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On Estimating the Cost of Capital for Private Companies

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Abstract

Estimation of the Cost of Capital (COC) is vital to understanding investments. To date, accepted methods of assessing the COC are either complex or arbitrary, leaving financial analysts without a consistent technique for conducting intrinsic valuations, which are necessary to decide if business investments are warranted. This project is intended to address concerns surrounding current methodologies available for estimating COC; specifically, we have identified a gap within the context of the valuation of privately held firms, and we begin to explore the development of a relatively simple new method, which would be available for use to establish a cost basis for private capital investment.

Introduction

Currently, there are four core methods used to estimate the COC: Capital Asset Pricing Model, Fama-French Three-Factor Model, Implied Cost of Capital, and Arbitrage Pricing Theory. However, each of these methods requires data from public markets, and require various information sets and are thus cumbersome to use. Private companies cannot take advantage of pricing in public markets, as their stocks are not traded in secondary markets. We investigate a new alternative for estimating the COC, which could then be used in practice among thousands of private companies worldwide, improving the way many asset pricing analyses and investment decisions are conducted.

Theoretical Background

Several financial theories were considered in developing the proposed model, which addresses connections between risk measures and financial data outcomes.*

- *Size differentiation in expected risk and returns performance*
- *Return on capital as proxy for WACC*
- *DuPont analysis of return on equity*
- *Volatility as a proxy for risk*
- *Implied Cost of Capital as a justification for associating financial data with returns*
- *Relationships among capital risk, leverage, and cost of equity*

Risk and return in finance must hold at all levels of arms-length investment. While public companies may rely upon market assessments of value for their estimates of capital cost, private companies lacking in empirical market evidence for their invested capital values would need alternative information to estimate levels of risk in investments. We apply theories as outlined here to direct our data analysis.

**See References*

Methodology

- *Methodological framework*: Collapse DuPont analysis with Modigliani & Miller I & II, CAPM, and FF3 models to form the basis of the proposed structure – a COC model specifically designed for privately held firms.
- *Analysis*: Regress volatility on measures of profitability, leverage, and turnover, to see what associations exist. Given the existence of associations, further research could be undertaken establishing a pathway for private firms to indirectly imply costs of capital, thereby allowing for intrinsic valuation of private investment. Ordinary Least Squares and Fixed Effects multiple regressions were conducted. In all, 25 models were checked, looking for associations between volatility and various financial data. (N = 19,127)
- *Data*: Securities and associated financial data were collected from Wharton Research Data Services (WRDS – Compustat North America from 2010-2015, post recessionary environment). Following theory established from Fama & French (1993), bins were established on firms on the basis of size, measured in annual revenues.

Bin Sizes for Companies Based upon Revenues	
BIN 1	$0-$25 million
BIN 2	$25-$100 million
BIN 3	$100-$1 billion
BIN 4	$1-$5 billion
BIN 5	> $5 billion

OLS FE regression was conducted with volatility as the left-hand-side variable, while various performance measures were checked for associations at the .01 (*), .05 (**), and .10 (***) levels.

Results

- ROE was not significant in any model.
- ROA was significant in more than 20 models, as was profit margin, and total asset turnover.
- Leverage was not significant in any model.
- Fixed effects models showed only ROA as significant for the entire group. (N = 19,127)

REGRESSION - DUPONT (PTL) AND VOLATILITY						
	ALL	BIN1	BIN2	BIN3	BIN4	BIN5
ROA	-2.0379***	-0.6640***	3.6163	-0.1587	-0.5467	-20.0596***
	-22.4	-4.16	1.88	-0.07	-0.17	-6.81
	0	0	0.061	0.948	0.864	0
NI/S	-0.0084***	0.001	-0.2428	-3.7489***	-7.1719***	-7.7237***
	-6.7	0.47	-0.57	-4.31	-5	-5.88
	0	0.639	0.572	0	0	0
S/A	2.9108***	10.8129***	8.3547***	8.9708***	4.7617***	2.5435***
	9.23	8.28	9.4	12.39	9.92	12.14
	0	0	0	0	0	0
A/E	0.0007	0.0475	0.103	-0.0484	0.0064	0.0016
	0.11	0.73	1.9	-0.85	1.43	0.47
	0.909	0.467	0.058	0.393	0.152	0.638
Constant	58.7498***	106.5104***	84.2421***	60.3329***	51.7225***	40.5634***
	139.72	61.54	54.35	65.48	88.97	141.17
	0	0	0	0	0	0
R-square	0.0344	0.0468	0.0447	0.0564	0.033	0.0505
N	19127	2133	2026	2862	4116	7990

Project Significance

This research demonstrates with considerable power (N = 19,127) that an association exists between volatility and ROA (p = .01), providing evidence to support prior work done by Modigliani & Miller (proposition I, 1958) suggesting valuation is independent of leverage. Also, we found no association between ROE and volatility, providing further support.

Current analysis provides evidence suggesting profit margin and asset turnover are also associated with volatility, lending support for the DuPont Identity for analysis within a valuation context. While further data analysis and modeling are necessary to continue to advance this research, affirmative results for combining CAPM, FF3, M&M, and DuPont are encouraging.

The goal remains to develop a model allowing private firms to readily compute costs of capital using a simple algorithm that uses their private financial information.

References

- Size Differentiation in Expected Risk and Returns – Fama & French (1993)
- Return on Capital as Proxy for WACC – Frank & Shen (2016) and Jacobs (2005)
- DuPont Analysis of Return on Equity – Bode, Kane, & Marcus (2014)
- Volatility as a Proxy for Risk – Black & Scholes (1973) and Sharpe (1963)
- Implied Cost of Capital as a Justification for Associating Financial Data with Returns – Hou, van Dijk, & Zhang (2012)
- Relationships Among Capital Risk, Leverage, and Cost of Equity – Modigliani & Miller (1958)