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Approaches to calculating project hurdle rates

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Traditionally, firms have used certain thumb rules to estimate hurdle rates that are easy to measure but often inaccurate, leading to overinvestment/ underinvestment problems.

Gradually firms have started using more theoretically correct models. These models are supposed to provide accurate measurements of hurdle rates, presuming input data quality is very good. However, the lack of readily available quality data and deficiency in sound understanding of finance that these models required, proved to be a hindrance for these models gaining wide acceptance.

Lately, with improved systems for data capture and computation, the quality and quantity of input data set for these models has significantly improved. This coupled with the maturing of knowledge curve across global organisations has made the correct application of these models easier. Clearly, the trend is to move away from simpler traditional models to more accurate models.

This study does a comparative analysis of the models that help predict project hurdle rates better.

Hurdle rate is the minimum acceptable return on a project that a firm requires, given its risk profile and opportunity cost of other investments

At a broad level, there are 3 approaches adopted by firms to measure hurdle rates.

	Hurdle Rate Formulae*
Thumb Rules	Firm WACC + 3%-5% Premium
	5 Year Stock Index average returns (SENSEX in India)
	Lending Rate received from bank by Firm
Firm WACC Build Up	Firm WACC + Project Default Premium + Project Risk Premium - Project Strategic Importance Discount - Project Size Discount + Project Tenure Premium + Expected Inflation Premium
Project WACC	Project WACC

*Refer to Appendix 3 for description

While Conventional Thumb rules are easy to measure, the Firm WACC Build Up and Project WACC score higher in accuracy and scientific nature

Approach	Accuracy	Ease of Measurement	Use	Scientific Nature
Conventional Thumb rules				
Firm WACC Build Up methodologies				
Project WACC methodologies				

Below is a more detailed analysis of Firm WACC Build Up and Project WACC approaches

Approach	Inclusion of Strategic Value & Attractiveness of Project	Reflects Firm's Needs	Measuring Project Riskiness	Objectivity of Output	Capturing project risk profile and providing a good estimate of return	Ease of Measurement of respective WACC & Beta	Ease of Measurement of other parameters*
Firm WACC Build Up							
Project WACC							

Legend	**Poor**	**Average**	**Good**

*Refer to Appendix 3, Appendix 4 for parameters

Firm and Project WACC measurement components

Components of WACC	Options*	Accuracy	Ease of Measurement
Cost of Debt	1) Debt publicly traded: k_d = Yield to Maturity on outstanding debt		
	2) Debt not traded: k_d = Based on Firm's credit rating, actual or synthetic		
	3) In case of Projects, k_d = annual interest rate paid on debt		
Cost of Equity	1) CAPM: $k_e = R_f + \beta_{Firm/Project}*(R_m - R_f)$		
	2) Fama French: $k_e = R_f + \beta_{Firm/Project}*(R_m - R_f) + B_1*$(small cap return premium)$+ B_2*$(Book-to-market value premium)		
	3) Pastor Stambaugh: $k_e = R_f + \beta_{Firm/Project}*(R_m - R_f) + B_1*$(small cap return premium)$+ B_2*$(Book-to-market value premium) + B_3*(Liquidity Premium)		
	4) Burmeister, Roll & Ross: $k_e = R_f + B_1*$(confidence risk premium)$+ B_2*$(tenure risk premium) $+ B_3*$(inflation risk premium) + B_4*(business cycle risk premium) $+ B_5*$(market timing risk premium)		
	5) Cost of Equity Build Up: k_e = Bond Yield + Equity Risk premium		
Cost of Preferred Stock	1) For Projects preferred stock is not applicable	NA	NA
	2) K_{ps} = dividend on preferred stock/price per share of preferred stock		

Legend	Poor	Average	Good

*Refer to Appendix 4 for description of parameters

Key statistics from a Global CFO Survey of 127 companies on hurdle rates*

What does your hurdle rate represent?	%
Project WACC or Firm WACC Build Up	60.0
Thumb Rules	24.6
Cost of Equity	15.4

If you calculate the hurdle rate for a division/business segment, do you	Always %
use the company-wide hurdle rate	53.9
use the hurdle rate of firms that are in the same industry as the division in question (proxy firms)	13.8
adjust the industry hurdle rate of proxy firms for tax rate, cost of debt, capital structure, etc. differences between your firm and proxy firms	8.3

How important are the following risk factors in determining the hurdle rate?	Very Imp %
Market risk of a project, defined as the sensitivity of the project returns to economic conditions	30.5
Project risk that is unique to the firm and unrelated to the state of the economy	28.7

