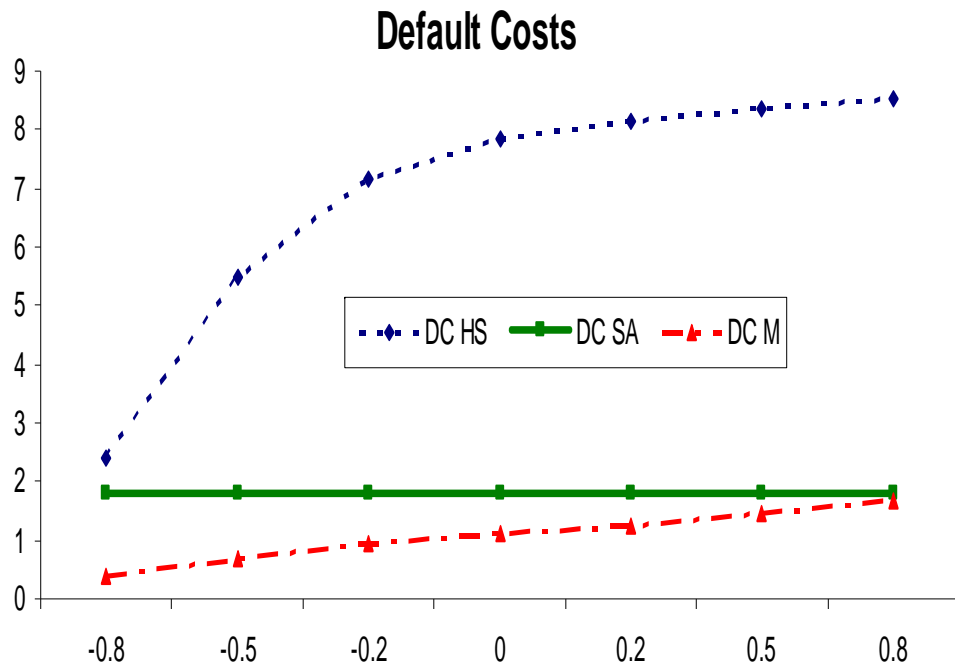
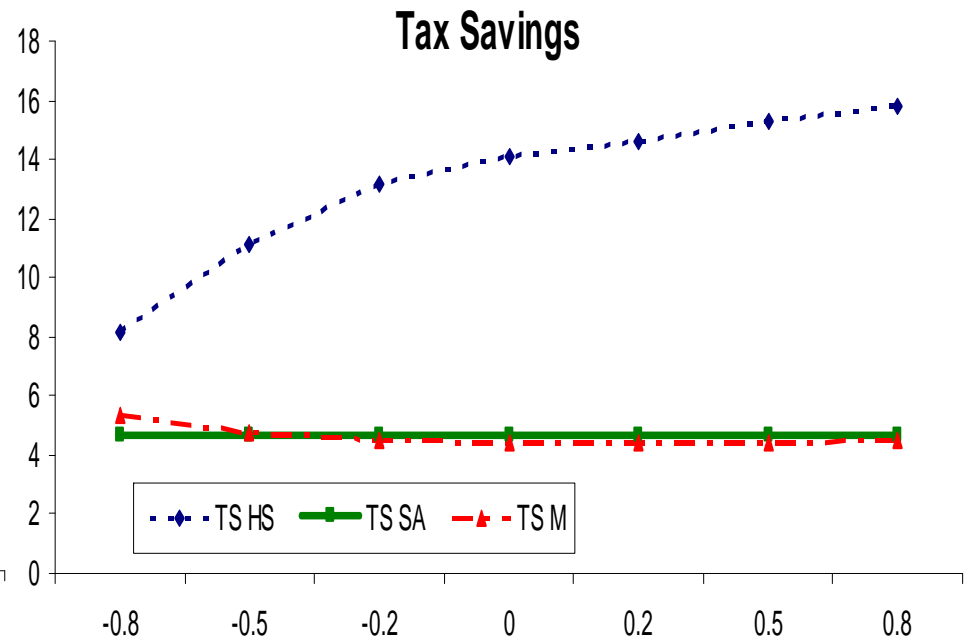
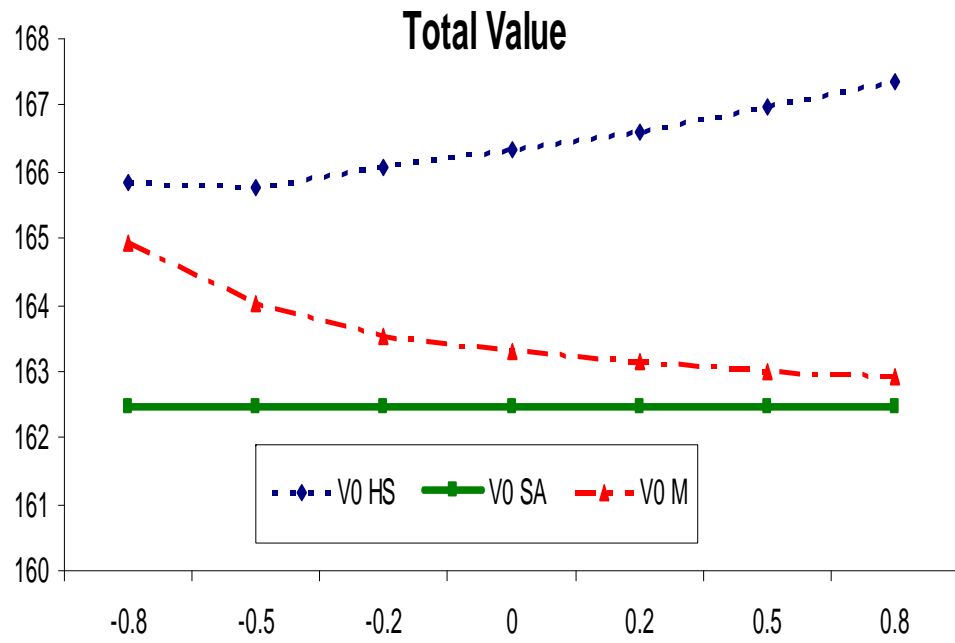
Table 1: Base Case Parameters

