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 ≈ 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
    - 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 \( P_i \); proportional bankruptcy costs \( \alpha_i X_i \), with \( 0 < \alpha_i < 1 \)
  \[
  \sum_i \nu_{0i} = \sum_i D_{0i} + E_{0i} = \sum_i V_{0i} + T S_i - D C_i
  \]
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 $P_s^* > 0$.

\[
\Gamma(P_H, P_S) \triangleq DC_2(P_S) - DC_S(P_H, P_S) = \alpha \phi \mathbb{E} \left[ X_S 1 \{ 0 < X_S < X^d_S, X_H > h(X_S) \} \right]
\]
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 $\alpha^*$ 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>
<thead>
<tr>
<th>Variables</th>
<th>Symbols</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Riskfree Rate</td>
<td>$r$</td>
<td>5.00%</td>
</tr>
<tr>
<td>Time Period/Debt Maturity (yrs)</td>
<td>$T$</td>
<td>5.00%</td>
</tr>
<tr>
<td>T-period Riskfree Rate</td>
<td>$r_T = (1 + r)^T - 1$</td>
<td>27.63%</td>
</tr>
<tr>
<td>Capitalization Factor</td>
<td>$Z = (1 + r_T)/r_T$</td>
<td>4.62</td>
</tr>
<tr>
<td><strong>Unlevered Firm Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected Future Operational Cash Flow at T</td>
<td>$Mu$</td>
<td>127.63</td>
</tr>
<tr>
<td>Expected Operational Cash Flow Value (PV)</td>
<td>$X_0 = Mu/(1 + r)^T$</td>
<td>100.00</td>
</tr>
<tr>
<td>Cash Flow Volatility at T</td>
<td>$Std$</td>
<td>49.19</td>
</tr>
<tr>
<td>Annualized operating Cash Flow Volatility</td>
<td>$\sigma = Std/T^{0.5}$</td>
<td>22.00</td>
</tr>
<tr>
<td>Tax Rate</td>
<td>$\tau$</td>
<td>20%</td>
</tr>
<tr>
<td>Value of Unlevered Firm w/Limited Liability</td>
<td>$V_0$</td>
<td>80.05</td>
</tr>
<tr>
<td>Value of Limited Liability</td>
<td>$L_0$</td>
<td>0.057</td>
</tr>
<tr>
<td>Symbols</td>
<td>Stand Alone</td>
<td>Holding</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>Face Value of Debt</td>
<td>$P^*$</td>
<td>57.10</td>
</tr>
<tr>
<td>Default Threshold</td>
<td>$X^{d*}$</td>
<td>67.65</td>
</tr>
<tr>
<td>Tax Shield</td>
<td>$X^{Z*}$</td>
<td>14.89</td>
</tr>
<tr>
<td>Leverage Ratio (%)</td>
<td>$D^{<em>}_0/\nu^{</em>}_0$</td>
<td>51.81</td>
</tr>
<tr>
<td>Annual Yield Spread of Debt (%)</td>
<td>$y$</td>
<td>1.23</td>
</tr>
<tr>
<td>Levered Firm Value</td>
<td>$\nu^{<em>}_0 = D^{</em>}_0 + E^{*}_0$</td>
<td>81.47</td>
</tr>
<tr>
<td>Tax Savings of Leverage</td>
<td>$TS^{*}_0$</td>
<td>2.32</td>
</tr>
<tr>
<td>Expected Default Costs</td>
<td>$DC^{*}_0$</td>
<td>0.89</td>
</tr>
</tbody>
</table>

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 Conglom" 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?