*CFO Survey, Iwan Meier and Vefa Tarhan, 2006

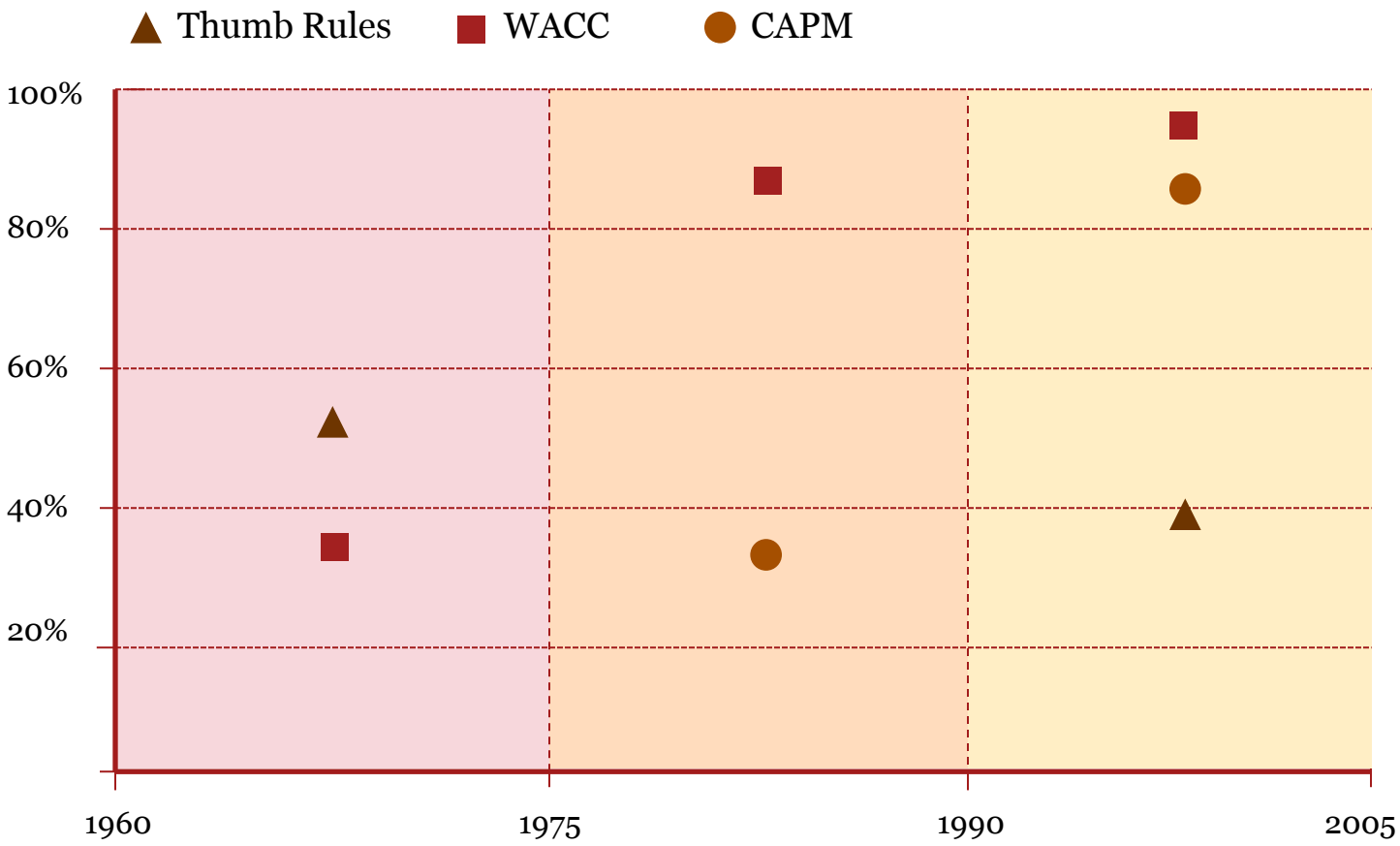
Key statistics from a Global CFO Survey of 127 companies on hurdle rates*

How important are the following factors while determining your hurdle rate?	Very Imp %
Whether it is a short-lived or long-lived project	10.8
Whether it is a strategic or non-strategic project	26.5
Whether it is a revenue expansion or a cost reduction project	14.9
Whether it is a replacement project or a new investment	16.0
Whether it is a domestic project or a foreign project	10.5
Whether the project in question requires significantly more funds than the typical project your firm takes	30.0

If you were to change your hurdle rates, how important would the following factors be?	Very Imp %
Interest rate changes	38.8
Cyclical changes in the economy	8.6
Cyclical changes in the industry	22.2
Changes in political uncertainty	5.9
Changes in the expected risk premium	33.1
Changes in the corporate tax rates	11.7

*CFO Survey, Iwan Meier and Vefa Tarhan, 2006

Findings on the percentage of firms that employed the following methods for calculating hurdle rate, across periods



*Hurdle Rate Premium, Iwan Meier and Vefa Tarhan, 2006

Appendix I
Firm WACC measurement

The Firm WACC formula:

$$WACC = w_d * k_d *(1-t) + w_{ps}* k_{ps} + w_e*k_e$$

where,

w_d, w_{ps}, w_e are the weights for debt, preferred stock and equity in the capital structure of the firm

k_d, k_{ps}, k_e are the cost of debt, preferred stock and equity respectively for the firm

t is the marginal tax rate of the firm

Methods of calculation of k_d, k_{ps}, k_e have been described in page 4.