Variables	Symbols	Values
Annual Riskfree Rate	r	5.00%
Time Period/Debt Maturity (yrs)	T	5.00
T-period Riskfree Rate	$r_T = (1 + r)^T - 1$	27.63%
Capitalization Factor	$Z = (1 + r_T)/r_T$	4.62
<i>Unlevered Firm Variables</i>		
Expected Future Operational Cash Flow at T	Mu	127.63
Expected Operational Cash Flow Value (PV)	$X_0 = Mu/(1 + r)^T$	100.00
Cash Flow Volatility at T	Std	49.19
Annualized operating Cash Flow Volatility	$\sigma = Std/T^{0.5}$	22.00
Tax Rate	τ	20%
Value of Unlevered Firm w/Limited Liability	V_0	80.05
Value of Limited Liability	L_0	0.057

Table 1: Optimal Capital Structure and Value

	Symbols	Values				
		Stand Alone	Holding	Subsidiary	1/2 HS	1/2 Conglom
Face Value of Debt	P^*	57.10	0	220	110	58.5
Default Threshold	X^{d*}	67.65	0	249.27	-	69.64
Tax Shield	X^{Z*}	14.89	0	102.93	-	13.94
Leverage Ratio (%)	D_0^*/V_0^*	51.81	0	99.9	70.26	54.62
Annual Yield Spread of Debt (%)	y	1.23	//	8.45	-	0.6
Levered Firm Value	$V_0^* = D_0^* + E_0^*$	81.47	49.46	117.13	83.29	81.57
Tax Savings of Leverage	TS_0^*	2.32	0	14.62	7.31	2.18
Expected Default Costs	DC_0^*	0.89	0	8.13	4.07	0.61

The Table reports the optimal values of the different arrangements under the base case assumptions. The "Stand Alone" column refers to a non guaranteed unit. The "holding" and "subsidiary" columns refer respectively to the figures of a guarantor and a beneficiary unit of a conditional guarantee. The columns "1/2 HS" and "1/2 Congl" report respectively the figures of an HS and of a Merger divided by 2 to be comparable with the Stand Alone column.



Conclusion

- This paper models for the first time the provision of inter-corporate guarantees.
- It offers a rationale for the diffusion of Holding-Subsidiary structures without relying on previous insights relating to internal capital markets and expropriation of minority shareholders.
- It explains their observed reliance on debt and their high tax gains, which is of concern to tax authorities.
- Future work
 - Generalization
 - Welfare: do guarantees induce too large bankruptcy costs?