Levered Returns

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Goal

▶ Explain the lack of positive empirical relationship between E(R) and measures of leverage.

    1. Firms issue debt in order to invest.

    2. Investment lowers risk of the firm by exercising growth options.

▶ Unconditional relationship difficult to detect.
    ↪ Need to control for Growth options.

▶ Equation (8) of simplified model:

$$\beta_t^i = 1 + \underbrace{\frac{V_{it}^G}{V_{it}}(\nu_0 - 1)}_{\text{Growth Options}} + \underbrace{\frac{V_{it}^D}{V_{it}}(\nu_1 - 1)}_{\text{Default}} + \underbrace{(1-t)\frac{c/r}{V_{it}}}_{\text{Leverage effect}}$$

General Comments

- ▶ On the surface the model appears to have limitations:

  1. Firms cannot issue equity. Relaxing this:
     - ▶ Issuing debt still lowers growth options.
     - ▶ High $D/(D+E)$ will imply few GO, but not vice versa.
     - ▶ Anyway, empirically large firms have more leverage.

  2. Firms cannot save.
     - ▶ Firms have no reason to pay dividends. Better off saving.
     - ▶ Weakens relationship between leverage and GO.
     - ▶ But, could add agency friction.

- ▶ George and Hwang 2007, Penman, Richardson and Tuna 2006

  ↪ Controlling for B/M, High Leverage → low E(R).

  ↪ B/M noisy measure of GO.

Is Leverage behind the Value Premium?

- ▶ Model can replicate size and book to market effects of FF 1992. In model BM, can be positively correlated with leverage:
  - ▶ Growth options $\uparrow \leftrightarrow$ BM $\downarrow$, Leverage $\downarrow$.
  - ▶ $Z_{it} \uparrow \rightarrow$ BM $\downarrow$, Leverage $\updownarrow$.
  - ▶ Mechanism: Size proxy for growth options, BM for leverage.
- ▶ Rajan and Zingales 1995: Empirically, Leverage rises in BM.
- ▶ What about expected returns on assets?
  - ▶ Consider two firms, 1 and 2 with same market value.
  - ▶ Firm 1 has higher K $\rightarrow$ GO $\downarrow$ $\rightarrow$ less risk $\rightarrow$ lower E(R)
- ▶ E(R) on assets fall in BM, controlling for market value.
- ▶ E(R) on equity: Unless D/K and K move 1-1, controlling for ME and Leverage, BM should have the wrong sign.
- ▶ Can add countercyclical price of risk.

Model Implications (1)

- Model implies that *firms* with high leverage will be less risky.

- Sort firms into portfolios based on leverage.

- Look at covariance of cashflow growth with consumption growth.

- Cashflows=Interest+Dividends+Repurchases

	1	2	3	4	5	6	7	8	9	10	10m1
	Portfolios sorted on Market Leverage										
σ	**15%**	**12%**	**13%**	**11%**	**10%**	**11%**	**11%**	**11%**	**11%**	**10%**	
C-beta	**2.08**	**2.20**	**2.39**	**2.09**	**2.18**	**2.06**	**2.09**	**1.39**	**1.51**	**1.08**	-1.00
t-stat	2.19	3.13	2.88	2.97	3.52	2.88	2.90	1.84	2.08	1.47	-0.89
RSQ	9%	16%	14%	15%	20%	14%	15%	6%	8%	4%	2%
	Portfolios sorted on Book Leverage										
σ	**15%**	**12%**	**11%**	**11%**	**11%**	**10.0%**	**12%**	**11%**	**11%**	**11%**	
C-beta	**2.44**	**1.87**	**1.64**	**2.16**	**2.01**	**2.07**	**1.96**	**1.88**	**1.61**	**1.55**	-0.89
t-stat	2.61	2.34	2.27	3.11	3.05	3.53	2.64	2.74	2.23	2.17	-0.90
RSQ	12%	10%	9%	16%	16%	20%	12%	13%	9%	9%	2%

Model Implications (2)

- Expected returns function of GO, prob(Default) and Leverage.

- Controlling for GO, leverage should enter with a positive sign.

- Need good proxy for remaining GO. Candidates:
    - Average I/K over last 5 years
    - Book assets
    - Market Cap
    - Book to Market

- Can use prob(default) measure of Vassalou and Xing.

Fama-Mcbeth Regressions: 1970-2005

E_tR_{t+1}	$DEFPROB_t$	$\overline{I/K}_t$	$\ln A_t$	$\ln ME_t$	$\ln BM_t$	$\ln BKLEV_t$	$\ln MKTLEV_t$
		-1.12^{**}				-0.05	
		-0.91^{**}					0.10^{*}
	2.73^{***}	-1.13^{**}					
	3.00^{***}	-1.23^{**}				-0.14^{***}	
	2.76^{***}	-1.10^{**}					0.02
			-0.07^{*}			-0.05	
			-0.06^{*}		0.38^{***}	-0.08	
	2.38^{**}		-0.05				
	2.67^{***}		-0.04			-0.13	
				-0.10^{**}			0.04
				-0.07^{*}	0.35^{***}		-0.06^{*}
	2.22^{**}			-0.07^{*}			
	2.28^{**}			-0.07^{*}			-0.01

► All these measures may fail to control for remaining GO.

Suggestions

1. Exploit the Corporate Tax Reform Act of 1986

   ▸ Changed the relative advantages of debt and equity.

   ▸ For most firms debt better, but depends on tax attributes.

      ▸ Givoly, Hayn, Ofeg and Sarig (1992)

   ▸ Tax change $\rightarrow$ D $\uparrow$ $\rightarrow$ I $\uparrow$ $\rightarrow$ GO $\downarrow$.

   ▸ Can keep track of the same firm: control other unobservables.

   ▸ Look at expected returns before and after the change.

2. Use changes in interest rates or credit spreads.

   $\hookrightarrow$ exogenous to firm, may change D/B but also price of risk.