Appendix II
Project WACC measurement

The Project WACC formula:

$$WACC = w_d * k_d *(1-t) + w_e*k_e$$

where,

w_d, w_e are weights for debt and equity in the capital structure of the investment on the project

k_d, k_e are the cost of debt and equity respectively

t is the marginal tax rate of the firm

Methods of calculation of k_d, k_e have been described in page 4.

One needs to be careful when calculating k_e for Project WACC – the beta should be $\beta_{Project}$ reflecting Project's risks and this is usually different from β_{Firm} that reflects Firm's risks.

Preferred stock is not a component of Project WACC.

Appendix III
Definitions

Parameter	Description	Measurement
Project Default Premium	This is a premium to compensate for the uncertainty in the cash flows of a project.	The IRRs of the project with certain cash flows and with probability weighted cash flows are computed and the difference is the value of this premium .
Project Risk Premium	This premium compensates for the risk aversion of the firm towards a risky project with uncertain cash flows.	This is a function of the standard deviation of NPVs of the project in all scenarios. Value assigned by the firm on the basis of the standard deviation.
Project Strategic Importance Discount	This is a discount reducing the hurdle rate, to capture the strategic importance of the project to the firm.	Value is subjectively assigned by the firm after assessing strategic importance.

Appendix III
Definitions

Parameter	Description	Measurement
Project Size Discount	If a project is very large in size, it generates high NPV even at moderate returns and hence the hurdle rate may be decreased.	Value is subjectively assigned by the firm.
Project Tenure Premium	For projects of long tenure the cash remains vested for a long duration, and hence a premium compensates for this.	Value is subjectively assigned by the firm.
Expected Inflation Premium	Increase in inflation would decrease the value of future cash flows and returns; hence a premium to compensate for it.	Expected increase in inflation over the tenure of the project.

Appendix IV
Definitions

Parameter	Description	Measurement
Yield to Maturity	Measures the cost of debt.	IRR of the cash flows associated with the debt.
R_f	Risk free rate.	RBI Bonds Yield.
R_m	Return on market portfolio.	Average returns over a period on a composite index such as SENSEX.
β_{Firm}	A measure of the volatility, or systematic risk, of a security of a firm in comparison to the market as a whole. It is the tendency of a security's returns to respond to swings in the market.	To estimate β_{Firm} , a set of historical returns on the firm equity and returns on the index or market portfolio, is regressed ; these returns can be daily, weekly or any period. The slope of the fitted line from the linear least-squares calculation is the estimated Beta.
$\beta_{Project}$	A measure of the volatility, or systematic risk, of the cash flows of a project in comparison to the market as a whole.	Project beta can be measured by calculating the beta of a company whose core operations are similar to the project and then adjusting for leverage and public or private nature.

Appendix IV
Definitions

Parameter	Description	Measurement
Small cap return premium	Small cap stocks are required to provide higher returns than large cap stocks because they have less demand and hence the premium.	Average return on 3 small-cap portfolios minus average return on 3 large-cap portfolios.
Book-to-market value premium	The lack of demand of securities of a firm results in it having high book-to-market value and hence the premium .	Average return on 2 high book-to-market portfolios minus the average return on 2 low book-to-market portfolios.
Liquidity Premium	This premium compensates for the lack of liquidity of a security.	Difference between average returns on a liquid and an illiquid security, which otherwise possess similar characteristics.
B_1, B_2,B_3,B_4,B_5	Coefficients of the respective factors. These denote the relation of cost of equity with each of the factors.	Regression analysis with historical set of data on the respective factors and return on equity.
Bond Yield	Measures the cost of debt.	IRR of the cash flows associated with the debt.

Appendix IV
Definitions

Parameter	Description	Measurement
Confidence risk premium	This premium compensates for the risk aversion and lack of confidence of the firm towards a risky project with uncertain cash flows.	Value is subjectively assigned by the firm. Coefficient changes accordingly.
Tenure risk premium	For projects of long tenure the cash remains vested for a long duration, and hence a premium compensates for this.	Value is subjectively assigned by the firm. Coefficient changes accordingly.
Inflation risk premium	Increase in inflation would decrease the value of future cash flows and returns; hence a premium to compensate for it	Expected increase in inflation over the tenure of the project.
Business cycle risk premium	The cyclic nature of the sector of the project leads to significant uncertainty in cash flows. This premium compensates for it.	Value is subjectively assigned by the firm. Coefficient changes accordingly.
Market timing risk premium	This premium compensates for the fall in security prices & increasing costs in case of a downturn.	Estimate the range of values of the cost of securities through scenario analysis and select a premium.

Thank You

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