The Risk Anomaly and Corporate Finance

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1

Two Facts You Already Know

- **The equity premium puzzle:** The salient "beta" risk *across asset classes* is compensated, to a greater extent than simple models of expected utility would predict
- **The risk anomaly:** The more subtle "beta" risk *within asset classes* appears to be relatively neglected

3

Misspecification or Mispricing

- One strand of asset pricing aims to resurrect market efficiency, linking only that which does predict returns to **subtler notions of risk**
- The other strand accepts these as evidence of market mispricing, linked to a combination of **institutional and individual behavior and the limits to arbitrage**
  - Behavioral finance replaces rational and frictionless asset pricing
- Both seem defensible, but this talk is going to take the second point of view as a starting point

4

The Idea

- Suppose investors neglect risk, overvaluing high risk stocks and undervaluing low risk stocks
- At **low** levels of leverage and asset risk, increasing debt lowers the cost of capital by lowering the risk-adjusted cost of equity
- At **high** levels of leverage and asset risk, increasing debt shifts risk from equity where it is overvalued to debt where it is not
- Absent tax benefits or costs of financial distress, this leads to an interior optimal leverage ratio
  - Consistent with a range of facts: Corporate leverage, private equity, venture capital, bank capital regulation

6

Plan

- **Assumption 1:** Is there a risk anomaly?
- **Assumption 2:** Is there an integrated risk anomaly?
- The risk anomaly and capital structure
- Two anecdotes
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7

The Risk Anomaly

8

The Risk Anomaly

- A possible market inefficiency, namely that low beta stocks do not earn commensurately lower returns
- A long tradition in tests of the CAPM
  - Black (1972), Black, Jensen, and Scholes (1972), Haugen and Heins (1975), and Fama and French (1992) find flat relationship between beta and return

$$r_e = \gamma(\beta_e - 1) + r_f + \beta_e r_p$$

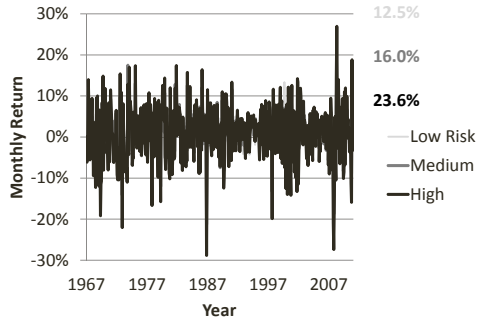
Where $\gamma < 0$ measures the flatness of the security market line and $\gamma < -r_p$ indicates that the risk-return relationship is inverted

The Risk Anomaly

9

The Risk Anomaly

- Buy and hold value-weighted returns for CRSP, sorted into three FF-sized groups by trailing beta



The Risk Anomaly

10

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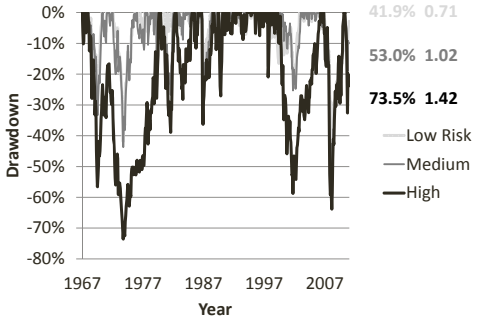

The Risk Anomaly

11

The Risk Anomaly

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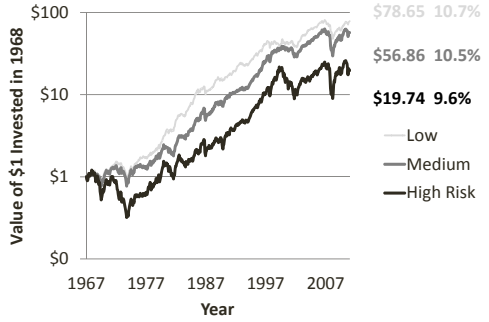

The Risk Anomaly

12

The Risk Anomaly

- Maybe this is the **wrong measure of risk**
  - It is true that the CAPM is built on imperfect assumptions
  - But, beta sorts deliver lower risk, by almost any measure
  - And, the risk anomaly holds within industries, so high beta stocks would have to be hedges without relying on different asset risk
- Maybe this is **a fluke of the historical data**
  - It is true that this anomaly is less robust than value versus growth
  - But, it works in international, developed markets back to 1989
  - And, much of this post-dates the first empirical tests in the 1970s
- **Reminder:** Could be misspecification of risk or mispricing, but this talk is going to take the pricing to be real and anomalous

The Risk Anomaly

13

Drivers of the Anomaly

- **Individual demand** for securities
  - Risk seeking: Lottery preferences
  - Risk seeking: Representativeness
  - Risk seeking: Overconfidence and short sales constraints
  - Risk neglect: Categorization
- Limits to **institutional arbitrage**
  - Risk seeking: Mutual fund flows and incentives
  - Risk neglect: Benchmarking

The Risk Anomaly

14

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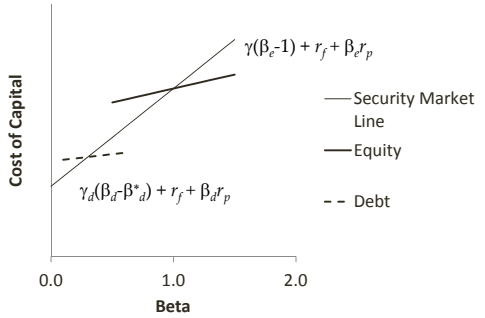
16

Is There an Integrated Risk Anomaly?

17

Is There an Integrated Risk Anomaly?

- Modigliani and Miller does not depend on a rational tradeoff between risk and return, but rather market integration

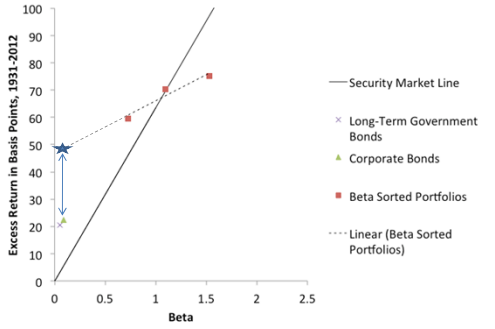


Segmented Markets

18

Is There an Integrated Risk Anomaly?

- Examining this in our sample of all CRSP stocks from July 1971 through December 2011



Segmented Markets

19

A Test of Segmented Markets

- A somewhat more formal test of whether corporate bond alphas are consistent with the risk anomaly in stocks

	Bottom 30%		*Top - Bottom 30%*		*Corporate – Bottom 30%*		*Extrapolated Corporate – Bottom 30%*	
Basis Points	**Coef**	**[t]**	**Coef**	**[t]**	**Coef**	**[t]**	**Coef**	**[prob]**
CAPM Regressions, January 1931-December 2012								
Market	0.71	[63.79]	0.80	[50.64]	-0.63	[-39.63]		
Intercept	13.6	[2.24]	-35.1	[-4.09]	3.8	[0.45]	27.5	
Difference							-23.6	[p =0.036]
R-Squared								0.8899

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The Risk Anomaly and Capital Structure

The Risk Anomaly and Capital Structure

- Two key assumptions for this to matter for corporate finance

1. There is a **risk anomaly**

$$r_e = \gamma(\beta_e - 1) + r_f + \beta_e r_p$$

2. Debt and equity are **segmented markets**

$$r_d = r_f + \beta_d r_p$$

or $r_d = \gamma_d(\beta_d - \beta^*_d) + r_f + \beta_d r_p$ with $\gamma_d < \gamma$

The Risk Anomaly and Capital Structure

- Optimal capital structure minimizes the cost of capital

$$WACC = Er_e + (1\text{-}E)r_d$$
$$= r_f + \beta_a r_p + \gamma\beta_a r_p - \gamma[E + (1\text{-}E)\beta_d(\beta_a, E)]$$

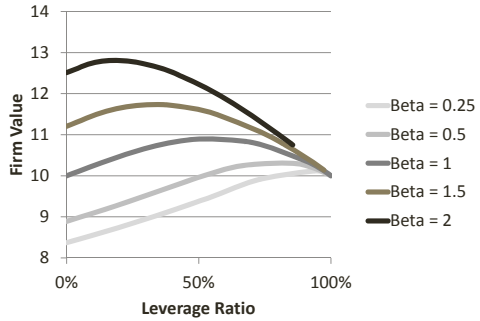
$$FOC: \quad 0 = -\gamma[1 - \beta_d(\beta_a, E) + (1\text{-}E)\beta'_d(\beta_a, E)]$$

- **Result 1:** Existence, not extent of the risk anomaly matters
  - Somewhat of a technicality, because there are no other frictions
- **Result 2:** Firms will issue as much risk-free debt as they can
- **Result 3:** $dE/d\beta_a > 0$ Optimal level of capital is rising in β_a
  - Because of the risk anomaly in equities, optimal to locate risk there… inefficient risk allocation dominates at high leverage
  - Optimal policy looks a bit like targeting a credit rating

Animation

The Risk Anomaly and Capital Structure

- To put numbers on the axes, we need to specify a functional form for $\beta_d(\beta_a, E)$… like Merton model of debt



Two Case Studies

Speaks to Some Limits of the Tradeoff Theory

- **A high leverage puzzle:** Some firms have high debt despite no tax benefits

Debt = $2.7B, Cash = $175M
Tangible Assets = $3.4B
Marginal Tax Rate < 5%

- **A low leverage puzzle:** Many firms have zero debt and carry excess cash despite paying substantial taxes

Debt = $0, Cash = $1B
Market Equity = $24B
Marginal Tax Rate = 35%

High Leverage Without Taxes

- At **low levels of underlying asset risk**… think about a leasing company like Textainer
  - At 100% equity with no debt, the equity will be **undervalued**
- Replacing an initial 10% of equity with debt does two things:
  - 10% of the capital (debt plus equity) goes from being undervalued to being fairly valued

AND

  - The remaining 90% of the capital becomes riskier, and so it moves from being more undervalued to being less undervalued because of the risk anomaly

Low Leverage Despite Taxes

- At **high levels of underlying asset risk**… think about technology company like Linear
  - At 100% equity with no debt, the equity will be **overvalued**
- Replacing an initial 10% of equity with debt does two things:
  - 10% of the capital (debt plus equity) goes from being overvalued to being fairly valued

AND

  - The remaining 90% of the capital becomes a little bit riskier, but not as much as for a firm with low asset risk because the debt shares in the risk of the firm at much lower levels of leverage

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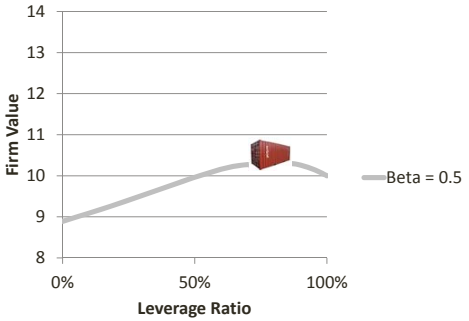
Applications

Corporate Leverage

- May help explain **highly levered firms with low or small tax benefits** that nonetheless view equity as expensive

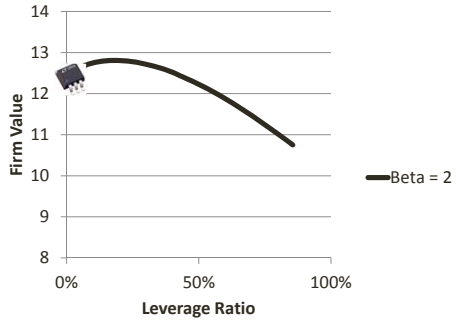


Two Case Studies

33

The Low Leverage Puzzle

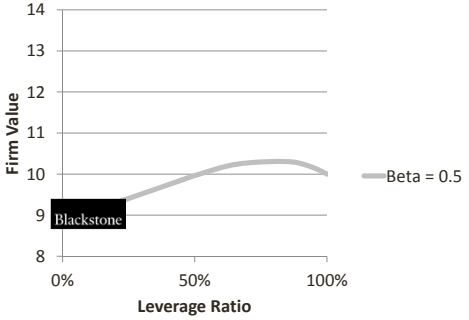
- May help explain the **low leverage puzzle**… high asset beta firms have no incentives to issue debt despite tax benefits



34

Private Equity

- May help explain a **tailwind for LBOs** that target undervalued, low risk firms

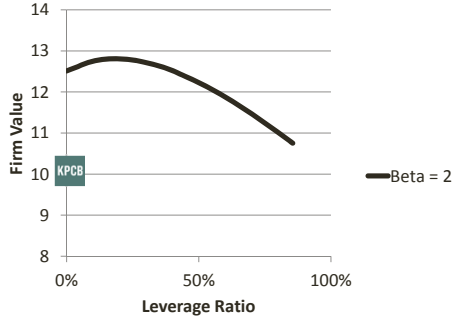


Two Case Studies

35

Venture Capital

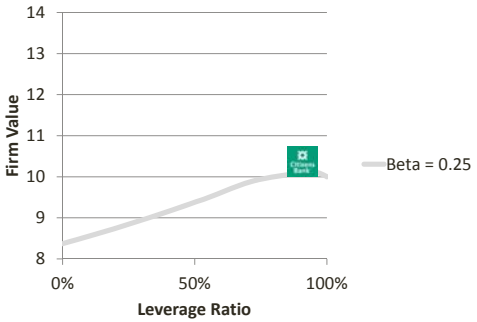
- May be a **tailwind for venture capital investments** that locate startups at, or above, fundamental value



36

Bank Capital Regulation

- May help explain banks' resistance to **substantially increased capital requirements** and limits on payout



37

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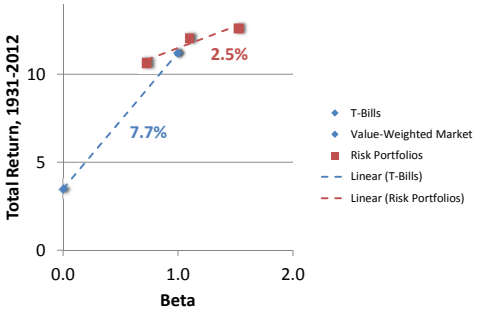
38

The Risk Anomaly Tradeoff of Leverage

- Two facts that you already knew… the "equity premium puzzle" and the failure of the CAPM



39

The Risk Anomaly Tradeoff of Leverage

- Two facts that you already knew… the "equity premium puzzle" and the failure of the CAPM
- This could be misspecification of risk or mispricing
- If the pricing is both real and anomalous, there is a "risk anomaly tradeoff" of leverage
  - A simple model that can explain a number of patterns in corporate capital structure… and other patterns, in structured finance, bank leverage, private equity, venture capital
  - And one that is easy to square with what CFOs, bankers, private equity investors *say* about the benefits of leverage

40